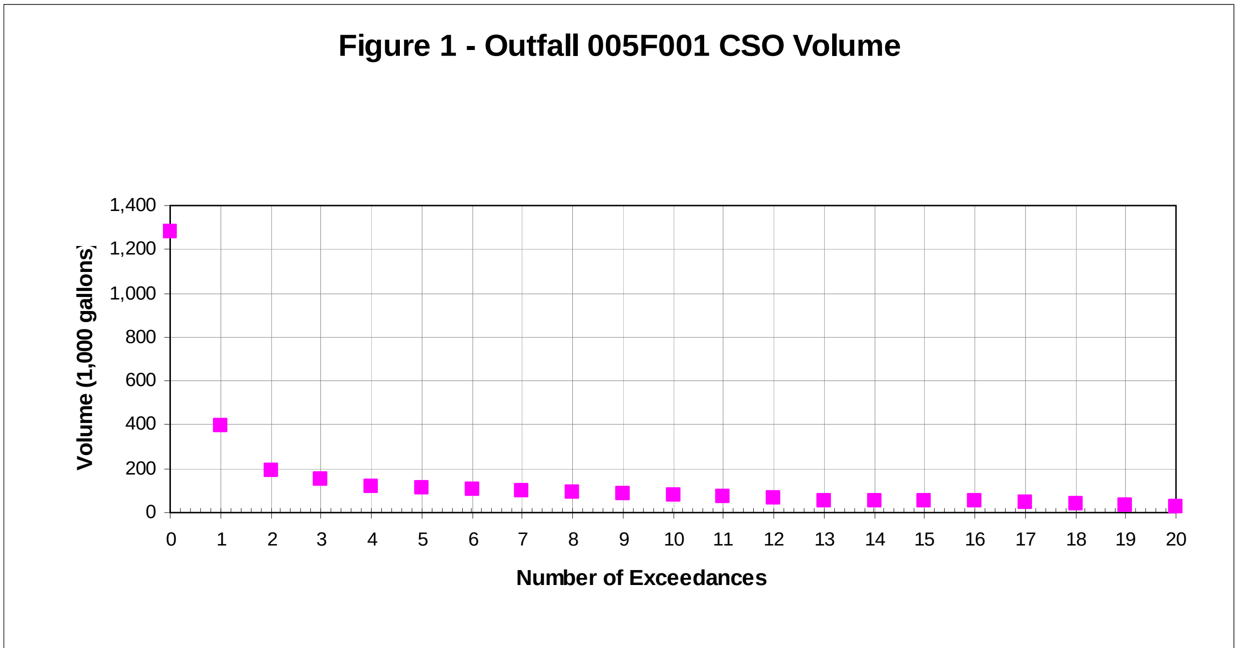
D.28.3 ACSO 005F001 – OLYMPIA, SHALER AND WOODRUFF SEWERSHED – NPDES# 005F001

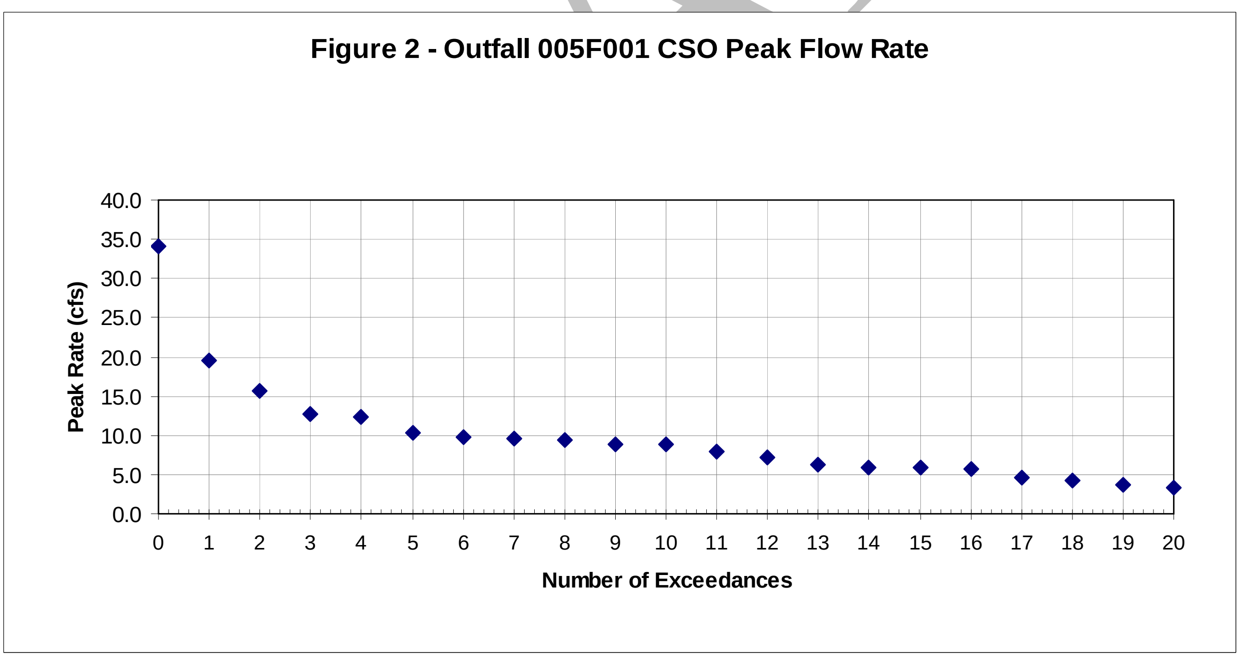
Description of Outfall

Outfall 005F001 conveys overflows from the ALCOSAN diversion chamber 005F001 to Saw Mill Run. The outfall is located along Saw Mill Run adjacent to the PennDOT maintenance facility near the outbound exit from the Fort Pitt Tunnels in the City of Pittsburgh. The service area is called the Olympia, Shaler and Woodruff Sewershed, and is 422 acres of residential, commercial, and business users. The Olympia, Shaler and Woordruff Sewersehds are comprised of approximately 316 manholes and 85,283 linear feet (16.2 miles) of mostly combined sewer up to 48 inches in diameter. The 005F001 sewershed (Banksville Road) consists of 79 acres, or approximately 19% of the total service area.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 005F001 typically experiences 51 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 005F001 is approximately 1.28 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 005F001 is approximately 34.03 CFS. *Figure 1 – Outfall 005F001 CSO Volume* and *Figure 2 – Outfall 005F001 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.





Very limited space exists adjacent to the outfall. There is an existing parking lot at the PennDOT maintenance garage located within the cloverleaf of the I-279 on-ramp and Saw Mill Run Boulevard. This parking facility may be able to be procured for a storage or treatment facility.

The site is generally bounded by Saw Mill Run to the west, the PennDOT maintenance garage to the north, and I-279 to the south.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 005F001. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-005F001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-005F001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-005F001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes.

Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-005F001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-005F001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-005F001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

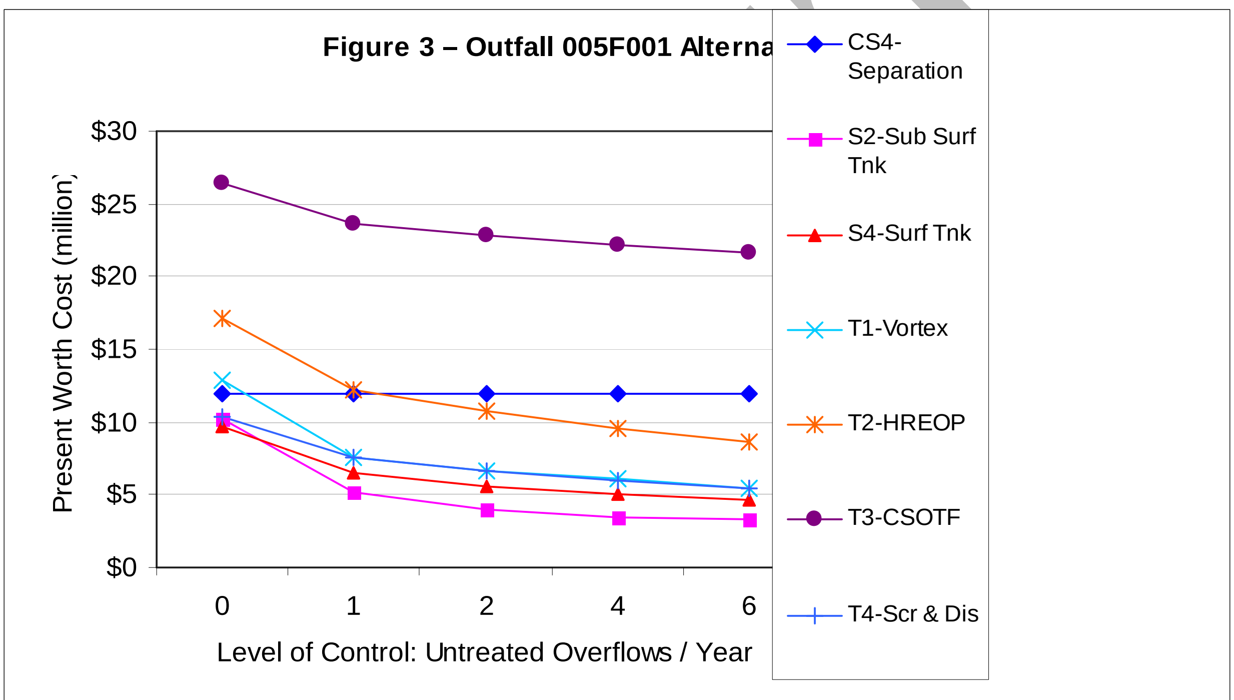
T4-005F001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 005F001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

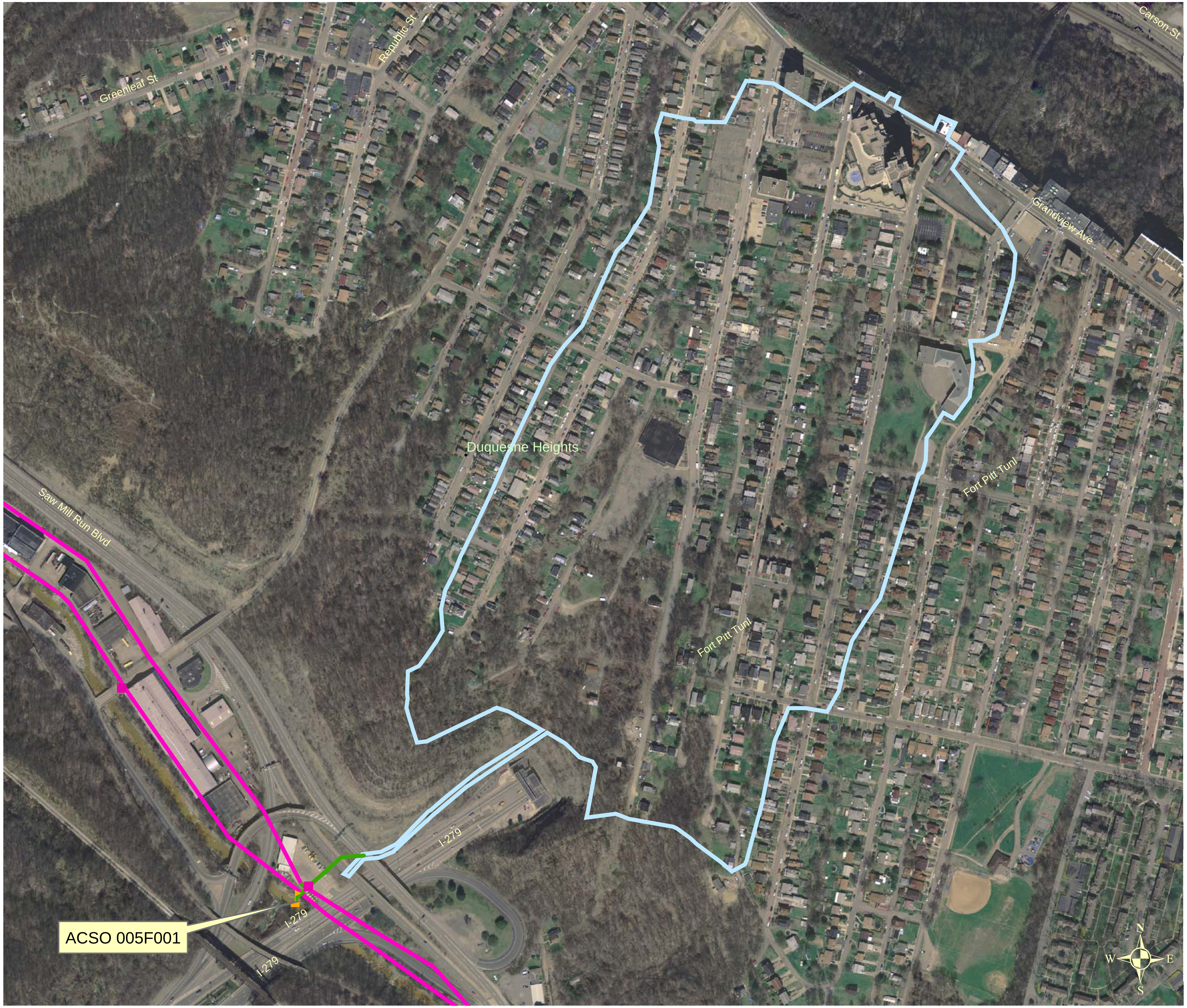
Recommendations

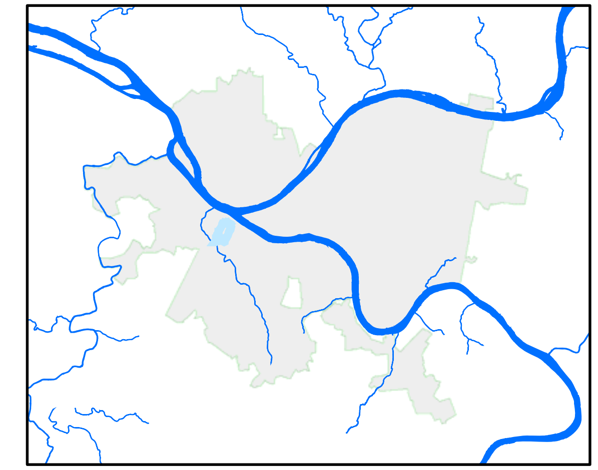
Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-005F001: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Space is limited for the construction of a sub-surface storage facility for all control levels. It appears that significant site work and property acquisition will be required for this alternative.





Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

300 0 300 Feet

Attachment 1
ACSO 005F001
Tributary Area Map
Sawmill Run
Sewershed

CSO Controls Alternatives

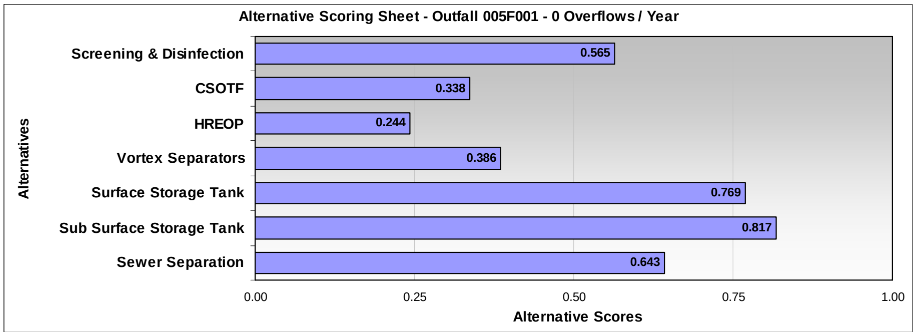
PWSA

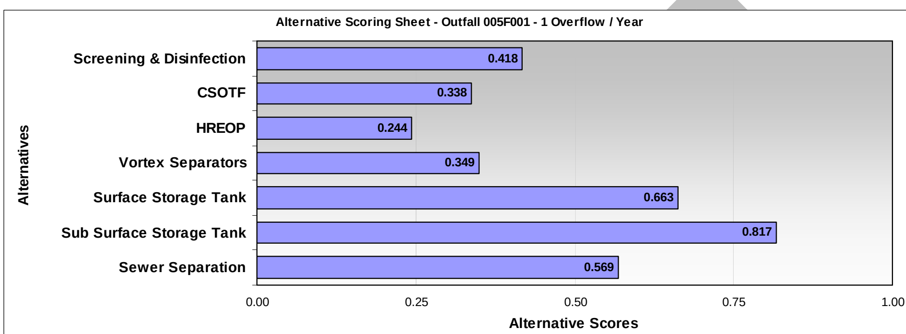
SW-D-0228.pdf

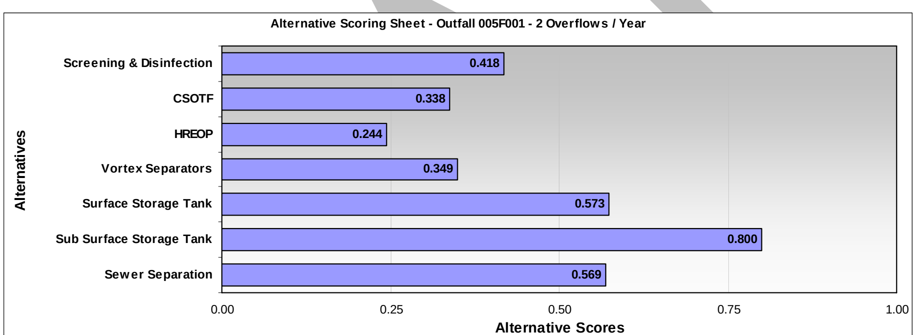
Attachment 2 - CSO Alternatives Development Worksheet

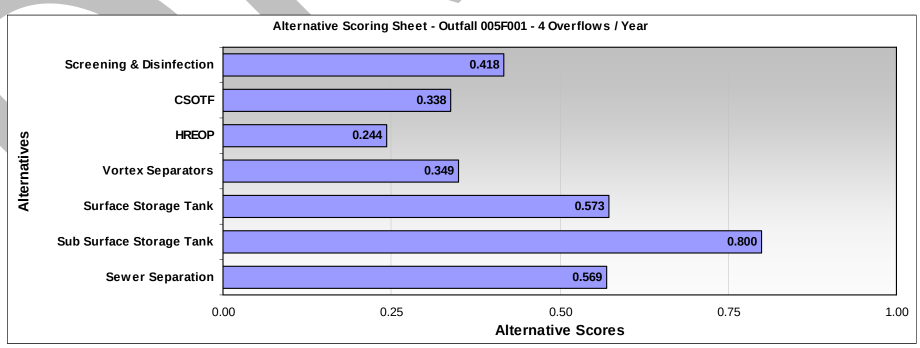
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	A relief sewer will not be evaluated.
Sewer separation	Y	Sewer separation within the 79 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

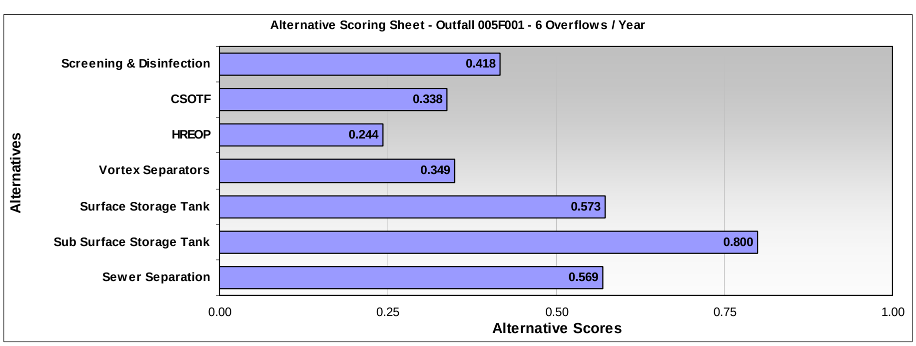
Attachment 3 – Alternative Scoring Sheet

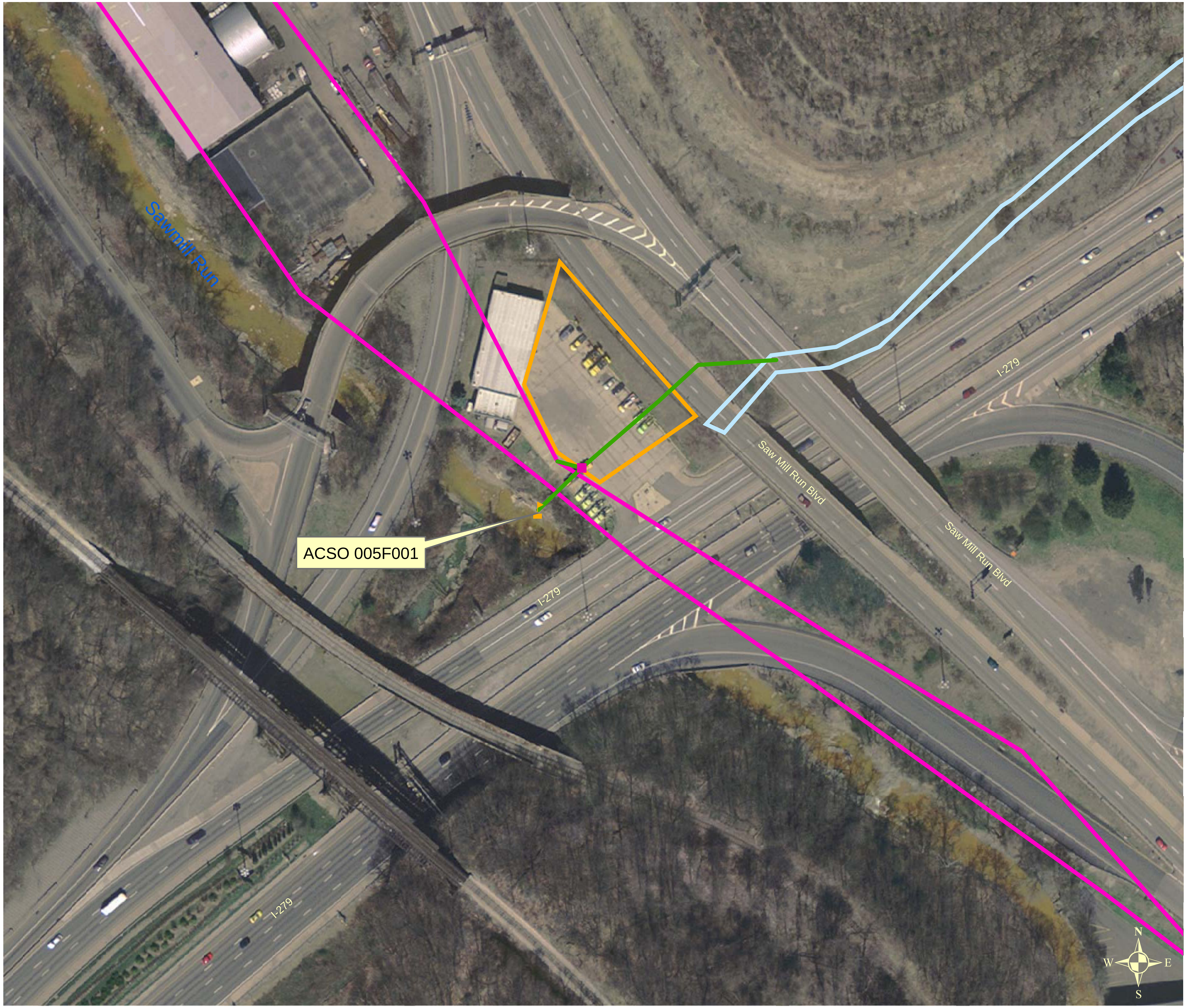


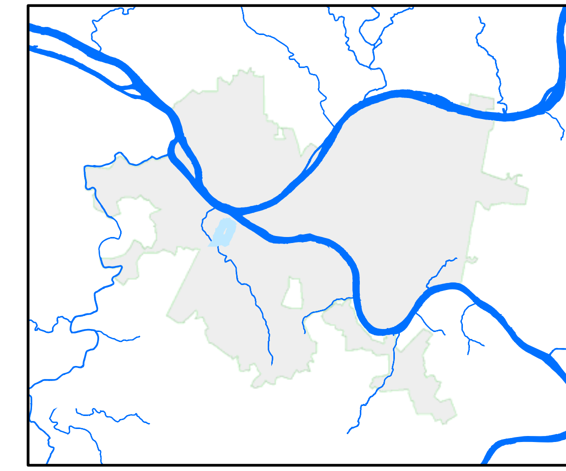












Area Overview

Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

Attachment 4
ACSO 005F001
Facilities Boundary Map
Sawmill Run Sewershed

CSO Controls Alternatives

PWSA

SW-D-0228.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: CS4-Separation		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	1	1	1	1	1
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: CS4-Separation		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: CS4-Separation		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.					
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
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Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
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4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
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Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	2	2
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.					
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.	3	3	3	3	3
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative: T1-Vortex		Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative: T1-Vortex		Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative: T1-Vortex		Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T2-HREOP		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	1	1	1	1	1
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T3-CSOTF		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	**Objective Scoring: Present Worth**	**Actual Scores**				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	**Objective Scoring: Pollution Reduction**	**Actual Scores**				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	**Objective Scoring: Impact on Habitat, Stream, River etc.**	**Actual Scores**				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	2	2	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team

›f Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.570**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.622**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.590**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.573**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.610**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.610**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

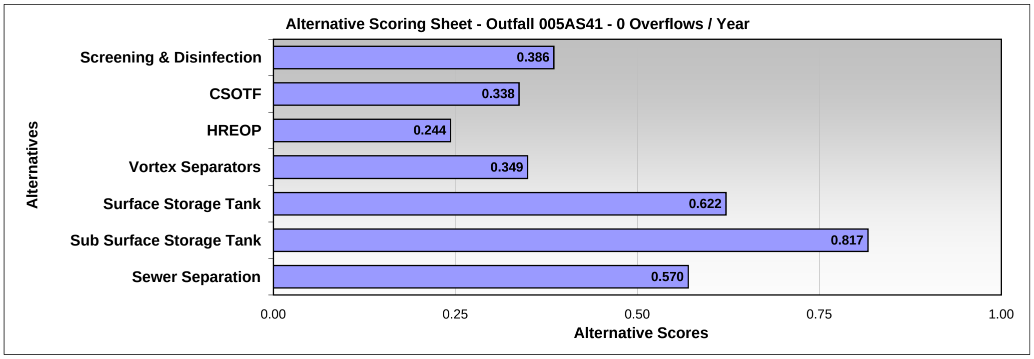
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

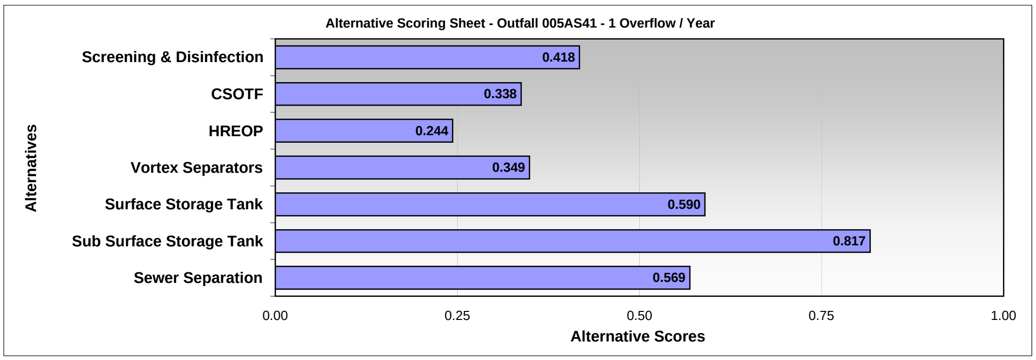
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

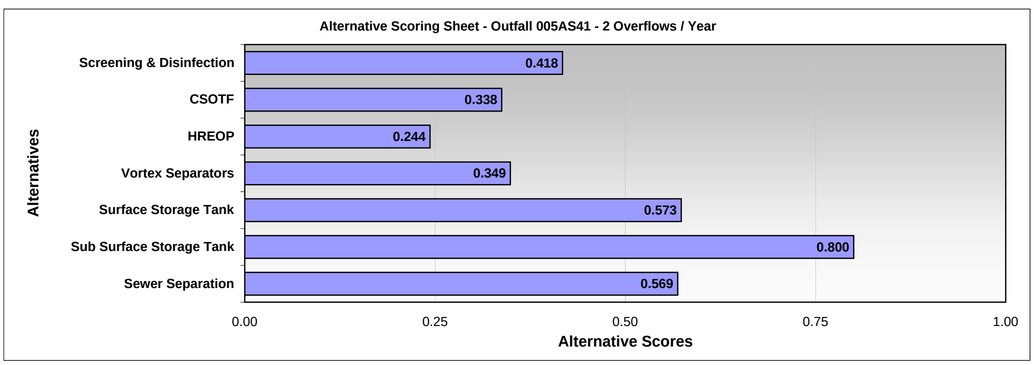
Total Score

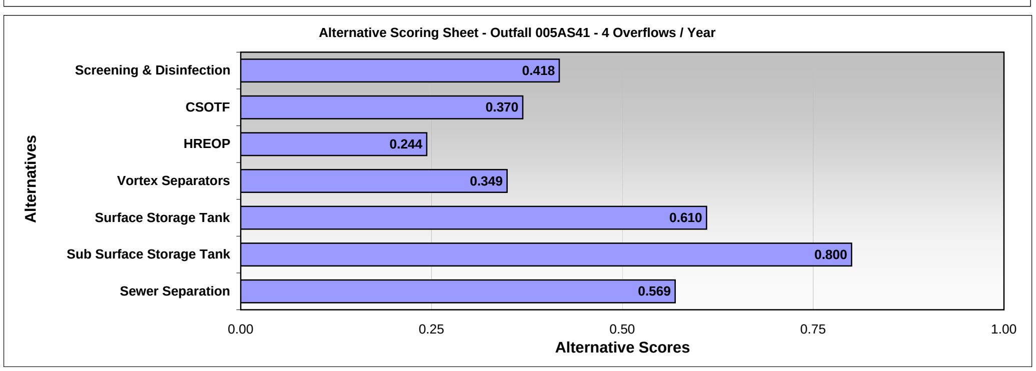
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

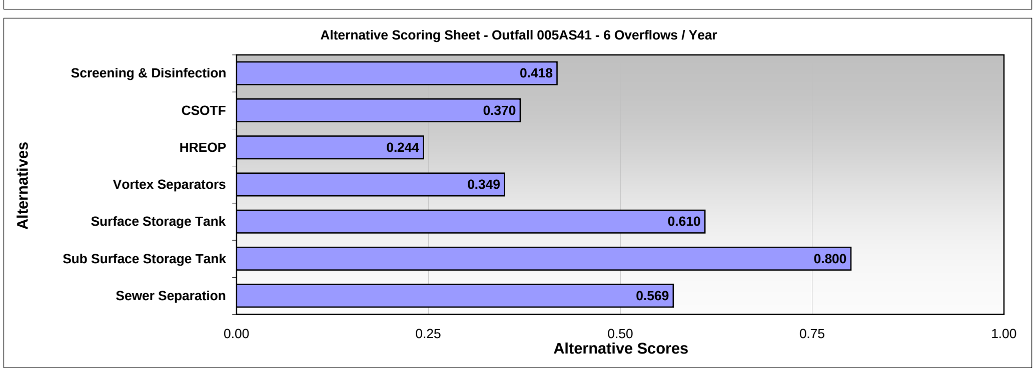
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**


Alternative Scoring Sheet - Outfall 005AS41 - 0 Overflows / Year
Alternatives
Screening & Disinfection 0.386
CSOTF 0.338
HREOP 0.244
Vortex Separators 0.349
Surface Storage Tank 0.622
Sub Surface Storage Tank 0.817
Sewer Separation 0.570
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005AS41 - 1 Overflow / Year
Alternatives
Screening & Disinfection 0.418
CSOTF 0.338
HREOP 0.244
Vortex Separators 0.349
Surface Storage Tank 0.590
Sub Surface Storage Tank 0.817
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005AS41 - 2 Overflows / Year
Alternatives
Screening & Disinfection 0.418
CSOTF 0.338
HREOP 0.244
Vortex Separators 0.349
Surface Storage Tank 0.573
Sub Surface Storage Tank 0.800
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005AS41 - 4 Overflows / Year
Alternatives
Screening & Disinfection 0.418
CSOTF 0.370
HREOP 0.244
Vortex Separators 0.349
Surface Storage Tank 0.610
Sub Surface Storage Tank 0.800
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005AS41 - 6 Overflows / Year
Alternatives
Screening & Disinfection 0.418
CSOTF 0.370
HREOP 0.244
Vortex Separators 0.349
Surface Storage Tank 0.610
Sub Surface Storage Tank 0.800
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	0	
Peak Volume	27,553	CF
	0.21	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	17.48	CFS
	11.30	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		106		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,900,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		46,174		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**92,000**		
			TOTAL CAPITAL COST $	**16,031,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	0	
Peak Volume	27,553	CF
	0.21	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	17.48	CFS
	11.30	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41

SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.21	28,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.24	33,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		58		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		39		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.25	33,930	**Sufficient Volume**
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**169,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		11.30	17.48	= Peak Rate
Force Main Diameter (In)		23		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,919,000**	**$ 31,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		17.48		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		50,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		250		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**31,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		11.30		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**935,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		22,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**4,231,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	0	
Peak Volume	27,553	CF
	0.21	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	17.48	CFS
	11.30	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SUB-SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.21	28,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.24	33,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		58		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		39		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		0.25	33,930	**Sufficient Volume**
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**1,549,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.21	0.32	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3		Input by Engineer
Force Main Velocity (FPS)		6.5	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**460,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		17.48		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		50,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**188,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		11.30		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**935,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		22,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**3,292,000**

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RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	0	
Peak Volume	27,553	CF
	0.21	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	17.48	CFS
	11.30	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41

SWIRL CONCENTRATOR / VORTEX SEPARATOR

0 Overflows / Year

1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		11.30	17.48	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		2		
Construction Cost (Swirl / Vortex)	**$**	**1,328,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		12.43	19.23	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		24		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,001,000**	**$ 32,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		17.48		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		58,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		2,900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**211,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		11.30		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**935,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		12.43		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		56	27	
Passes / Detention (Min)		3	**15.72**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**596,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		12,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**24,000**		
			TOTAL CAPITAL COST $	**6,489,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	0	
Peak Volume	27,553	CF
	0.21	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	17.48	CFS
	11.30	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41

SEDIMENTATION BASIN (CSOTF)

0 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		11.30	17.48	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		63	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		31	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.18	23,436	
Construction Cost (CSOTF)	**$**	**16,380,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		11.30	17.48	= Peak Flow x % Req Pump
Force Main Diameter (In)		23		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,919,000**	**$ 31,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		17.48		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		35,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,750		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**142,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		11.30		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**935,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		11.30		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		53	26	
Passes / Detention (Min)		3	15.76	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**573,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		10,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**20,000**		
			TOTAL CAPITAL COST $	**21,102,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	0	
Peak Volume	27,553	CF
	0.21	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	17.48	CFS
	11.30	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
0 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		11.30		17.48	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		140			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		18		OK	Input by Engineer
Width (Ft)		9		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**2,977,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		12.43		19.23	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		24			Input by Engineer
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,001,000**	**$**	**32,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		17.48			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		11.30			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**935,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		12.43			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		56		27	Input by Engineer
Passes / Detention (Min)		3		15.72	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	596,000	$	473,000	
Construction Cost (Disinfection)	**$**	**1,069,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		27,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**			
			TOTAL CAPITAL COST	**$**	**8,196,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	0	
Peak Volume	27,553	CF
	0.21	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	17.48	CFS
	11.30	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		11.30		17.48	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**935,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		11.30		17.48	= Peak Flow x % Req Pump
Force Main Diameter (In)		23			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,919,000**	**$**	**31,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		17.48			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,500			=CFS x 200
Odor Control Flow Rate (CFM)		180			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**24,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		11.30			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		53		26	
Passes / Detention (Min)		3		**15.76**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	573,000	$	448,000	
Construction Cost (Disinfection)	**$**	**1,021,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
				TOTAL CAPITAL COST $	**5,080,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	1	
Peak Volume	10,295	CF
	0.08	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	10.15	CFS
	6.56	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		106		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,900,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		46,174		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**92,000**		
			TOTAL CAPITAL COST $	**16,031,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	1	
Peak Volume	10,295	CF
	0.08	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	10.15	CFS
	6.56	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.08		10,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.09		12,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		36			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		24			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.10		12,960	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**58,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		6.56		10.15	= Peak Rate
Force Main Diameter (In)		18			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,421,000**	**$**	**26,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		10.15			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		18,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		90			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**14,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		6.56			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**716,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST $	**3,377,000**

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RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	1	
Peak Volume	10,295	CF
	0.08	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	10.15	CFS
	6.56	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SUB-SURFACE STORAGE TANK				
1 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.08	10,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.09	12,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		36		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		24		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.10	12,960	**Sufficient Volume**
Tank Area (SF)		1,000		= Length x Width
Construction Cost (Storage Tank)		**1,151,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.08	0.12	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2		Input by Engineer
Force Main Velocity (FPS)		5.5	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**350,000**	**$ 13,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		10.15		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		18,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**84,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		6.56		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**716,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	**2,456,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	1	
Peak Volume	10,295	CF
	0.08	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	10.15	CFS
	6.56	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
1 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		6.56	10.15	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		7.22	11.17	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		18		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,505,000**	**$ 26,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		10.15		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		6.56		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**716,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		7.22		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		43	20	
Passes		3	**15.40**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**489,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		7,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**14,000**		
			TOTAL CAPITAL COST $	**4,112,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	1	
Peak Volume	10,295	CF
	0.08	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	10.15	CFS
	6.56	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SEDIMENTATION BASIN (CSOTF)					
1 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		6.56		10.15	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,100			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		48		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		24		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.10		13,824	
Construction Cost (CSOTF)	**$**	**16,387,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		6.56		10.15	= Peak Flow x % Req Pump
Force Main Diameter (In)		18			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.7		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,421,000**	**$**	**26,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		10.15			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		21,000			=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,050			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**95,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		6.56			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**716,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		6.56			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		41		20	
Passes		3		16.15	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**476,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		8,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**16,000**			
			TOTAL CAPITAL COST	**$**	**20,239,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	1	
Peak Volume	10,295	CF
	0.08	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	10.15	CFS
	6.56	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		6.56		10.15	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		80			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		14		**OK**	Input by Engineer
Width (Ft)		7		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**2,229,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		7.22		11.17	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		18			Input by Engineer
Force Main Velocity (FPS)		6.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,505,000**	**$**	**26,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		10.15			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		6.56			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**716,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		7.22			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		43		20	Input by Engineer
Passes		3		**15.40**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	489,000	$	350,000	
Construction Cost (Disinfection)	**$**	**839,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		25,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST **$**	**6,482,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	1	
Peak Volume	10,295	CF
	0.08	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	10.15	CFS
	6.56	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		6.56		10.15	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**716,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		6.56		10.15	= Peak Flow x % Req Pump
Force Main Diameter (In)		18			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,421,000**	**$**	**26,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		10.15			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000			=CFS x 200
Odor Control Flow Rate (CFM)		100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		6.56			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		41		20	
Passes		3		**16.15**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	476,000	$	339,000	
Construction Cost (Disinfection)	**$**	**815,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST $	**4,141,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	2	
Peak Volume	8,754	CF
	0.07	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	8.08	CFS
	5.22	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		106		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,900,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		46,174		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**92,000**		
			TOTAL CAPITAL COST $	**16,031,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	2	
Peak Volume	8,754	CF
	0.07	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	8.08	CFS
	5.22	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41			
SURFACE STORAGE TANK			
2 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.07	9,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.08	11,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	34		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	23		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.09	11,730	**Sufficient Volume**
Tank Area (SF)	1,000		= Length x Width
Construction Cost (Storage Tank)	**48,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	5.22	8.08	= Peak Rate
Force Main Diameter (In)	16		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,236,000**	**$ 25,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	8.08		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	17,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	90		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**14,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	5.22		Ref: CSO Statistics
Construction Cost (Screening) $	**654,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**40,000**		
		TOTAL CAPITAL COST $	**3,119,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	2	
Peak Volume	8,754	CF
	0.07	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	8.08	CFS
	5.22	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SUB-SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.07	9,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.08	11,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		34		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		23		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.09	11,730	**Sufficient Volume**
Tank Area (SF)		1,000		= Length x Width
Construction Cost (Storage Tank)		**1,116,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.07	0.10	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2		Input by Engineer
Force Main Velocity (FPS)		4.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**340,000**	**$ 13,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		8.08		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		17,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		850		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**81,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		5.22		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**654,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	**2,346,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	2	
Peak Volume	8,754	CF
	0.07	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	8.08	CFS
	5.22	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
2 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		5.22		8.08	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		5.74		8.88	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		16			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,310,000**	**$**	**25,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		8.08			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		5.22			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**654,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		5.74			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		38		19	
Passes		3		**16.25**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**459,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		5,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**			
				TOTAL CAPITAL COST	**$ 3,820,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	2	
Peak Volume	8,754	CF
	0.07	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	8.08	CFS
	5.22	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41			
SEDIMENTATION BASIN (CSOTF)			
2 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	5.22	8.08	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	43	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	22	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.08	11,352	
Construction Cost (CSOTF) $	**16,390,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	5.22	8.08	= Peak Flow x % Req Pump
Force Main Diameter (In)	16		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,236,000**	**$ 25,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	8.08		Ref: CSO Statistics
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	17,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	850		= ACH x Volume / 60
Construction Cost (Odor Control) $	**81,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	5.22		Ref: CSO Statistics
Construction Cost (Screening) $	**654,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	5.22		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	37	17	
Passes	3	**15.58**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**448,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	7,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**14,000**		
		TOTAL CAPITAL COST $	**19,950,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	2	
Peak Volume	8,754	CF
	0.07	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	8.08	CFS
	5.22	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		5.22		8.08	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		70			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		13		OK	Input by Engineer
Width (Ft)		6		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**2,018,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		5.74		8.88	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		16			Input by Engineer
Force Main Velocity (FPS)		6.4		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,310,000**	**$**	**25,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		8.08			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		5.22			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**654,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		5.74			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		38		19	Input by Engineer
Passes		3		16.25	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	459,000	$	317,000	
Construction Cost (Disinfection)	**$**	**776,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		24,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
			TOTAL CAPITAL COST	**$**	**5,948,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	2	
Peak Volume	8,754	CF
	0.07	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	8.08	CFS
	5.22	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		5.22		8.08	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**654,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		5.22		8.08	= Peak Flow x % Req Pump
Force Main Diameter (In)		16			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,236,000**	**$**	**25,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		8.08			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,600			=CFS x 200
Odor Control Flow Rate (CFM)		80			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**13,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		5.22			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		37		17	
Passes		3		**15.58**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	448,000	$	301,000	
Construction Cost (Disinfection)	**$**	**749,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**3,825,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	4	
Peak Volume	7,319	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	6.17	CFS
	3.99	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		106		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,900,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		46,174		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**92,000**		
			TOTAL CAPITAL COST $	**16,031,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	4	
Peak Volume	7,319	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	6.17	CFS
	3.99	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SURFACE STORAGE TANK					
4 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.05		7,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.06		8,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		29			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		20			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.07		8,700	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**40,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		3.99		6.17	= Peak Rate
Force Main Diameter (In)		14			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,047,000**	**$**	**23,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		6.17			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		60			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**10,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		3.99			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**597,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST $	**2,859,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	4	
Peak Volume	7,319	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	6.17	CFS
	3.99	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SUB-SURFACE STORAGE TANK					
4 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.05		7,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.06		8,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		29			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		20			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.07		8,700	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**1,083,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.05		0.08	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2			Input by Engineer
Force Main Velocity (FPS)		3.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**331,000**	**$**	**13,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		6.17			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		600			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**61,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.99			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**597,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST $	**2,227,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	4	
Peak Volume	7,319	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	6.17	CFS
	3.99	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		3.99		6.17	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		4.38		6.78	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		14			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,110,000**	**$**	**23,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		6.17			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.99			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**597,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		4.38			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		34		16	
Passes		3		**16.04**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**430,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		4,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**8,000**			
				TOTAL CAPITAL COST	**$ 3,530,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	4	
Peak Volume	7,319	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	6.17	CFS
	3.99	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		3.99	6.17	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		38	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		19	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.06	8,664	
Construction Cost (CSOTF)	**$**	**16,392,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		3.99	6.17	= Peak Flow x % Req Pump
Force Main Diameter (In)		14		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,047,000**	**$ 23,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		6.17		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		13,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		650		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**65,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		3.99		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**597,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		3.99		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		32	15	
Passes		3	15.56	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**422,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		7,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**14,000**		
			TOTAL CAPITAL COST $	**19,662,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	4	
Peak Volume	7,319	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	6.17	CFS
	3.99	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41						
HIGH RATE END OF PIPE TREATMENT (HREOP)						
4 Overflows / Year						
1. High Rate End of Pipe Treatment (HREOP) Parameters						
Sizing Basis: Peak Flow (MGD / CFS)		3.99		6.17	Ref: CSO Statistics	
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters	
Surface Area Req'd at Peak Flow (SF)		50			= (MGD x 1,000,000) / (6,000 GPD / SF)	
Length (Ft)		11		OK	Input by Engineer	
Width (Ft)		6		Area OK	= Area Req'd / Length	
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters	
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer	
Construction Cost (HREOP)	**$**	**1,825,000**				
2. Dewatering Pump Station / Force Main Parameters						
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters	
Underflow Rate (%)		10%			Ref: Technical Parameters	
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par	
Dewatering Pumping Rate (MGD / CFS)		4.38		6.78	= Peak Vol / DW Time x % Req Pump	
Force Main Diameter (In)		14			Input by Engineer	
Force Main Velocity (FPS)		6.3		Check:	OK - Velocity >2 fps/< 10 fps	
Force Main Length (Ft)		100			Input by Engineer	
Construction Cost (PS / Force Main)	**$**	**2,110,000**	**$**	**23,000**		
3. Consolidation and/or Outfall Pipe Parameters						
Peak Flow (CFS)		6.17			Ref: Technical Parameters	
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"	
Length (Ft)		100			Input by Engineer	
Depth (Ft)		20			Input by Engineer	
Construction Cost (Pipe)	**$**	**63,000**				
4. Odor Control Parameters						
Air Changes / Hour (ACH)		3			Ref: Technical Parameters	
Volume of Ventilated Space (CF)		2,000			=Required Storage Vol x 2	
Odor Control Flow Rate (CFM)		100			= ACH x Volume / 60	
Construction Cost (Odor Control)	**$**	**15,000**				
5. Screening Parameters						
Screening Required (Yes = 1; No = 2)		1			Input by Engineer	
Peak Flow, into facility (MGD)		3.99			Ref: CSO Statistics	
Construction Cost (Screening)	**$**	**597,000**				
6. Disinfection Parameters						
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer	
Peak Flow (MGD)		4.38			Ref: Peak flow of PS	
Cl_2 Contact Tank Length / Width (Ft)		34		16	Input by Engineer	
Passes		3		16.04	Input by Engineer / 12' SWD Basis	
				OK Detn Time		
Construction Cost (Disinfection / CC Tank)	$	430,000	$	280,000		
Construction Cost (Disinfection)	**$**	**710,000**				
7. Regulator Parameters						
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer	
Number Regulators		1			Input by Engineer	
Construction Cost (Regulators)	**$**	**39,000**				
8. Land Acquisition Parameters						
Land Required - HREOP (SF)		24,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560	
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters	
Land Acquisition Cost	**$**	**48,000**				
				TOTAL CAPITAL COST	**$**	**5,430,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	4	
Peak Volume	7,319	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	6.17	CFS
	3.99	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		3.99		6.17	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**597,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		3.99		6.17	= Peak Flow x % Req Pump
Force Main Diameter (In)		14			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,047,000**	**$**	**23,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		6.17			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,200			=CFS x 200
Odor Control Flow Rate (CFM)		60			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**10,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		3.99			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		32		15	
Passes		3		**15.56**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	422,000	$	265,000	
Construction Cost (Disinfection)	**$**	**687,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**3,512,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	6	
Peak Volume	6,922	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	4.72	CFS
	3.05	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		106		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,900,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		46,174		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**92,000**		
			TOTAL CAPITAL COST $	**16,031,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	6	
Peak Volume	6,922	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	4.72	CFS
	3.05	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SURFACE STORAGE TANK				
6 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.05	7,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.06	8,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		29		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		20		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.07	8,700	**Sufficient Volume**
Tank Area (SF)		1,000		= Length x Width
Construction Cost (Storage Tank)		**37,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		3.05	4.72	= Peak Rate
Force Main Diameter (In)		12		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,894,000**	**$ 21,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		4.72		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		60		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**10,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		3.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**554,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	**2,658,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	6	
Peak Volume	6,922	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	4.72	CFS
	3.05	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41

SUB-SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.05	7,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.06	8,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		29		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		20		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.07	8,700	**Sufficient Volume**
Tank Area (SF)		1,000		= Length x Width
Construction Cost (Storage Tank)		**1,074,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.05	0.08	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2		Input by Engineer
Force Main Velocity (FPS)		3.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**329,000**	**$ 13,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		4.72		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**61,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**554,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	**2,173,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	6	
Peak Volume	6,922	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	4.72	CFS
	3.05	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
6 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		3.05	4.72	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.36	5.20	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		13		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,945,000**	**$ 22,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		4.72		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**554,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		3.36		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		30	14	
Passes		3	**16.17**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**409,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		3,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**6,000**		
			TOTAL CAPITAL COST	**$ 3,298,000**

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RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	6	
Peak Volume	6,922	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	4.72	CFS
	3.05	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41				
SEDIMENTATION BASIN (CSOTF)				
6 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		3.05	4.72	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		600		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		36	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		18	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.06	7,776	
Construction Cost (CSOTF)	**$**	**16,393,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.05	4.72	= Peak Flow x % Req Pump
Force Main Diameter (In)		12		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,894,000**	**$ 21,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		4.72		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**61,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**554,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		3.05		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		28	14	
Passes		3	**16.60**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**402,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		6,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**		
			TOTAL CAPITAL COST $	**19,439,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	6	
Peak Volume	6,922	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	4.72	CFS
	3.05	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		3.05		4.72	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		40			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		10		OK	Input by Engineer
Width (Ft)		5		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,678,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.36		5.20	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		13			Input by Engineer
Force Main Velocity (FPS)		5.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,945,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		4.72			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		3.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**554,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		3.36			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		30		14	Input by Engineer
Passes		3		16.17	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	409,000	$	250,000	
Construction Cost (Disinfection)	**$**	**659,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		23,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST $	**5,015,000**

RESULTS SUMMARY		
Number of Events / Year	41	
Number of Overflows / Year	6	
Peak Volume	6,922	CF
	0.05	MG
Total Volume	133,250	CF
	1.00	MG
Peak Rate	4.72	CFS
	3.05	MGD

Capital Costs - 005AS41 / Sewershed ACSO 005AS41					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		3.05		4.72	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**554,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		3.05		4.72	= Peak Flow x % Req Pump
Force Main Diameter (In)		12			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,894,000**	**$**	**21,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		4.72			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		900			=CFS x 200
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		3.05			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		28		14	
Passes		3		**16.60**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	402,000	$	241,000	
Construction Cost (Disinfection)	**$**	**643,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**3,269,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	11.30	$94,980	20	10.910	$1,036,224
	Tank O&M	No. Events / Yr	41	$25,613	50	14.484	$370,967
		Const Cost ($)	$169,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	11	$8,395	20	10.910	$91,594
	Odor Control O&M	Capacity (cfm)	250	$875	20	10.910	$9,546
	Reserve / Replace	10% Gravity / 15% Pump					$14,537
			Total Annual O&M	$130,000		Total PW O&M	$1,523,000

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.21	$6,544	20	10.910	$71,391
	Tank O&M	No. Events / Yr	41	$29,063	50	14.484	$420,935
		Const Cost ($)	$1,549,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	11	$8,395	20	10.910	$91,594
	Odor Control O&M	Capacity (cfm)	2,500	$8,750	20	10.910	$95,462
	Reserve / Replace	10% Gravity / 15% Pump					$4,931
			Total Annual O&M	$53,000		Total PW O&M	$684,000

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)							
ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	11.30	$94,980	20	10.910	$1,036,224
	Sed. Basin O&M	Flow Rate (mgd)	11.30	$1,271	50	14.484	$18,411
	Screening O&M	Flow Rate (mgd)	11.30	$8,395	20	10.910	$91,594
	Disinfection O&M	Flow Rate (mgd)	11.30	$70,438	20	10.910	$768,469
	Odor Control O&M	Capacity (cfm)	1,750.00	$6,125	20	10.910	$66,823
	Reserve / Replace	10% Gravity / 15% Pump					$16,398
			Total Annual O&M	$182,000		Total PW O&M	$1,998,000

Operation and Maintenance Costs

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	12.43	$101,225	20	10.910	$1,104,354
	HREP O&M	Flow Rate (mgd)	11.30	$96,941	20	10.910	$1,057,616
	Screening O&M	Flow Rate (mgd)	11.30	$8,395	20	10.910	$91,594
	Disinfection O&M	Flow Rate (mgd)	12.43	$74,648	20	10.910	$814,410
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$24,577
			Total Annual O&M	**$282,000**		**Total PW O&M**	**$3,100,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	12.43	$101,225	20	10.910	$1,104,354
	Swirl / Vortex O&M	Flow Rate (mgd)	11.30	$1,271	20	10.910	$13,868
	Screening O&M	Flow Rate (mgd)	11.30	$8,395	20	10.910	$91,594
	Disinfection O&M	Flow Rate (mgd)	12.43	$74,648	20	10.910	$814,410
	Odor Control O&M	Capacity (cfm)	2,900.00	$10,150	20	10.910	$110,736
	Reserve / Replace	10% Gravity / 15% Pump					$18,788
			Total Annual O&M	**$196,000**		**Total PW O&M**	**$2,154,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	11.30	$94,980	20	10.910	$1,036,224
	Screening O&M	Flow Rate (mgd)	11.30	$8,395	20	10.910	$91,594
	Disinfection O&M	Flow Rate (mgd)	11.30	$70,438	20	10.910	$768,469
	Odor Control O&M	Capacity (cfm)	180.00	$630	20	10.910	$6,873
	Reserve / Replace	10% Gravity / 15% Pump					$16,077
			Total Annual O&M	**$175,000**		**Total PW O&M**	**$1,919,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	6.56	$66,062	20	10.910	$720,731
	Tank O&M	No. Events / Yr	41	$25,335	50	14.484	$366,948
		Const Cost ($)	$58,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	7	$7,987	20	10.910	$87,141
	Odor Control O&M	Capacity (cfm)	90	$315	20	10.910	$3,437
	Reserve / Replace	10% Gravity / 15% Pump					$11,863
			Total Annual O&M	**$100,000**		**Total PW O&M**	**$1,190,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.08	$3,390	20	10.910	$36,983
	Tank O&M	No. Events / Yr	41	$28,068	50	14.484	$406,524
		Const Cost ($)	$1,151,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	7	$7,987	20	10.910	$87,141
	Odor Control O&M	Capacity (cfm)	900	$3,150	20	10.910	$34,366
	Reserve / Replace	10% Gravity / 15% Pump					$3,604
			Total Annual O&M	**$43,000**		**Total PW O&M**	**$569,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	6.56	$66,062	20	10.910	$720,731
	Sed. Basin O&M	Flow Rate (mgd)	6.56	$738	50	14.484	$10,692
	Screening O&M	Flow Rate (mgd)	6.56	$7,987	20	10.910	$87,141
	Disinfection O&M	Flow Rate (mgd)	6.56	$50,585	20	10.910	$551,883
	Odor Control O&M	Capacity (cfm)	1,050.00	$3,675	20	10.910	$40,094
	Reserve / Replace	10% Gravity / 15% Pump					$13,378
			Total Annual O&M	**$130,000**		**Total PW O&M**	**$1,424,000**

Operation and Maintenance Costs

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	7.22	$70,405	20	10.910	$768,117
	HREP O&M	Flow Rate (mgd)	6.56	$70,422	20	10.910	$768,296
	Screening O&M	Flow Rate (mgd)	6.56	$7,987	20	10.910	$87,141
	Disinfection O&M	Flow Rate (mgd)	7.22	$53,609	20	10.910	$584,876
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$19,602
			Total Annual O&M	**$203,000**		**Total PW O&M**	**$2,232,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	7.22	$70,405	20	10.910	$768,117
	Swirl / Vortex O&M	Flow Rate (mgd)	6.56	$738	20	10.910	$8,054
	Screening O&M	Flow Rate (mgd)	6.56	$7,987	20	10.910	$87,141
	Disinfection O&M	Flow Rate (mgd)	7.22	$53,609	20	10.910	$584,876
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$13,498
			Total Annual O&M	**$133,000**		**Total PW O&M**	**$1,462,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	6.56	$66,062	20	10.910	$720,731
	Screening O&M	Flow Rate (mgd)	6.56	$7,987	20	10.910	$87,141
	Disinfection O&M	Flow Rate (mgd)	6.56	$50,585	20	10.910	$551,883
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$13,161
			Total Annual O&M	**$125,000**		**Total PW O&M**	**$1,377,000**

Operation and Maintenance Costs

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	5.22	$56,693	20	10.910	$618,520
	Tank O&M	No. Events / Yr	41	$25,310	50	14.484	$366,586
		Const Cost ($)	$48,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	5	$7,873	20	10.910	$85,895
	Odor Control O&M	Capacity (cfm)	90	$315	20	10.910	$3,437
	Reserve / Replace	10% Gravity / 15% Pump					$10,940
			Total Annual O&M	$91,000		Total PW O&M	$1,085,000

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.07	$3,042	20	10.910	$33,187
	Tank O&M	No. Events / Yr	41	$27,980	50	14.484	$405,257
		Const Cost ($)	$1,116,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	5	$7,873	20	10.910	$85,895
	Odor Control O&M	Capacity (cfm)	850	$2,975	20	10.910	$32,457
	Reserve / Replace	10% Gravity / 15% Pump					$3,386
			Total Annual O&M	$42,000		Total PW O&M	$560,000

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)							
ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	5.22	$56,693	20	10.910	$618,520
	Sed. Basin O&M	Flow Rate (mgd)	5.22	$587	50	14.484	$8,505
	Screening O&M	Flow Rate (mgd)	5.22	$7,873	20	10.910	$85,895
	Disinfection O&M	Flow Rate (mgd)	5.22	$44,001	20	10.910	$480,047
	Odor Control O&M	Capacity (cfm)	850.00	$2,975	20	10.910	$32,457
	Reserve / Replace	10% Gravity / 15% Pump					$12,341
			Total Annual O&M	$113,000		Total PW O&M	$1,238,000

Operation and Maintenance Costs

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	5.74	$60,421	20	10.910	$659,187
	HREP O&M	Flow Rate (mgd)	5.22	$61,552	20	10.910	$671,526
	Screening O&M	Flow Rate (mgd)	5.22	$7,873	20	10.910	$85,895
	Disinfection O&M	Flow Rate (mgd)	5.74	$46,631	20	10.910	$508,745
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$17,982
			Total Annual O&M	**$177,000**		**Total PW O&M**	**$1,947,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	5.74	$60,421	20	10.910	$659,187
	Swirl / Vortex O&M	Flow Rate (mgd)	5.22	$587	20	10.910	$6,406
	Screening O&M	Flow Rate (mgd)	5.22	$7,873	20	10.910	$85,895
	Disinfection O&M	Flow Rate (mgd)	5.74	$46,631	20	10.910	$508,745
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$12,452
			Total Annual O&M	**$116,000**		**Total PW O&M**	**$1,273,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	5.22	$56,693	20	10.910	$618,520
	Screening O&M	Flow Rate (mgd)	5.22	$7,873	20	10.910	$85,895
	Disinfection O&M	Flow Rate (mgd)	5.22	$44,001	20	10.910	$480,047
	Odor Control O&M	Capacity (cfm)	80.00	$280	20	10.910	$3,055
	Reserve / Replace	10% Gravity / 15% Pump					$12,156
			Total Annual O&M	**$109,000**		**Total PW O&M**	**$1,200,000**

Operation and Maintenance Costs

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.99	$47,350	20	10.910	$516,589
	Tank O&M	No. Events / Yr	41	$25,290	50	14.484	$366,296
		Const Cost ($)	$40,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	4	$7,769	20	10.910	$84,758
	Odor Control O&M	Capacity (cfm)	60	$210	20	10.910	$2,291
	Reserve / Replace	10% Gravity / 15% Pump					$10,003
			Total Annual O&M	**$81,000**		**Total PW O&M**	**$980,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.05	$2,699	20	10.910	$29,446
	Tank O&M	No. Events / Yr	41	$27,898	50	14.484	$404,062
		Const Cost ($)	$1,083,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	4	$7,769	20	10.910	$84,758
	Odor Control O&M	Capacity (cfm)	600	$2,100	20	10.910	$22,911
	Reserve / Replace	10% Gravity / 15% Pump					$3,140
			Total Annual O&M	**$41,000**		**Total PW O&M**	**$544,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	3.99	$47,350	20	10.910	$516,589
	Sed. Basin O&M	Flow Rate (mgd)	3.99	$448	50	14.484	$6,495
	Screening O&M	Flow Rate (mgd)	3.99	$7,769	20	10.910	$84,758
	Disinfection O&M	Flow Rate (mgd)	3.99	$37,338	20	10.910	$407,352
	Odor Control O&M	Capacity (cfm)	650.00	$2,275	20	10.910	$24,820
	Reserve / Replace	10% Gravity / 15% Pump					$11,300
			Total Annual O&M	**$96,000**		**Total PW O&M**	**$1,051,000**

Operation and Maintenance Costs

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	4.38	$50,463	20	10.910	$550,554
	HREP O&M	Flow Rate (mgd)	3.99	$52,529	20	10.910	$573,084
	Screening O&M	Flow Rate (mgd)	3.99	$7,769	20	10.910	$84,758
	Disinfection O&M	Flow Rate (mgd)	4.38	$39,570	20	10.910	$431,704
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$16,407
			Total Annual O&M	**$151,000**		**Total PW O&M**	**$1,660,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	4.38	$50,463	20	10.910	$550,554
	Swirl / Vortex O&M	Flow Rate (mgd)	3.99	$448	20	10.910	$4,893
	Screening O&M	Flow Rate (mgd)	3.99	$7,769	20	10.910	$84,758
	Disinfection O&M	Flow Rate (mgd)	4.38	$39,570	20	10.910	$431,704
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$11,402
			Total Annual O&M	**$99,000**		**Total PW O&M**	**$1,083,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	3.99	$47,350	20	10.910	$516,589
	Screening O&M	Flow Rate (mgd)	3.99	$7,769	20	10.910	$84,758
	Disinfection O&M	Flow Rate (mgd)	3.99	$37,338	20	10.910	$407,352
	Odor Control O&M	Capacity (cfm)	60.00	$210	20	10.910	$2,291
	Reserve / Replace	10% Gravity / 15% Pump					$11,151
			Total Annual O&M	**$93,000**		**Total PW O&M**	**$1,022,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.05	$39,616	20	10.910	$432,209
	Tank O&M	No. Events / Yr	41	$25,283	50	14.484	$366,187
		Const Cost ($)	$37,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	3	$7,690	20	10.910	$83,900
	Odor Control O&M	Capacity (cfm)	60	$210	20	10.910	$2,291
	Reserve / Replace	10% Gravity / 15% Pump					$9,262
			Total Annual O&M	**$73,000**		**Total PW O&M**	**$894,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.05	$2,600	20	10.910	$28,368
	Tank O&M	No. Events / Yr	41	$27,875	50	14.484	$403,736
		Const Cost ($)	$1,074,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	3	$7,690	20	10.910	$83,900
	Odor Control O&M	Capacity (cfm)	600	$2,100	20	10.910	$22,911
	Reserve / Replace	10% Gravity / 15% Pump					$3,015
			Total Annual O&M	**$41,000**		**Total PW O&M**	**$542,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	3.05	$39,616	20	10.910	$432,209
	Sed. Basin O&M	Flow Rate (mgd)	3.05	$343	50	14.484	$4,973
	Screening O&M	Flow Rate (mgd)	3.05	$7,690	20	10.910	$83,900
	Disinfection O&M	Flow Rate (mgd)	3.05	$31,734	20	10.910	$346,215
	Odor Control O&M	Capacity (cfm)	600.00	$2,100	20	10.910	$22,911
	Reserve / Replace	10% Gravity / 15% Pump					$10,494
			Total Annual O&M	**$82,000**		**Total PW O&M**	**$901,000**

Operation and Maintenance Costs

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	3.36	$42,221	20	10.910	$460,626
	HREP O&M	Flow Rate (mgd)	3.05	$44,897	20	10.910	$489,826
	Screening O&M	Flow Rate (mgd)	3.05	$7,690	20	10.910	$83,900
	Disinfection O&M	Flow Rate (mgd)	3.36	$33,631	20	10.910	$366,913
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$15,144
			Total Annual O&M	**$129,000**		**Total PW O&M**	**$1,418,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	3.36	$42,221	20	10.910	$460,626
	Swirl / Vortex O&M	Flow Rate (mgd)	3.05	$343	20	10.910	$3,746
	Screening O&M	Flow Rate (mgd)	3.05	$7,690	20	10.910	$83,900
	Disinfection O&M	Flow Rate (mgd)	3.36	$33,631	20	10.910	$366,913
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$10,555
			Total Annual O&M	**$84,000**		**Total PW O&M**	**$926,000**

ACSO 005AS41	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	3.05	$39,616	20	10.910	$432,209
	Screening O&M	Flow Rate (mgd)	3.05	$7,690	20	10.910	$83,900
	Disinfection O&M	Flow Rate (mgd)	3.05	$31,734	20	10.910	$346,215
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$10,352
			Total Annual O&M	**$80,000**		**Total PW O&M**	**$875,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$16.0	$16,031,000	$0
1	$16.0	$16,031,000	$0
2	$16.0	$16,031,000	$0
4	$16.0	$16,031,000	$0
6	$16.0	$16,031,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$4.0	$3,292,000	$684,000
1	$3.0	$2,456,000	$569,000
2	$2.9	$2,346,000	$560,000
4	$2.8	$2,227,000	$544,000
6	$2.7	$2,173,000	$542,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$5.8	$4,231,000	$1,523,000
1	$4.6	$3,377,000	$1,190,000
2	$4.2	$3,119,000	$1,085,000
4	$3.8	$2,859,000	$980,000
6	$3.6	$2,658,000	$894,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$8.6	$6,489,000	$2,154,000
1	$5.6	$4,112,000	$1,462,000
2	$5.1	$3,820,000	$1,273,000
4	$4.6	$3,530,000	$1,083,000
6	$4.2	$3,298,000	$926,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$11.3	$8,196,000	$3,100,000
1	$8.7	$6,482,000	$2,232,000
2	$7.9	$5,948,000	$1,947,000
4	$7.1	$5,430,000	$1,660,000
6	$6.4	$5,015,000	$1,418,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$23.1	$21,102,000	$1,998,000
1	$21.7	$20,239,000	$1,424,000
2	$21.2	$19,950,000	$1,238,000
4	$20.7	$19,662,000	$1,051,000
6	$20.3	$19,439,000	$901,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$7.0	$5,080,000	$1,919,000
1	$5.5	$4,141,000	$1,377,000
2	$5.0	$3,825,000	$1,200,000
4	$4.5	$3,512,000	$1,022,000
6	$4.1	$3,269,000	$875,000

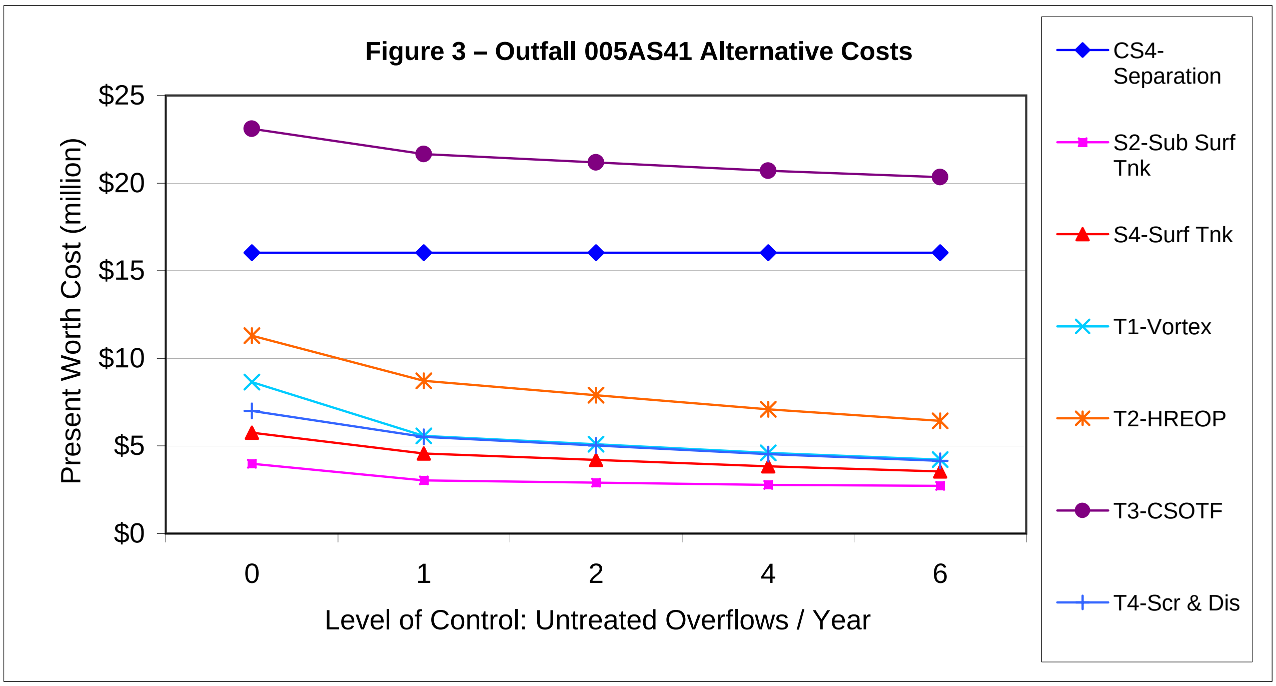


Figure 3 – Outfall 005AS41 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 005AS41
Location Name	Shaler Street
Model ID	ADC 005AS41-W.Y
Structure Type	Outfall
PWSA Sewershed	Olympia, Shaler and Woodruff Streets
Stream of Discharge	Saw Mill Run
NPDES Permit Number	005AS41
Owner	ALCOSAN

Results Summary

Number of Events:	41
Peak Volume:	27,553 ft^3
	0.21 MG
Total Volume:	133,250 ft^3
	1.00 MG
Peak Rate:	17.48 cfs

Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
8/20/2005 18:15	54	8/20/2005 19:00	27553.45	206.114	0	17.48	0
7/26/2005 19:45	35	7/26/2005 19:55	10295.19	77.013	1	10.15	1
5/13/2005 22:35	90	5/13/2005 22:45	8754.35	65.487	2	6.17	4
5/23/2005 16:15	35	5/23/2005 16:30	7328.32	54.819	3	8.08	2
1/5/2005 13:45	1264	1/5/2005 14:45	7319.39	54.753	4	1.33	19
11/9/2005 19:15	35	11/9/2005 19:30	7080.34	52.964	5	4.72	6
7/21/2005 14:20	30	7/21/2005 14:45	6922.07	51.781	6	6.33	3
6/11/2005 17:35	30	6/11/2005 17:45	5962.81	44.605	7	4.51	8
7/15/2005 17:35	45	7/15/2005 17:45	5171.58	38.686	8	2.91	13
11/14/2005 22:02	362	11/15/2005 3:45	5103.47	38.177	9	1.70	17
7/5/2005 16:30	35	7/5/2005 16:45	4779.97	35.757	10	4.98	5
8/29/2005 9:15	274	8/29/2005 13:45	3632.03	27.169	11	2.46	16
11/9/2005 4:15	20	11/9/2005 4:30	3534.39	26.439	12	4.19	9
5/14/2005 16:00	20	5/14/2005 16:15	3423.26	25.608	13	4.72	7
9/29/2005 5:30	20	9/29/2005 5:45	3356.24	25.106	14	3.75	11
5/11/2005 22:35	90	5/11/2005 22:45	2581.97	19.314	15	2.61	15
7/25/2005 13:20	15	7/25/2005 13:30	2511.33	18.786	16	4.19	10
11/29/2005 6:45	289	11/29/2005 6:55	2134.69	15.969	17	0.98	24
4/23/2005 3:43	51	4/23/2005 4:15	2104.23	15.741	18	1.16	21
8/27/2005 15:20	15	8/27/2005 15:30	1973.02	14.759	19	3.30	12
6/28/2005 18:05	15	6/28/2005 18:15	1452.21	10.863	20	2.69	14
1/8/2005 4:46	48	1/8/2005 5:15	1325.20	9.913	21	0.94	26
1/12/2005 1:00	35	1/12/2005 1:30	1319.07	9.867	22	0.96	25
2/9/2005 16:30	20	2/9/2005 16:45	1128.93	8.445	23	1.29	20
11/16/2005 4:05	15	11/16/2005 4:15	838.84	6.275	24	1.50	18
7/12/2005 19:45	20	7/12/2005 20:00	814.23	6.091	25	0.92	27
7/17/2005 16:20	29	7/17/2005 16:30	635.29	4.752	26	1.04	23
12/15/2005 13:45	20	12/15/2005 14:00	605.91	4.533	27	0.71	28
8/26/2005 20:50	15	8/26/2005 21:00	597.57	4.470	28	1.05	22
1/14/2005 2:00	20	1/14/2005 2:15	539.96	4.039	29	0.62	29
1/11/2005 8:46	168	1/11/2005 11:30	509.41	3.811	30	0.47	31
3/28/2005 17:24	100	3/28/2005 19:00	426.56	3.191	31	0.47	30
5/28/2005 8:41	37	5/28/2005 9:00	406.18	3.038	32	0.25	33

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
2/20/2005 19:45	19	2/20/2005 20:00	316.75	2.369	33	0.38	32
4/2/2005 6:16	32	4/2/2005 6:45	220.70	1.651	34	0.17	35
10/22/2005 6:45	19	10/22/2005 7:00	190.27	1.423	35	0.23	34
5/7/2005 13:16	17	5/7/2005 13:30	104.16	0.779	36	0.14	37
10/21/2005 7:18	16	10/21/2005 7:30	101.50	0.759	37	0.15	36
10/7/2005 10:31	17	10/7/2005 10:40	88.88	0.665	38	0.11	38
3/28/2005 10:02	16	3/28/2005 10:15	64.27	0.481	39	0.08	39
10/21/2005 18:52	12	10/21/2005 19:00	42.38	0.317	40	0.07	40

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 005AS41
Location Name	Shaler Street
Model ID	ADC 005AS41-W.Y
Structure Type	Outfall
PWSA Sewershed	Olympia, Shaler and Woodruff Streets
Stream of Discharge	Saw Mill Run
NPDES Permit Number	005AS41
Owner	ALCOSAN

Results Summary

Number of Events:	41
Peak Volume:	27,553 ft^3
	0.21 MG
Total Volume:	133,250 ft^3
	1.00 MG
Peak Rate:	17.48 cfs

Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Figure 1 - Outfall 005AS41 CSO Volume

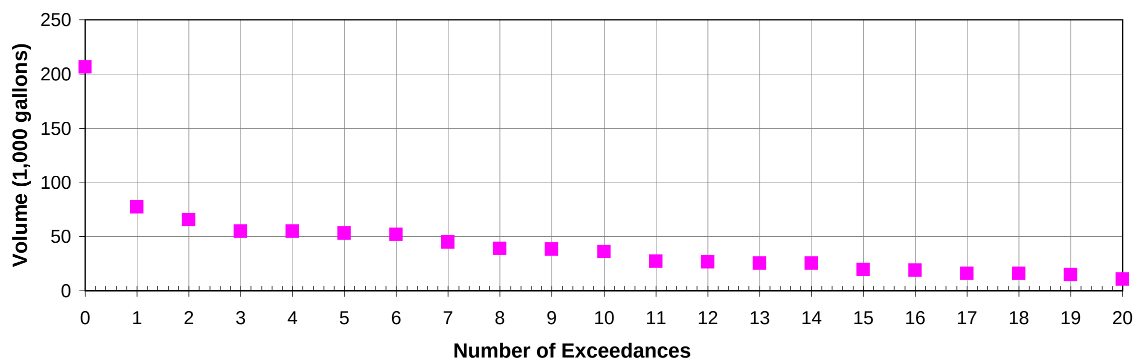
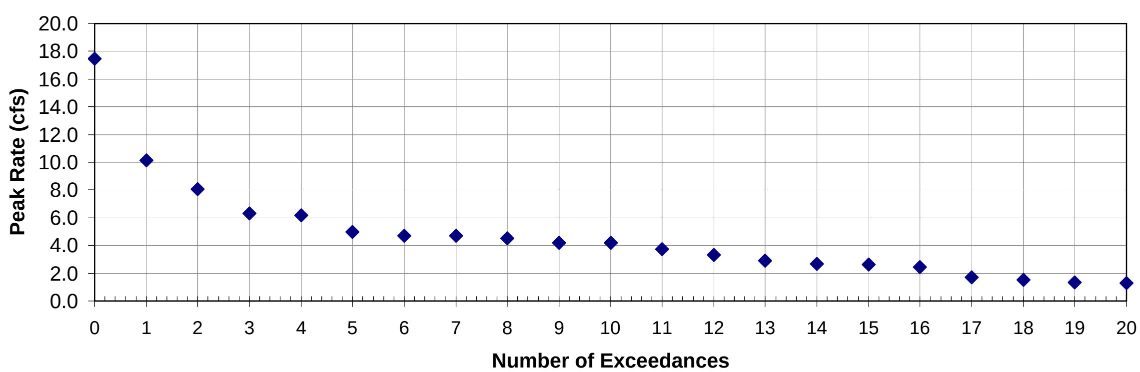


Figure 2 - Outfall 005AS41 CSO Peak Flow Rate



D.28.4 S-41 – OLYMPIA, SHALER AND WOODRUFF SEWERSHED – NPDES# 005AS41

Description of Outfall

Outfall S-41 conveys overflows from the ALCOSAN diversion chamber S-41 to Saw Mill Run. The outfall is located along Saw Mill Run adjacent to Shaler Street near the bridge to Woodville Avenue, in the City of Pittsburgh. The service area is called the Olympia, Shaler and Woodruff Sewershed and is 422 acres of residential, business and commercial users. The Olympia, Shaler and Woordruff Sewersheds are comprised of approximately 316 manholes and 85,283 linear feet (16.2 miles) of mostly combined sewer up to 48 inches in diameter. The S-41 sewershed (Shaler St.), consists of 106 acres, or approximately 25% of the total service area.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 005AS41 typically experiences 41 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 005AS41 is approximately 0.21 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 005AS41 is approximately 17.48 CFS. *Figure 1 – Outfall 005AS41 CSO Volume* and *Figure 2 – Outfall 005AS41 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

There appears to be a limited amount of available space for potential storage or treatment facilities in the vicinity of outfall 005AS41, north of Minotte Square in an existing parking facility. The site is generally bounded by Wabash Street to the east, private development to the north and south and McKnight Street to the west.

Figure 1 - Outfall 005AS41 CSO Volume

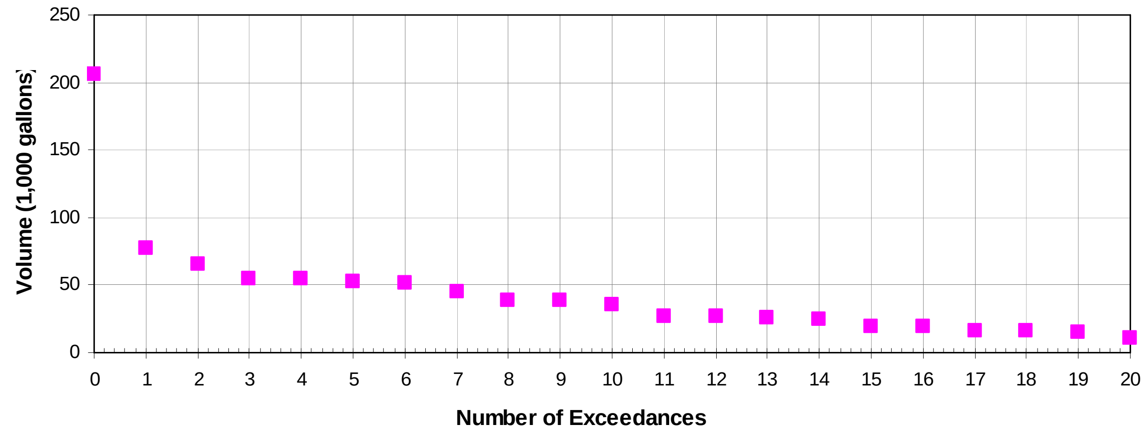
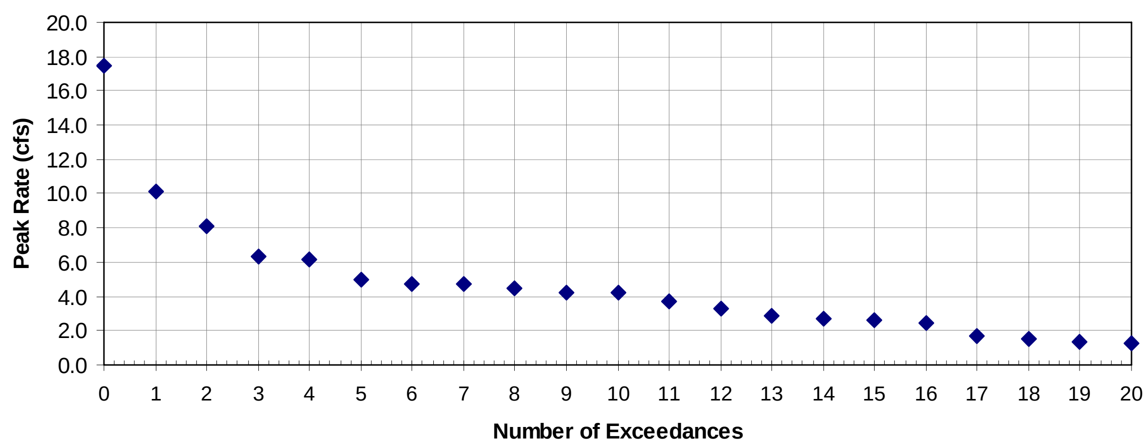


Figure 2 - Outfall 005AS41 CSO Peak Flow Rate



Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 005AS41. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-005AS41: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-005AS41: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-005AS41: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-005AS41: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-005AS41: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities.   Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-005AS41: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

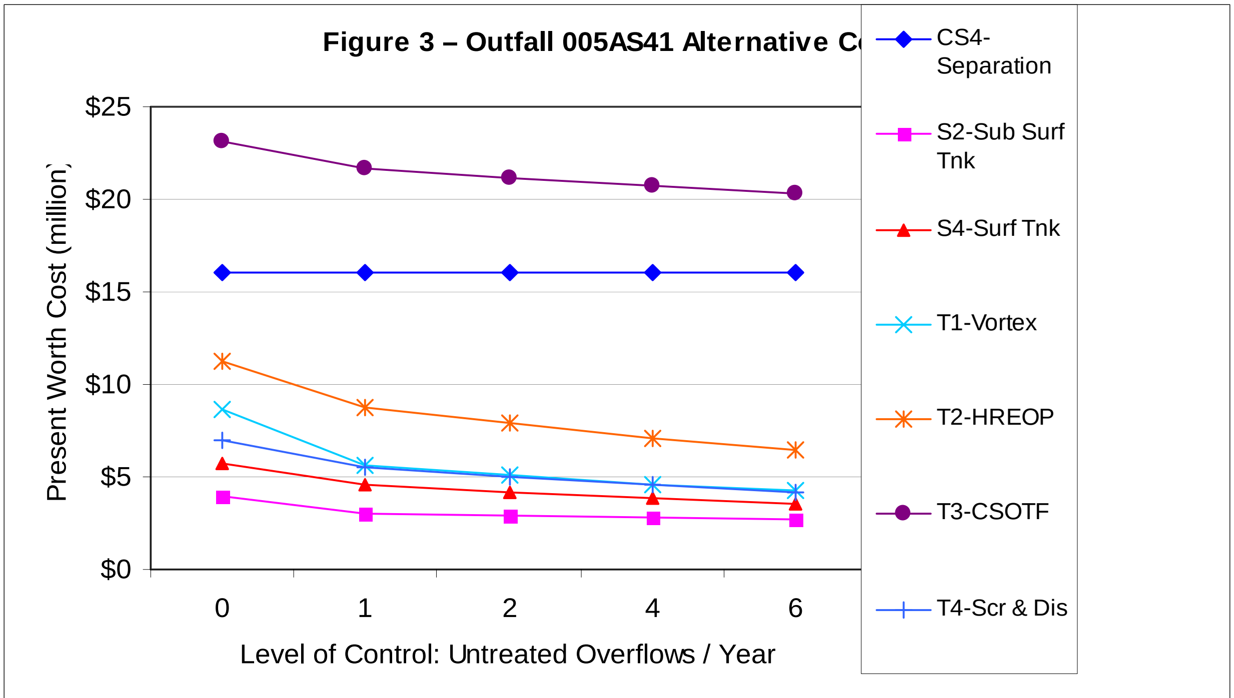
T4-005AS41: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 005AS41 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

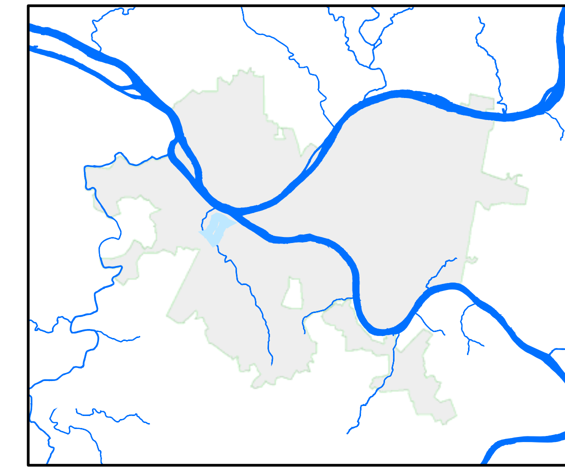
Recommendations

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-005AS41: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

It appears that space is available for the construction of a sub-surface storage facility for all control levels.



Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

500 0 500 Feet

Attachment 1
S-41
Tributary Area Map
Shaler St.
Sewershed

CSO Controls Alternatives

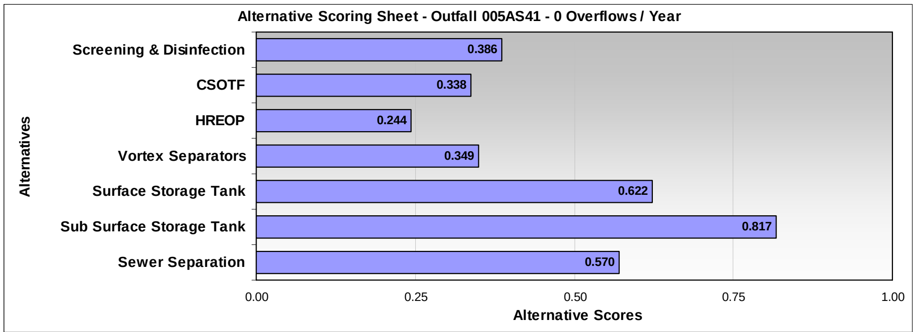
PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

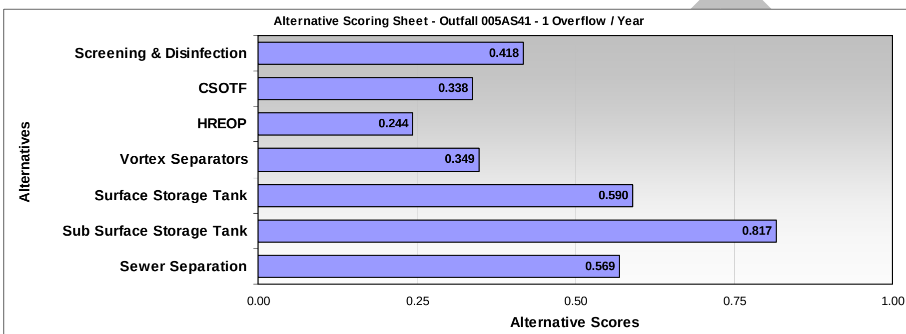
SW-D-0230.pdf

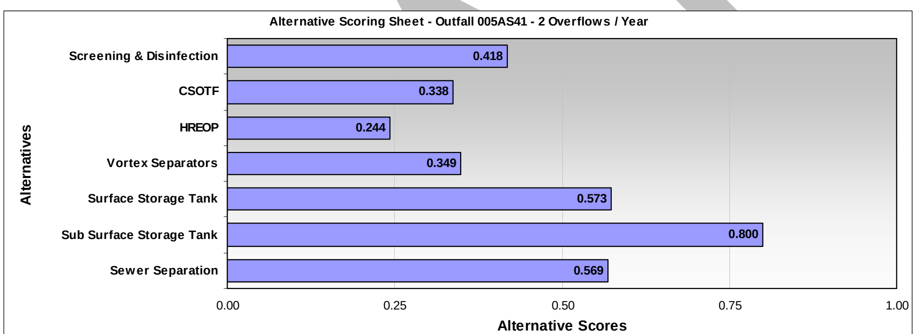
Attachment 2 - CSO Alternatives Development Worksheet

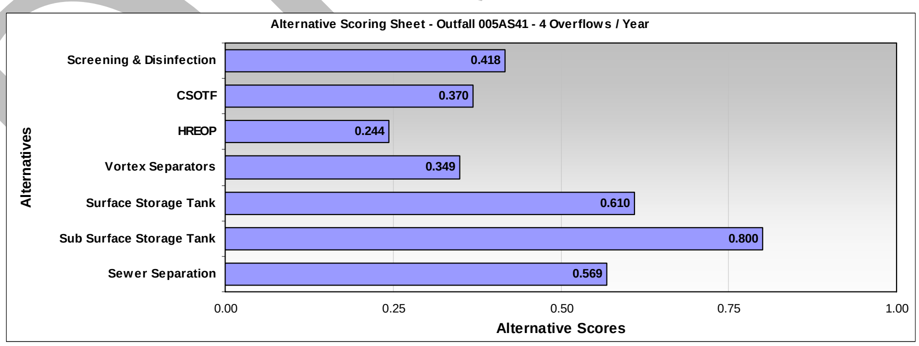
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not provide adequate CSO control.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only.
Sewer separation	Y	Sewer separation within the 106 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will be not evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

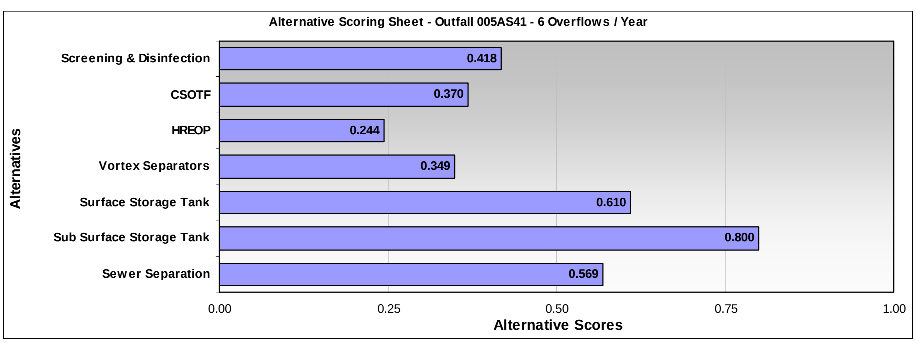
Attachment 3 – Alternative Scoring Sheet

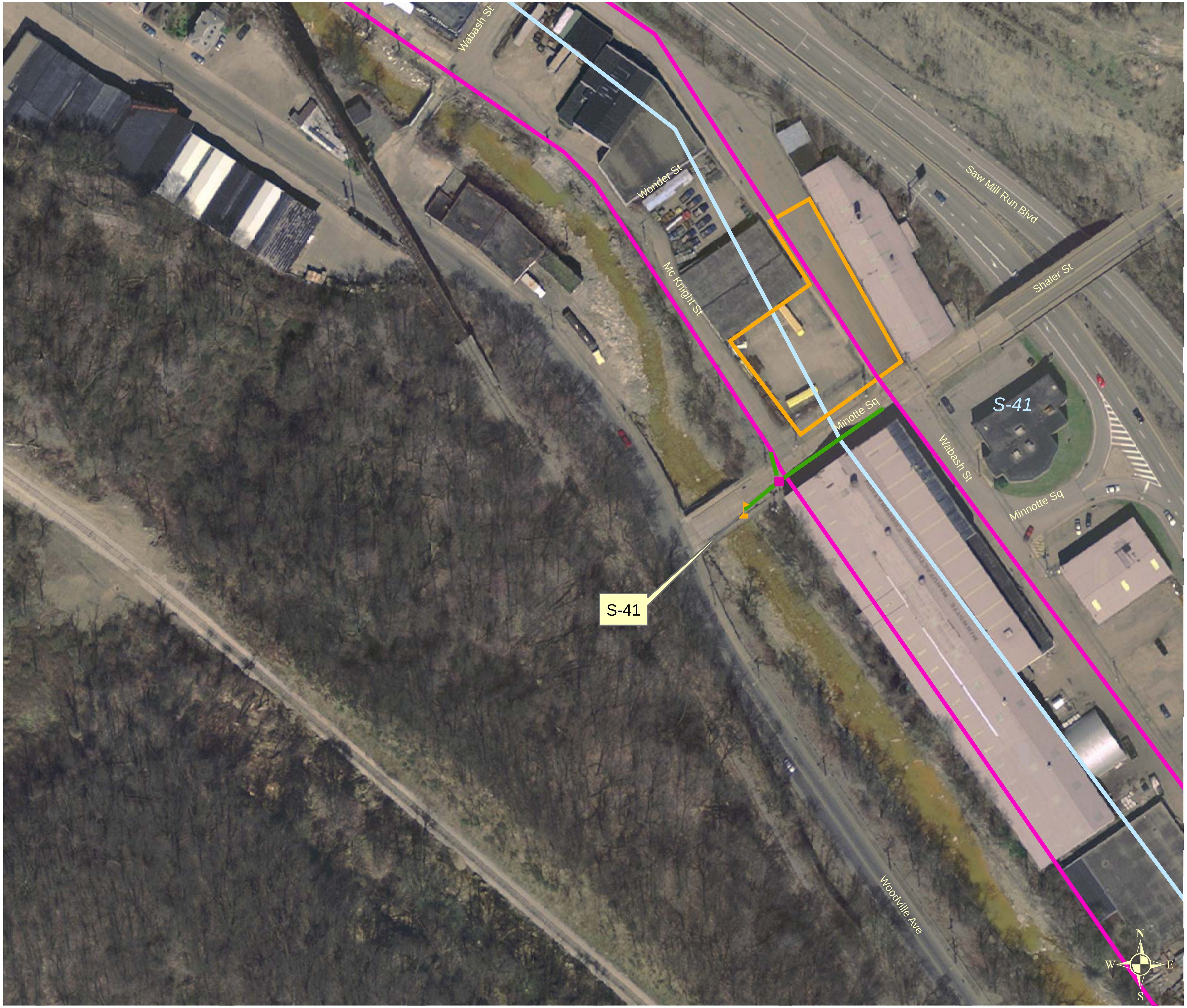


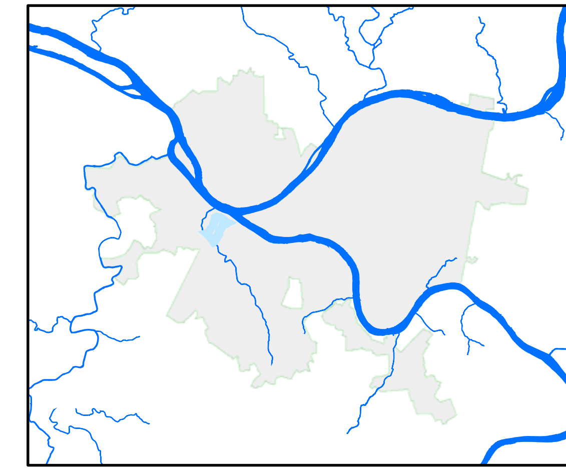












Area Overview

Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

Attachment 4
S-41
Facilities Boundary Map
Shaler St. Sewershed

CSO Controls Alternatives

PWSA

SW-D-0230.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: CS4-Separation		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	1	1	1	1	1
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: CS4-Separation		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: CS4-Separation		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	3	3	3	3	3
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	5	5	5	5	5
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	4	5	5	4
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	4	4	3	3	3
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	2	2	2	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	3	2	1	2
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	2	2	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	1	1	1	1	1
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	1	1	1	1	1
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.					
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T3-CSOTF		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	3	2	2	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	3	3	2	1	2
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.570**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.785**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.768**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.700**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.668**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.615**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.615**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.583**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.455**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.381**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.402**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.402**

Total Score

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.491**

Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.523**

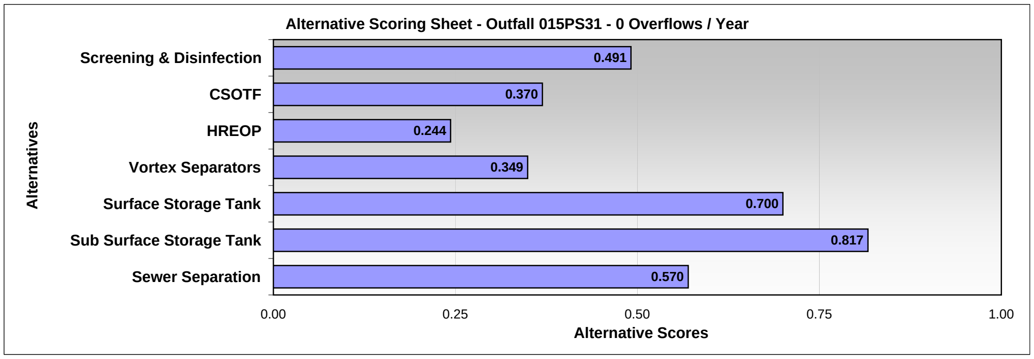
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.486**

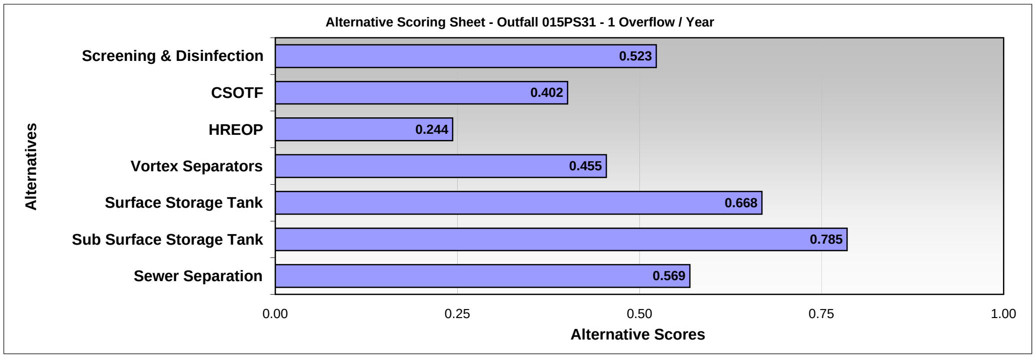
Total Score

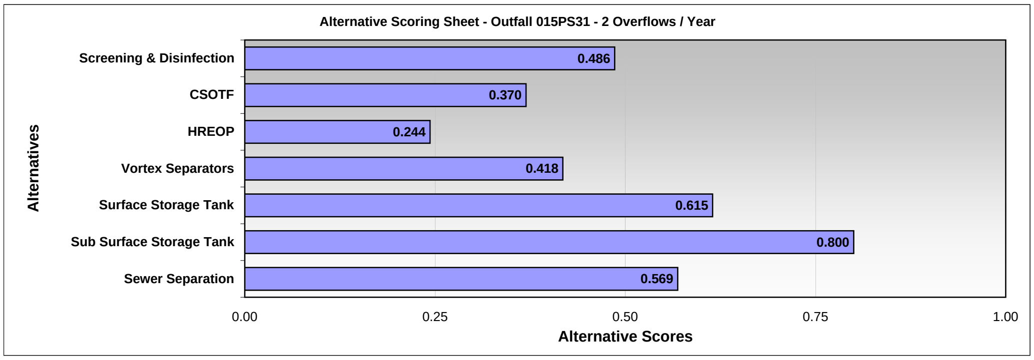
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.450**

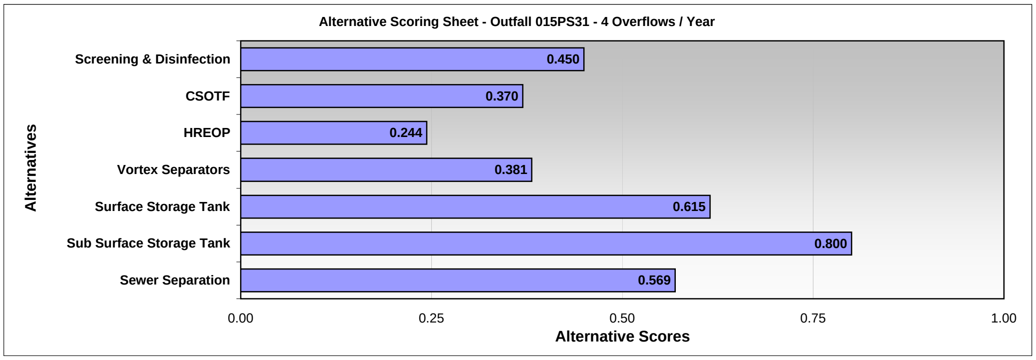
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.486**

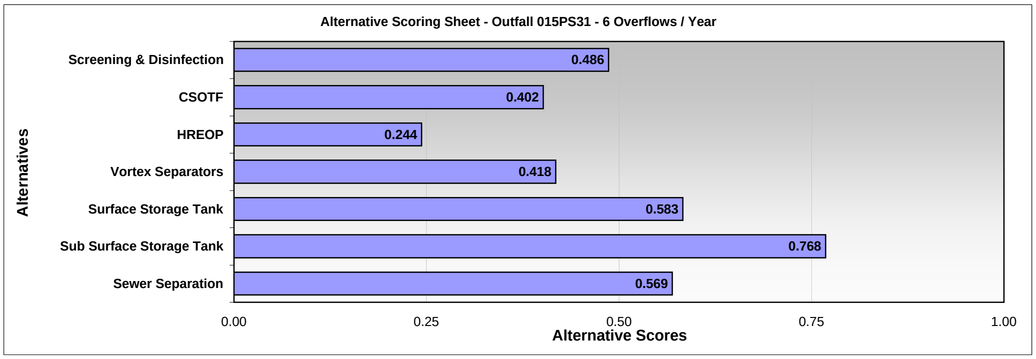
Alternative Scoring Sheet











RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	53,250	CF
	0.40	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	15.83	CFS
	10.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)				**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		45		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**9,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,602		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**39,000**		
			TOTAL CAPITAL COST $	**9,078,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	53,250	CF
	0.40	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	15.83	CFS
	10.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.40	53,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.47	62,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		80		= $(\text{Vol / SWD} * 1.5)^{1/2}$
Width (Ft)		53		= $(\text{Vol / SWD / } 1.5)^{1/2}$
Total Volume (MG / CF)		0.48	63,600	**Sufficient Volume**
Tank Area (SF)		4,000		= Length x Width
Construction Cost (Storage Tank)		**346,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		10.23	15.83	= Peak Rate
Force Main Diameter (In)		22		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,828,000**	**$ 30,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		15.83		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		93,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		470		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**51,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		10.23		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**886,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		25,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**4,293,000**

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Capital Costs

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	53,250	CF
	0.40	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	15.83	CFS
	10.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
SUB-SURFACE STORAGE TANK					
0 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank Default Value	
Sizing Basis: Peak Volume (MG / CF)		0.40		53,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.47		62,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		80			= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		53			= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		0.48		63,600	**Sufficient Volume**
Tank Area (SF)		4,000			= Length x Width
Construction Cost (Storage Tank)		**2,141,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.40		0.62	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		4			Input by Engineer
Force Main Velocity (FPS)		7.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**623,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		15.83			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		93,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,650			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**305,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		10.23			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**886,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes / Detention (Min)				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		25,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
			TOTAL CAPITAL COST	**$**	**4,121,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	53,250	CF
	0.40	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	15.83	CFS
	10.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
0 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		10.23		15.83	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		2			
Construction Cost (Swirl / Vortex)	**$**	**1,250,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		11.25		17.41	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		23			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,915,000**	**$**	**31,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		15.83			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		58,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		2,900			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**211,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		10.23			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**886,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		11.25			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		53		26	
Passes / Detention (Min)		3		**15.83**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**572,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		11,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**22,000**			
				TOTAL CAPITAL COST	**$ 6,249,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	53,250	CF
	0.40	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	15.83	CFS
	10.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SEDIMENTATION BASIN (CSOTF)				
0 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		10.23	15.83	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		61	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		31	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.17	22,692	
Construction Cost (CSOTF)	**$**	**16,381,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		10.23	15.83	= Peak Flow x % Req Pump
Force Main Diameter (In)		22		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,828,000**	**$ 30,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		15.83		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		34,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,700		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**139,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		10.23		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**886,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		10.23		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		51	24	
Passes / Detention (Min)		3	15.46	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**551,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		9,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**		
			TOTAL CAPITAL COST $	**20,935,000**

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RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	53,250	CF
	0.40	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	15.83	CFS
	10.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
0 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		10.23		15.83	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		130			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		17		OK	Input by Engineer
Width (Ft)		9		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**2,808,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		11.25		17.41	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		23			Input by Engineer
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,915,000**	**$**	**31,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		15.83			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		10.23			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**886,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		11.25			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		53		26	Input by Engineer
Passes / Detention (Min)		3		15.83	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	572,000	$	448,000	
Construction Cost (Disinfection)	**$**	**1,020,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		27,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**			
				TOTAL CAPITAL COST $	**7,842,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	53,250	CF
	0.40	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	15.83	CFS
	10.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		10.23		15.83	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**886,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		10.23		15.83	= Peak Flow x % Req Pump
Force Main Diameter (In)		22			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,828,000**	**$**	**30,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		15.83			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,200			=CFS x 200
Odor Control Flow Rate (CFM)		160			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**22,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		10.23			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		51		24	
Passes / Detention (Min)		3		**15.46**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	551,000	$	421,000	
Construction Cost (Disinfection)	**$**	**972,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST $	**4,886,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	17,884	CF
	0.13	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.17	CFS
	3.34	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		45		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**9,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,602		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**39,000**		
			TOTAL CAPITAL COST $	**9,078,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	17,884	CF
	0.13	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.17	CFS
	3.34	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31			
SURFACE STORAGE TANK			
1 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.13	18,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.16	21,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	47		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	32		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.17	22,560	**Sufficient Volume**
Tank Area (SF)	2,000		= Length x Width
Construction Cost (Storage Tank)	**105,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	3.34	5.17	= Peak Rate
Force Main Diameter (In)	13		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,942,000**	**$ 22,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	5.17		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	32,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	160		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**22,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	3.34		Ref: CSO Statistics
Construction Cost (Screening) $	**567,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	21,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**42,000**		
		TOTAL CAPITAL COST $	**2,802,000**

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RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	17,884	CF
	0.13	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.17	CFS
	3.34	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31

SUB-SURFACE STORAGE TANK

1 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.13		18,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.16		21,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		Sufficient Depth	Ref: Tech Parameters, Rev as Req'd
Length (Ft)		47			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		32			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.17		22,560	Sufficient Volume
Tank Area (SF)		2,000			= Length x Width
Construction Cost (Storage Tank)		**1,326,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.13		0.21	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3			Input by Engineer
Force Main Velocity (FPS)		4.2		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**398,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.17			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,600			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**132,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		3.34			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**567,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			Typ 2, Rev as Req'd
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			No Disinfection
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		21,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**			
			TOTAL CAPITAL COST	**$**	**2,581,000**

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RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	17,884	CF
	0.13	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.17	CFS
	3.34	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
1 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		3.34	5.17	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.67	5.68	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		13		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,997,000**	**$ 22,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		5.17		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.34		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**567,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		3.67		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		31	15	
Passes		3	**16.37**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**415,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		3,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**6,000**		
			TOTAL CAPITAL COST $	**3,369,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	17,884	CF
	0.13	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.17	CFS
	3.34	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
SEDIMENTATION BASIN (CSOTF)					
1 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		3.34		5.17	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		600			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		36		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		18		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.06		7,776	
Construction Cost (CSOTF)	**$**	**16,393,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.34		5.17	= Peak Flow x % Req Pump
Force Main Diameter (In)		13			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,942,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.17			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,000			=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		600			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**61,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.34			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**567,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		3.34			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		29		14	
Passes		3		**15.72**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**408,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		6,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**			
			TOTAL CAPITAL COST	**$**	**19,507,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	17,884	CF
	0.13	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.17	CFS
	3.34	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		3.34		5.17	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		40			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		10		OK	Input by Engineer
Width (Ft)		5		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,723,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.67		5.68	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		13			Input by Engineer
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,997,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.17			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		3.34			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**567,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		3.67			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		31		15	Input by Engineer
Passes		3		**16.37**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	415,000	$	260,000	
Construction Cost (Disinfection)	**$**	**675,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		23,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST $	**5,141,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	17,884	CF
	0.13	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.17	CFS
	3.34	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		3.34		5.17	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**567,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		3.34		5.17	= Peak Flow x % Req Pump
Force Main Diameter (In)		13			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,942,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.17			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=CFS x 200
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		3.34			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		29		14	
Passes		3		**15.72**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	408,000	$	246,000	
Construction Cost (Disinfection)	**$**	**654,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST $	**3,342,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	12,994	CF
	0.10	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.00	CFS
	3.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		45		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**9,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,602		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**39,000**		
			TOTAL CAPITAL COST $	**9,078,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	12,994	CF
	0.10	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.00	CFS
	3.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31

SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.10		13,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.11		15,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		40			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		27			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.12		16,200	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**74,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		3.23		5.00	= Peak Rate
Force Main Diameter (In)		12			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,924,000**	**$**	**21,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.00			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		23,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		120			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**17,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		3.23			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**562,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		21,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**			
				TOTAL CAPITAL COST $	**2,742,000**

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RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	12,994	CF
	0.10	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.00	CFS
	3.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
SUB-SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.10		13,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.11		15,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		40			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		27			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.12		16,200	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**1,213,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.10		0.15	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2			Input by Engineer
Force Main Velocity (FPS)		6.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**367,000**	**$**	**13,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.00			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		23,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,150			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**102,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.23			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**562,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		21,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**			
				TOTAL CAPITAL COST $	**2,401,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	12,994	CF
	0.10	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.00	CFS
	3.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
2 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	3.23	5.00	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	3.55	5.50	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	13		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,977,000**	**$ 22,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	5.00		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	3.23		Ref: CSO Statistics
Construction Cost (Screening) $	**562,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	3.55		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	30	15	
Passes	3	**16.37**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**413,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	3,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**6,000**		
		TOTAL CAPITAL COST $	**3,342,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	12,994	CF
	0.10	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.00	CFS
	3.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SEDIMENTATION BASIN (CSOTF)				
2 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		3.23	5.00	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		600		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		36	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		18	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.06	7,776	
Construction Cost (CSOTF)	**$**	**16,393,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.23	5.00	= Peak Flow x % Req Pump
Force Main Diameter (In)		12		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,924,000**	**$ 21,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		5.00		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**61,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.23		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**562,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		3.23		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		29	14	
Passes		3	**16.25**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**406,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		6,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**		
			TOTAL CAPITAL COST $	**19,481,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	12,994	CF
	0.10	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.00	CFS
	3.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		3.23		5.00	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		40			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		10		OK	Input by Engineer
Width (Ft)		5		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,706,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		3.55		5.50	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		13			Input by Engineer
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,977,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.00			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		3.23			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**562,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		3.55			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		30		15	Input by Engineer
Passes		3		16.37	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	413,000	$	255,000	
Construction Cost (Disinfection)	**$**	**668,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		23,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**5,092,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	12,994	CF
	0.10	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	5.00	CFS
	3.23	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SCREENING AND DISINFECTION				
2 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		3.23	5.00	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**562,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		3.23	5.00	= Peak Flow x % Req Pump
Force Main Diameter (In)		12		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,924,000**	**$ 21,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		5.00		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000		=CFS x 200
Odor Control Flow Rate (CFM)		50		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		3.23		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		29	14	
Passes		3	**16.25**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	406,000	$ 246,000	
Construction Cost (Disinfection)	**$**	**652,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		23,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST $	**3,316,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	8,017	CF
	0.06	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	4.86	CFS
	3.14	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		45		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**9,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,602		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**39,000**		
			TOTAL CAPITAL COST $	**9,078,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	8,017	CF
	0.06	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	4.86	CFS
	3.14	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.06	8,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.07	9,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		31		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		21		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.07	9,765	**Sufficient Volume**
Tank Area (SF)		1,000		= Length x Width
Construction Cost (Storage Tank)		**44,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		3.14	4.86	= Peak Rate
Force Main Diameter (In)		12		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,909,000**	**$ 21,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		4.86		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		14,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		70		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**11,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		3.14		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**558,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	**2,685,000**

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RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	8,017	CF
	0.06	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	4.86	CFS
	3.14	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31

SUB-SURFACE STORAGE TANK

4 Overflows / Year

1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.06	8,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.07	9,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	31		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	21		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.07	9,765	**Sufficient Volume**
Tank Area (SF)	1,000		= Length x Width
Construction Cost (Storage Tank)	**1,099,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.06	0.09	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	2		Input by Engineer
Force Main Velocity (FPS)	4.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**335,000**	**$ 13,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	4.86		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	14,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	700		= ACH x Volume / 60
Construction Cost (Odor Control) $	**69,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	3.14		Ref: CSO Statistics
Construction Cost (Screening) $	**558,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**40,000**		
		TOTAL CAPITAL COST $	**2,216,000**

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RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	8,017	CF
	0.06	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	4.86	CFS
	3.14	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		3.14		4.86	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.46		5.35	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		13			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,962,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		4.86			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.14			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**558,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		3.46			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		30		14	
Passes		3		**15.70**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**411,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		3,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**6,000**			
				TOTAL CAPITAL COST	**$ 3,321,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	8,017	CF
	0.06	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	4.86	CFS
	3.14	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		3.14	4.86	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		600		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		36	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		18	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.06	7,776	
Construction Cost (CSOTF)	**$**	**16,393,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		3.14	4.86	= Peak Flow x % Req Pump
Force Main Diameter (In)		12		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,909,000**	**$ 21,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		4.86		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**61,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		3.14		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**558,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		3.14		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		29	14	
Passes		3	16.70	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**404,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		6,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**		
			TOTAL CAPITAL COST $	**19,460,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	8,017	CF
	0.06	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	4.86	CFS
	3.14	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31						
HIGH RATE END OF PIPE TREATMENT (HREOP)						
4 Overflows / Year						
1. High Rate End of Pipe Treatment (HREOP) Parameters						
Sizing Basis: Peak Flow (MGD / CFS)		3.14		4.86	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		40			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		10		OK	Input by Engineer
Width (Ft)		5		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,693,000**			
2. Dewatering Pump Station / Force Main Parameters						
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		3.46		5.35	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		13			Input by Engineer
Force Main Velocity (FPS)		5.8		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,962,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters						
Peak Flow (CFS)		4.86			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters						
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters						
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		3.14			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**558,000**			
6. Disinfection Parameters						
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		3.46			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		30		14	Input by Engineer
Passes		3		15.70	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	411,000	$	250,000	
Construction Cost (Disinfection)	**$**	**661,000**			
7. Regulator Parameters						
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters						
Land Required - HREOP (SF)		23,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST $	**5,053,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	8,017	CF
	0.06	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	4.86	CFS
	3.14	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		3.14		4.86	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**558,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		3.14		4.86	= Peak Flow x % Req Pump
Force Main Diameter (In)		12			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,909,000**	**$**	**21,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		4.86			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=CFS x 200
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		3.14			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		29		14	
Passes		3		**16.70**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	404,000	$	246,000	
Construction Cost (Disinfection)	**$**	**650,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST $	**3,295,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	6,452	CF
	0.05	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	3.59	CFS
	2.32	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		45		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**9,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,602		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**39,000**		
			TOTAL CAPITAL COST $	**9,078,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	6,452	CF
	0.05	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	3.59	CFS
	2.32	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31			
SURFACE STORAGE TANK			
6 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.05	6,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.06	7,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	27		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	19		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.06	7,695	**Sufficient Volume**
Tank Area (SF)	1,000		= Length x Width
Construction Cost (Storage Tank)	**35,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	2.32	3.59	= Peak Rate
Force Main Diameter (In)	10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,767,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	3.59		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	11,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	60		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**10,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	2.32		Ref: CSO Statistics
Construction Cost (Screening) $	**520,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**40,000**		
		TOTAL CAPITAL COST $	**2,493,000**

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RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	6,452	CF
	0.05	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	3.59	CFS
	2.32	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31

SUB-SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.05	6,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.06	7,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	Sufficient Depth	Ref: Tech Parameters, Rev as Req'd
Length (Ft)		27		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		19		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.06	7,695	Sufficient Volume
Tank Area (SF)		1,000		= Length x Width
Construction Cost (Storage Tank)		**1,063,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.05	0.07	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2		Input by Engineer
Force Main Velocity (FPS)		3.4	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**326,000**	**$ 13,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.59		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		11,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		550		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**57,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		2.32		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**520,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		Typ 2, Rev as Req'd
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		No Disinfection
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	**2,121,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	6,452	CF
	0.05	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	3.59	CFS
	2.32	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
6 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		2.32	3.59	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.55	3.95	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		11		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,807,000**	**$ 20,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.59		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		2.32		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**520,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		2.55		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		26	12	
Passes		3	**15.80**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**392,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		2,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**4,000**		
			TOTAL CAPITAL COST	**$ 3,105,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	6,452	CF
	0.05	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	3.59	CFS
	2.32	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31				
SEDIMENTATION BASIN (CSOTF)				
6 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		2.32	3.59	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		29	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		15	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.04	5,220	
Construction Cost (CSOTF)	**$**	**16,395,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		2.32	3.59	= Peak Flow x % Req Pump
Force Main Diameter (In)		10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.6	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,767,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.59		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		400		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		2.32		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**520,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		2.32		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		25	12	
Passes		3	16.72	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**387,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		6,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**		
			TOTAL CAPITAL COST $	**19,247,000**

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RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	6,452	CF
	0.05	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	3.59	CFS
	2.32	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		2.32		3.59	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		30			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		9		OK	Input by Engineer
Width (Ft)		4		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,564,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		2.55		3.95	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		11			Input by Engineer
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,807,000**	**$**	**20,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.59			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		2.32			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**520,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		2.55			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		26		12	Input by Engineer
Passes		3		15.80	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	392,000	$	222,000	
Construction Cost (Disinfection)	**$**	**614,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		23,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**4,682,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	6,452	CF
	0.05	MG
Total Volume	201,656	CF
	1.51	MG
Peak Rate	3.59	CFS
	2.32	MGD

Capital Costs - 015PS31 / Sewershed ACSO 015PS31

SCREENING AND DISINFECTION

6 Overflows / Year

1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		2.32	3.59	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**520,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		2.32	3.59	= Peak Flow x % Req Pump
Force Main Diameter (In)		10		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,767,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.59		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		700		=CFS x 200
Odor Control Flow Rate (CFM)		40		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**7,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		2.32		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		25	12	
Passes		3	**16.72**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	387,000	$ 218,000	
Construction Cost (Disinfection)	**$**	**605,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		23,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST $	**3,066,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	10.23	$88,883	20	10.910	$969,712
	Tank O&M	No. Events / Yr	66	$41,415	50	14.484	$599,844
		Const Cost ($)	$346,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,303	20	10.910	$90,582
	Odor Control O&M	Capacity (cfm)	470	$1,645	20	10.910	$17,947
	Reserve / Replace	10% Gravity / 15% Pump					$14,087
			Total Annual O&M	**$141,000**		**Total PW O&M**	**$1,692,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.40	$10,162	20	10.910	$110,871
	Tank O&M	No. Events / Yr	66	$45,903	50	14.484	$664,839
		Const Cost ($)	$2,141,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,303	20	10.910	$90,582
	Odor Control O&M	Capacity (cfm)	4,650	$16,275	20	10.910	$177,559
	Reserve / Replace	10% Gravity / 15% Pump					$5,781
			Total Annual O&M	**$81,000**		**Total PW O&M**	**$1,050,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	10.23	$88,883	20	10.910	$969,712
	Sed. Basin O&M	Flow Rate (mgd)	10.23	$1,151	50	14.484	$16,671
	Screening O&M	Flow Rate (mgd)	10.23	$8,303	20	10.910	$90,582
	Disinfection O&M	Flow Rate (mgd)	10.23	$66,303	20	10.910	$723,362
	Odor Control O&M	Capacity (cfm)	1,700.00	$5,950	20	10.910	$64,914
	Reserve / Replace	10% Gravity / 15% Pump					$15,825
			Total Annual O&M	**$171,000**		**Total PW O&M**	**$1,881,000**

Operation and Maintenance Costs

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	11.25	$94,727	20	10.910	$1,033,468
	HREP O&M	Flow Rate (mgd)	10.23	$91,442	20	10.910	$997,624
	Screening O&M	Flow Rate (mgd)	10.23	$8,303	20	10.910	$90,582
	Disinfection O&M	Flow Rate (mgd)	11.25	$70,267	20	10.910	$766,605
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$23,567
			Total Annual O&M	**$266,000**		**Total PW O&M**	**$2,919,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	11.25	$94,727	20	10.910	$1,033,468
	Swirl / Vortex O&M	Flow Rate (mgd)	10.23	$1,151	20	10.910	$12,557
	Screening O&M	Flow Rate (mgd)	10.23	$8,303	20	10.910	$90,582
	Disinfection O&M	Flow Rate (mgd)	11.25	$70,267	20	10.910	$766,605
	Odor Control O&M	Capacity (cfm)	2,900.00	$10,150	20	10.910	$110,736
	Reserve / Replace	10% Gravity / 15% Pump					$18,133
			Total Annual O&M	**$185,000**		**Total PW O&M**	**$2,032,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	10.23	$88,883	20	10.910	$969,712
	Screening O&M	Flow Rate (mgd)	10.23	$8,303	20	10.910	$90,582
	Disinfection O&M	Flow Rate (mgd)	10.23	$66,303	20	10.910	$723,362
	Odor Control O&M	Capacity (cfm)	160.00	$560	20	10.910	$6,110
	Reserve / Replace	10% Gravity / 15% Pump					$15,507
			Total Annual O&M	**$165,000**		**Total PW O&M**	**$1,805,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.34	$42,060	20	10.910	$458,868
	Tank O&M	No. Events / Yr	66	$40,813	50	14.484	$591,117
		Const Cost ($)	$105,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	3	$7,714	20	10.910	$84,162
	Odor Control O&M	Capacity (cfm)	160	$560	20	10.910	$6,110
	Reserve / Replace	10% Gravity / 15% Pump					$9,525
			Total Annual O&M	**$92,000**		**Total PW O&M**	**$1,150,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.13	$4,902	20	10.910	$53,486
	Tank O&M	No. Events / Yr	66	$43,865	50	14.484	$635,329
		Const Cost ($)	$1,326,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	3	$7,714	20	10.910	$84,162
	Odor Control O&M	Capacity (cfm)	1,600	$5,600	20	10.910	$61,096
	Reserve / Replace	10% Gravity / 15% Pump					$3,525
			Total Annual O&M	**$63,000**		**Total PW O&M**	**$838,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	3.34	$42,060	20	10.910	$458,868
	Sed. Basin O&M	Flow Rate (mgd)	3.34	$376	50	14.484	$5,440
	Screening O&M	Flow Rate (mgd)	3.34	$7,714	20	10.910	$84,162
	Disinfection O&M	Flow Rate (mgd)	3.34	$33,514	20	10.910	$365,636
	Odor Control O&M	Capacity (cfm)	600.00	$2,100	20	10.910	$22,911
	Reserve / Replace	10% Gravity / 15% Pump					$10,741
			Total Annual O&M	**$86,000**		**Total PW O&M**	**$948,000**

Operation and Maintenance Costs

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	3.67	$44,825	20	10.910	$489,038
	HREP O&M	Flow Rate (mgd)	3.34	$47,326	20	10.910	$516,325
	Screening O&M	Flow Rate (mgd)	3.34	$7,714	20	10.910	$84,162
	Disinfection O&M	Flow Rate (mgd)	3.67	$35,518	20	10.910	$387,494
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$15,530
			Total Annual O&M	**$136,000**		**Total PW O&M**	**$1,494,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	3.67	$44,825	20	10.910	$489,038
	Swirl / Vortex O&M	Flow Rate (mgd)	3.34	$376	20	10.910	$4,097
	Screening O&M	Flow Rate (mgd)	3.34	$7,714	20	10.910	$84,162
	Disinfection O&M	Flow Rate (mgd)	3.67	$35,518	20	10.910	$387,494
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$10,819
			Total Annual O&M	**$89,000**		**Total PW O&M**	**$976,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	3.34	$42,060	20	10.910	$458,868
	Screening O&M	Flow Rate (mgd)	3.34	$7,714	20	10.910	$84,162
	Disinfection O&M	Flow Rate (mgd)	3.34	$33,514	20	10.910	$365,636
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$10,600
			Total Annual O&M	**$84,000**		**Total PW O&M**	**$921,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.23	$41,138	20	10.910	$448,814
	Tank O&M	No. Events / Yr	66	$40,735	50	14.484	$589,995
		Const Cost ($)	$74,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	3	$7,705	20	10.910	$84,062
	Odor Control O&M	Capacity (cfm)	120	$420	20	10.910	$4,582
	Reserve / Replace	10% Gravity / 15% Pump					$9,425
			Total Annual O&M	**$90,000**		**Total PW O&M**	**$1,137,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.10	$3,960	20	10.910	$43,207
	Tank O&M	No. Events / Yr	66	$43,583	50	14.484	$631,237
		Const Cost ($)	$1,213,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	3	$7,705	20	10.910	$84,062
	Odor Control O&M	Capacity (cfm)	1,150	$4,025	20	10.910	$43,913
	Reserve / Replace	10% Gravity / 15% Pump					$3,303
			Total Annual O&M	**$60,000**		**Total PW O&M**	**$806,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	3.23	$41,138	20	10.910	$448,814
	Sed. Basin O&M	Flow Rate (mgd)	3.23	$363	50	14.484	$5,262
	Screening O&M	Flow Rate (mgd)	3.23	$7,705	20	10.910	$84,062
	Disinfection O&M	Flow Rate (mgd)	3.23	$32,844	20	10.910	$358,324
	Odor Control O&M	Capacity (cfm)	600.00	$2,100	20	10.910	$22,911
	Reserve / Replace	10% Gravity / 15% Pump					$10,649
			Total Annual O&M	**$85,000**		**Total PW O&M**	**$930,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	3.55	$43,843	20	10.910	$478,322
	HREP O&M	Flow Rate (mgd)	3.23	$46,412	20	10.910	$506,353
	Screening O&M	Flow Rate (mgd)	3.23	$7,705	20	10.910	$84,062
	Disinfection O&M	Flow Rate (mgd)	3.55	$34,807	20	10.910	$379,745
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$15,383
			Total Annual O&M	**$133,000**		**Total PW O&M**	**$1,466,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	3.55	$43,843	20	10.910	$478,322
	Swirl / Vortex O&M	Flow Rate (mgd)	3.23	$363	20	10.910	$3,964
	Screening O&M	Flow Rate (mgd)	3.23	$7,705	20	10.910	$84,062
	Disinfection O&M	Flow Rate (mgd)	3.55	$34,807	20	10.910	$379,745
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$10,718
			Total Annual O&M	**$87,000**		**Total PW O&M**	**$957,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	3.23	$41,138	20	10.910	$448,814
	Screening O&M	Flow Rate (mgd)	3.23	$7,705	20	10.910	$84,062
	Disinfection O&M	Flow Rate (mgd)	3.23	$32,844	20	10.910	$358,324
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$10,507
			Total Annual O&M	**$82,000**		**Total PW O&M**	**$904,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.14	$40,398	20	10.910	$440,737
	Tank O&M	No. Events / Yr	66	$40,660	50	14.484	$588,909
		Const Cost ($)	$44,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	3	$7,698	20	10.910	$83,983
	Odor Control O&M	Capacity (cfm)	70	$245	20	10.910	$2,673
	Reserve / Replace	10% Gravity / 15% Pump					$9,336
			Total Annual O&M	**$90,000**		**Total PW O&M**	**$1,126,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.06	$2,868	20	10.910	$31,291
	Tank O&M	No. Events / Yr	66	$43,298	50	14.484	$627,109
		Const Cost ($)	$1,099,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	3	$7,698	20	10.910	$83,983
	Odor Control O&M	Capacity (cfm)	700	$2,450	20	10.910	$26,729
	Reserve / Replace	10% Gravity / 15% Pump					$3,072
			Total Annual O&M	**$57,000**		**Total PW O&M**	**$772,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	3.14	$40,398	20	10.910	$440,737
	Sed. Basin O&M	Flow Rate (mgd)	3.14	$354	50	14.484	$5,121
	Screening O&M	Flow Rate (mgd)	3.14	$7,698	20	10.910	$83,983
	Disinfection O&M	Flow Rate (mgd)	3.14	$32,304	20	10.910	$352,439
	Odor Control O&M	Capacity (cfm)	600.00	$2,100	20	10.910	$22,911
	Reserve / Replace	10% Gravity / 15% Pump					$10,571
			Total Annual O&M	**$83,000**		**Total PW O&M**	**$916,000**

Operation and Maintenance Costs

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	3.46	$43,054	20	10.910	$469,714
	HREP O&M	Flow Rate (mgd)	3.14	$45,676	20	10.910	$498,323
	Screening O&M	Flow Rate (mgd)	3.14	$7,698	20	10.910	$83,983
	Disinfection O&M	Flow Rate (mgd)	3.46	$34,236	20	10.910	$373,508
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$15,270
			Total Annual O&M	**$131,000**		**Total PW O&M**	**$1,443,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	3.46	$43,054	20	10.910	$469,714
	Swirl / Vortex O&M	Flow Rate (mgd)	3.14	$354	20	10.910	$3,858
	Screening O&M	Flow Rate (mgd)	3.14	$7,698	20	10.910	$83,983
	Disinfection O&M	Flow Rate (mgd)	3.46	$34,236	20	10.910	$373,508
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$10,641
			Total Annual O&M	**$86,000**		**Total PW O&M**	**$942,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	3.14	$40,398	20	10.910	$440,737
	Screening O&M	Flow Rate (mgd)	3.14	$7,698	20	10.910	$83,983
	Disinfection O&M	Flow Rate (mgd)	3.14	$32,304	20	10.910	$352,439
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$10,430
			Total Annual O&M	**$81,000**		**Total PW O&M**	**$889,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.32	$32,979	20	10.910	$359,796
	Tank O&M	No. Events / Yr	66	$40,638	50	14.484	$588,583
		Const Cost ($)	$35,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,629	20	10.910	$83,229
	Odor Control O&M	Capacity (cfm)	60	$210	20	10.910	$2,291
	Reserve / Replace	10% Gravity / 15% Pump					$8,651
			Total Annual O&M	**$82,000**		**Total PW O&M**	**$1,043,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.05	$2,481	20	10.910	$27,066
	Tank O&M	No. Events / Yr	66	$43,208	50	14.484	$625,806
		Const Cost ($)	$1,063,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,629	20	10.910	$83,229
	Odor Control O&M	Capacity (cfm)	550	$1,925	20	10.910	$21,002
	Reserve / Replace	10% Gravity / 15% Pump					$2,900
			Total Annual O&M	**$56,000**		**Total PW O&M**	**$760,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	2.32	$32,979	20	10.910	$359,796
	Sed. Basin O&M	Flow Rate (mgd)	2.32	$261	50	14.484	$3,780
	Screening O&M	Flow Rate (mgd)	2.32	$7,629	20	10.910	$83,229
	Disinfection O&M	Flow Rate (mgd)	2.32	$26,848	20	10.910	$292,907
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$9,799
			Total Annual O&M	**$70,000**		**Total PW O&M**	**$765,000**

Operation and Maintenance Costs

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	2.55	$35,147	20	10.910	$383,451
	HREP O&M	Flow Rate (mgd)	2.32	$38,205	20	10.910	$416,811
	Screening O&M	Flow Rate (mgd)	2.32	$7,629	20	10.910	$83,229
	Disinfection O&M	Flow Rate (mgd)	2.55	$28,453	20	10.910	$310,417
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$14,132
			Total Annual O&M	**$110,000**		**Total PW O&M**	**$1,210,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	2.55	$35,147	20	10.910	$383,451
	Swirl / Vortex O&M	Flow Rate (mgd)	2.32	$261	20	10.910	$2,847
	Screening O&M	Flow Rate (mgd)	2.32	$7,629	20	10.910	$83,229
	Disinfection O&M	Flow Rate (mgd)	2.55	$28,453	20	10.910	$310,417
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$9,853
			Total Annual O&M	**$72,000**		**Total PW O&M**	**$790,000**

ACSO 015PS31	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	2.32	$32,979	20	10.910	$359,796
	Screening O&M	Flow Rate (mgd)	2.32	$7,629	20	10.910	$83,229
	Disinfection O&M	Flow Rate (mgd)	2.32	$26,848	20	10.910	$292,907
	Odor Control O&M	Capacity (cfm)	40.00	$140	20	10.910	$1,527
	Reserve / Replace	10% Gravity / 15% Pump					$9,695
			Total Annual O&M	**$68,000**		**Total PW O&M**	**$747,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$9.1	$9,078,000	$0
1	$9.1	$9,078,000	$0
2	$9.1	$9,078,000	$0
4	$9.1	$9,078,000	$0
6	$9.1	$9,078,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$5.2	$4,121,000	$1,050,000
1	$3.4	$2,581,000	$838,000
2	$3.2	$2,401,000	$806,000
4	$3.0	$2,216,000	$772,000
6	$2.9	$2,121,000	$760,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$6.0	$4,293,000	$1,692,000
1	$4.0	$2,802,000	$1,150,000
2	$3.9	$2,742,000	$1,137,000
4	$3.8	$2,685,000	$1,126,000
6	$3.5	$2,493,000	$1,043,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$8.3	$6,249,000	$2,032,000
1	$4.3	$3,369,000	$976,000
2	$4.3	$3,342,000	$957,000
4	$4.3	$3,321,000	$942,000
6	$3.9	$3,105,000	$790,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$10.8	$7,842,000	$2,919,000
1	$6.6	$5,141,000	$1,494,000
2	$6.6	$5,092,000	$1,466,000
4	$6.5	$5,053,000	$1,443,000
6	$5.9	$4,682,000	$1,210,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$22.8	$20,935,000	$1,881,000
1	$20.5	$19,507,000	$948,000
2	$20.4	$19,481,000	$930,000
4	$20.4	$19,460,000	$916,000
6	$20.0	$19,247,000	$765,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$6.7	$4,886,000	$1,805,000
1	$4.3	$3,342,000	$921,000
2	$4.2	$3,316,000	$904,000
4	$4.2	$3,295,000	$889,000
6	$3.8	$3,066,000	$747,000

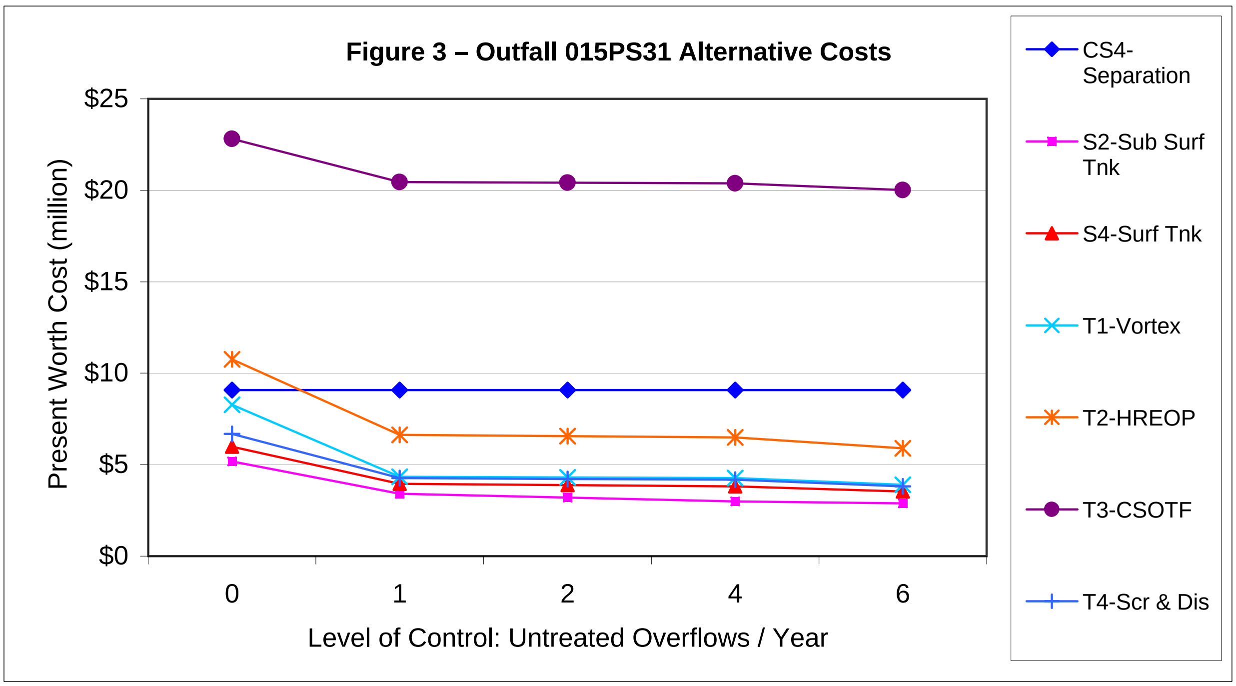


Figure 3 – Outfall 015PS31 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 015PS31
Location Name	Boggston Avenue
Model ID	ADC 015PS31.2
Structure Type	Outfall
PWSA Sewershed	Olympia, Shaler and Woodruff Streets
Stream of Discharge	Saw Mill Run
NPDES Permit Number	015PS31
Owner	ALCOSAN
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	66
Peak Volume:	53,250 ft^3
	0.40 MG
Total Volume:	201,656 ft^3
	1.51 MG
Peak Rate:	15.83 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
8/20/2005 18:15	138	8/20/2005 19:00	53249.83	398.335	0	15.83	0
5/13/2005 22:30	158	5/13/2005 22:45	17884.07	133.782	1	5.00	2
7/5/2005 16:20	119	7/5/2005 17:00	12993.77	97.200	2	4.86	3
1/5/2005 13:06	1307	1/5/2005 14:30	12056.30	90.187	3	1.02	25
11/29/2005 6:45	334	11/29/2005 7:15	8016.66	59.969	4	1.11	22
11/14/2005 21:40	389	11/14/2005 23:00	7017.49	52.494	5	1.29	18
7/26/2005 19:45	39	7/26/2005 20:00	6451.94	48.264	6	4.86	4
7/15/2005 17:36	48	7/15/2005 18:00	6231.91	46.618	7	4.26	5
8/29/2005 11:30	144	8/29/2005 13:45	5730.97	42.871	8	5.17	1
1/11/2005 8:41	546	1/11/2005 11:30	4802.21	35.923	9	1.09	23
3/28/2005 9:05	614	3/28/2005 19:15	4357.27	32.595	10	0.72	31
5/11/2005 22:35	90	5/11/2005 22:45	3946.74	29.524	11	1.97	14
10/22/2005 3:35	239	10/22/2005 6:45	3831.98	28.665	12	1.65	16
4/23/2005 3:40	66	4/23/2005 4:00	3612.36	27.022	13	2.18	12
9/29/2005 5:30	64	9/29/2005 5:45	3532.89	26.428	14	3.59	6
7/21/2005 14:25	29	7/21/2005 14:45	2784.35	20.828	15	2.66	7
5/23/2005 16:15	35	5/23/2005 16:30	2737.28	20.476	16	2.32	11
5/14/2005 16:05	60	5/14/2005 16:15	2401.29	17.963	17	2.51	8
11/9/2005 19:30	24	11/9/2005 19:45	2143.62	16.035	18	2.41	10
2/20/2005 19:22	86	2/20/2005 20:30	2126.70	15.909	19	0.93	27
1/12/2005 0:50	59	1/12/2005 1:30	1998.86	14.952	20	1.04	24
1/3/2005 8:53	689	1/3/2005 13:45	1922.29	14.380	21	0.40	45
8/27/2005 15:15	29	8/27/2005 15:30	1904.28	14.245	22	2.43	9
2/9/2005 15:09	108	2/9/2005 16:45	1893.83	14.167	23	1.26	19
5/28/2005 8:25	80	5/28/2005 9:30	1874.09	14.019	24	0.64	34
4/1/2005 19:36	853	4/2/2005 6:45	1729.46	12.937	25	0.42	43
1/8/2005 4:36	76	1/8/2005 5:25	1631.70	12.206	26	0.57	37
1/13/2005 22:48	225	1/14/2005 2:15	1610.79	12.050	27	0.56	38
12/15/2005 13:30	409	12/15/2005 14:00	1446.62	10.821	28	0.72	30
1/5/2005 2:47	242	1/5/2005 5:00	1415.99	10.592	29	0.34	50
10/7/2005 10:15	49	10/7/2005 10:45	1219.84	9.125	30	0.64	33
11/9/2005 4:20	19	11/9/2005 4:30	1143.87	8.557	31	1.86	15
7/25/2005 13:20	19	7/25/2005 13:30	1067.04	7.982	32	2.02	13

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
10/25/2005 1:31	153	10/25/2005 3:45	1021.34	7.640	33	0.31	51
6/14/2005 19:05	29	6/14/2005 19:15	982.92	7.353	34	1.13	21
9/16/2005 21:35	18	9/16/2005 21:45	833.62	6.236	35	1.43	17
10/22/2005 15:47	62	10/22/2005 16:30	766.55	5.734	36	0.52	39
10/21/2005 19:00	94	10/21/2005 19:15	721.40	5.396	37	0.44	42
9/23/2005 2:45	20	9/23/2005 3:00	655.95	4.907	38	0.79	28
2/14/2005 6:09	835	2/14/2005 19:45	636.44	4.761	39	0.23	55
7/17/2005 16:30	20	7/17/2005 16:45	625.47	4.679	40	0.72	32
9/26/2005 5:45	244	9/26/2005 9:30	606.30	4.535	41	0.36	47
3/23/2005 12:05	106	3/23/2005 12:30	593.56	4.440	42	0.26	52
11/1/2005 15:07	87	11/1/2005 16:30	569.73	4.262	43	0.36	46
3/27/2005 16:50	74	3/27/2005 17:00	569.70	4.262	44	0.51	40
8/26/2005 20:50	28	8/26/2005 21:00	553.97	4.144	45	0.75	29
4/22/2005 15:56	157	4/22/2005 18:00	524.81	3.926	46	0.26	53
5/7/2005 12:10	84	5/7/2005 13:30	513.39	3.840	47	0.58	36
6/3/2005 8:50	29	6/3/2005 9:15	505.29	3.780	48	0.47	41
11/16/2005 4:10	25	11/16/2005 4:15	453.39	3.392	49	0.95	26
10/21/2005 7:20	29	10/21/2005 7:30	436.70	3.267	50	0.42	44
10/24/2005 13:09	142	10/24/2005 14:30	403.71	3.020	51	0.16	56
3/23/2005 2:26	171	3/23/2005 2:45	395.05	2.955	52	0.26	54
6/28/2005 18:10	10	6/28/2005 18:15	363.40	2.718	53	1.21	20
4/20/2005 19:36	227	4/20/2005 23:15	314.72	2.354	54	0.35	48
8/8/2005 8:55	22	8/8/2005 9:00	267.43	2.001	55	0.62	35
10/25/2005 17:19	49	10/25/2005 17:55	263.31	1.970	56	0.12	63
11/8/2005 14:46	32	11/8/2005 15:15	228.31	1.708	57	0.15	58
4/27/2005 0:32	32	4/27/2005 0:45	207.59	1.553	58	0.14	59
2/16/2005 7:16	50	2/16/2005 7:30	181.50	1.358	59	0.12	64
10/26/2005 7:20	14	10/26/2005 7:30	172.80	1.293	60	0.35	49
11/16/2005 11:26	23	11/16/2005 11:30	149.19	1.116	61	0.15	57
12/25/2005 12:36	26	12/25/2005 12:45	133.08	0.996	62	0.14	61
5/28/2005 18:13	20	5/28/2005 18:30	123.39	0.923	63	0.14	60
5/20/2005 6:06	13	5/20/2005 6:15	74.37	0.556	64	0.13	62
5/14/2005 9:22	11	5/14/2005 9:30	39.08	0.292	65	0.08	65

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 015PS31
Location Name	Boggston Avenue
Model ID	ADC 015PS31.2
Structure Type	Outfall
PWSA Sewershed	Olympia, Shaler and Woodruff Streets
Stream of Discharge	Saw Mill Run
NPDES Permit Number	015PS31
Owner	ALCOSAN
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	66
Peak Volume:	53,250 ft^3
	0.40 MG
Total Volume:	201,656 ft^3
	1.51 MG
Peak Rate:	15.83 cfs

Figure 1 - Outfall 015PS31 CSO Volume

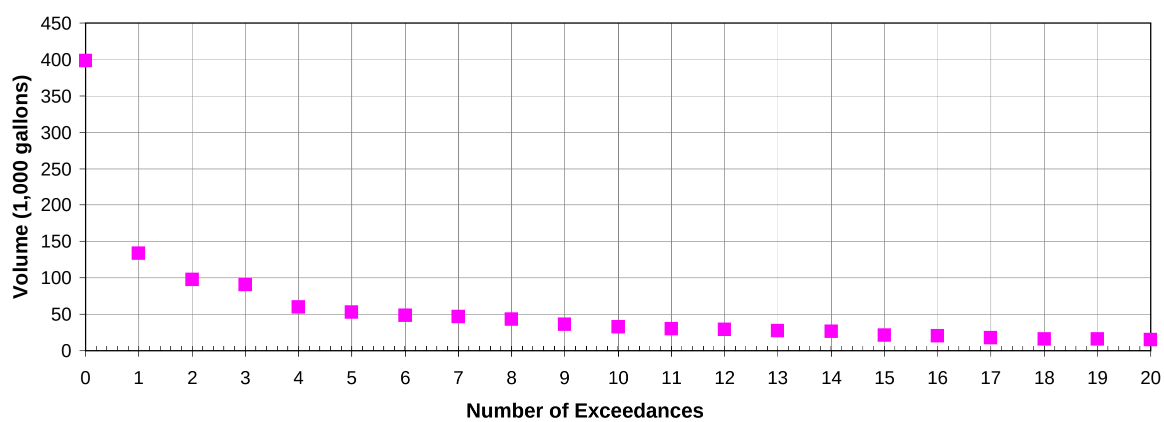
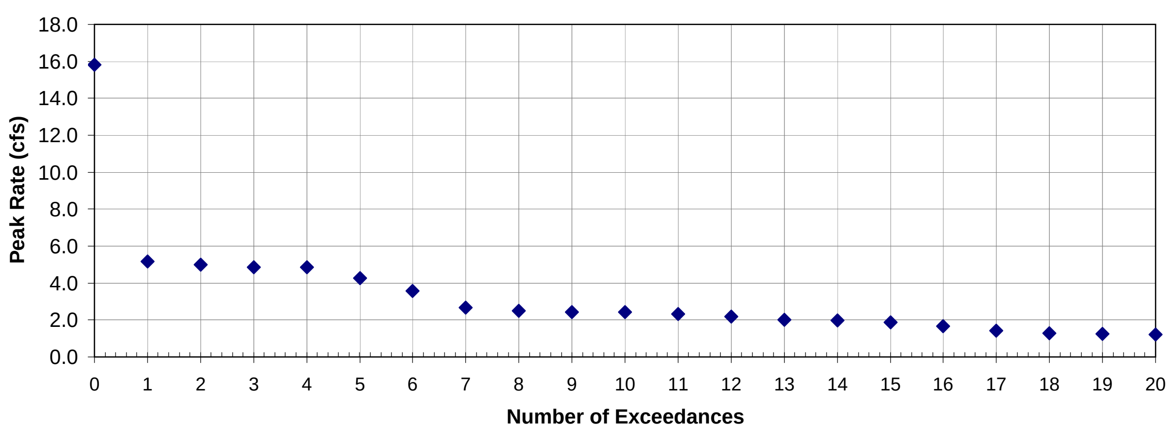


Figure 2 - Outfall 015PS31 CSO Peak Flow Rate



D.28.5 OLYMPIA, SHALER, AND WOODRUFF STREETS SEWERSHED – BOGGSTON AVENUE – NPDES# 015PS31

Description of Outfall

Outfall 015PS31 conveys overflows from ALCOSAN diversion chamber S-31 to Saw Mill Run, and ultimately into the Ohio River. The outfall is located along Saw Mill Run, near the Liberty Tunnels and Saw Mill Run Boulevard, in an area now or formerly owned by Gilbert Auto Wreckers. The Olympia, Shaler, and Woodruff Streets Sewershed consists of 422 acres of residential, business and commercial users. The Olympia, Shaler and Woordruff Sewersheds are comprised of approximately 316 manholes and 85,283 linear feet (16.2 miles) of mostly combined sewers up to 48 inches in diameter. The S-31 sewershed (Boggston Ave.) consists of 45 acres, or approximately 11% of the total service area.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 015PS31 typically experiences 66 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 015PS31 is approximately 0.40 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 015PS31 is approximately 15.83 CFS. *Figure 1 – Outfall 015PS31 CSO Volume* and *Figure 2 – Outfall 015PS31 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

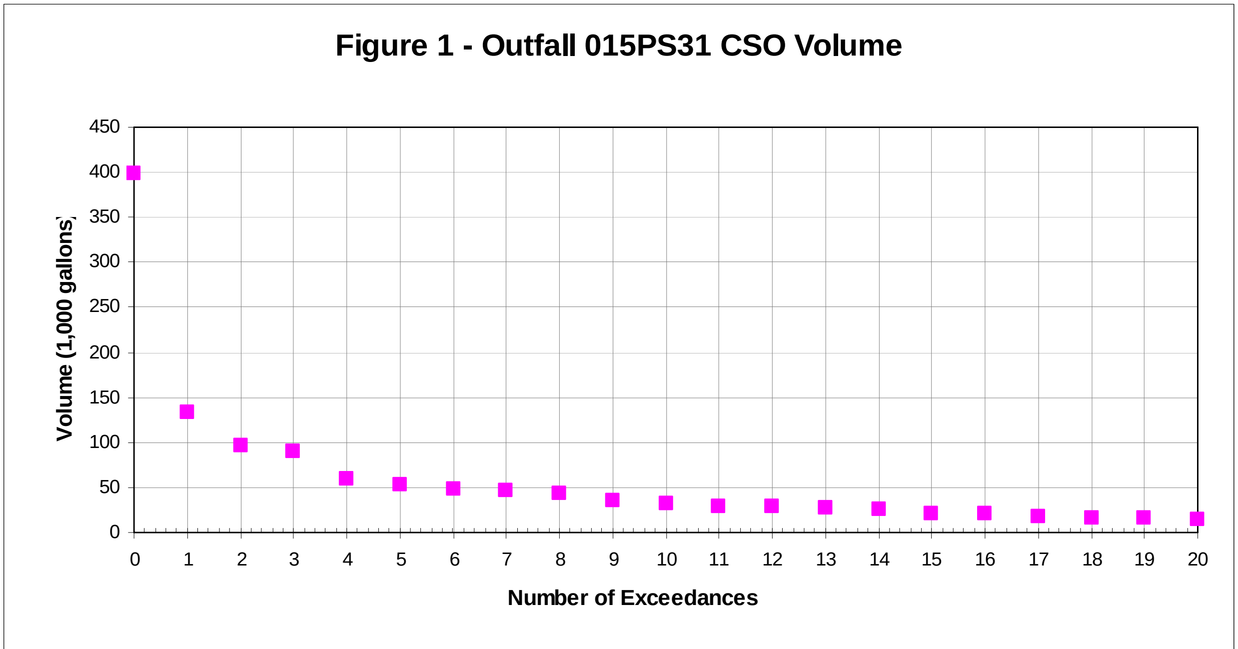


Figure 1 - Outfall 015PS31 CSO Volume
Volume (1,000 gallons)
450
400
350
300
250
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

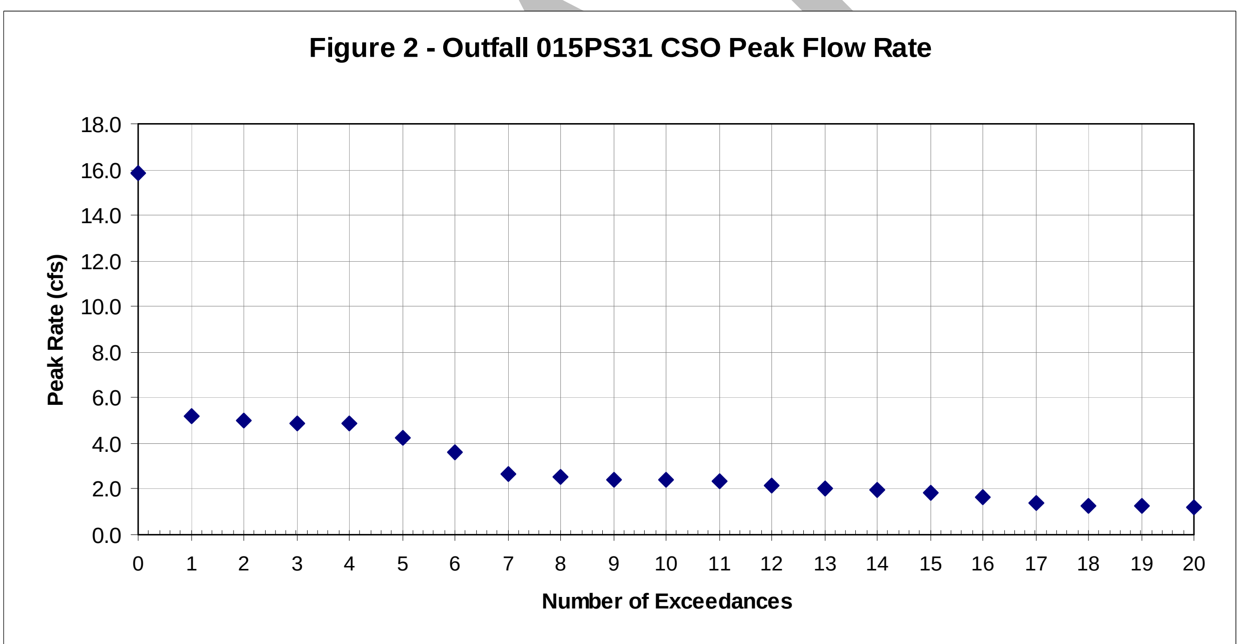


Figure 2 - Outfall 015PS31 CSO Peak Flow Rate
Peak Rate (cfs)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

There appears to be a limited amount of available space for potential storage or treatment facilities to the west of the existing Liberty Tunnels, adjacent to Saw Mill Run. The site is generally bounded by Saw Mill Run to the south, the Liberty Tunnels to the east and steep slopes and private development to the north and west. Within the boundaries of this critical infrastructure, there appears to be limited potential space for a storage or treatment facility.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 015PS31. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-015PS31: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-015PS31: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-015PS31: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-015PS31: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-015PS31: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-015PS31: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

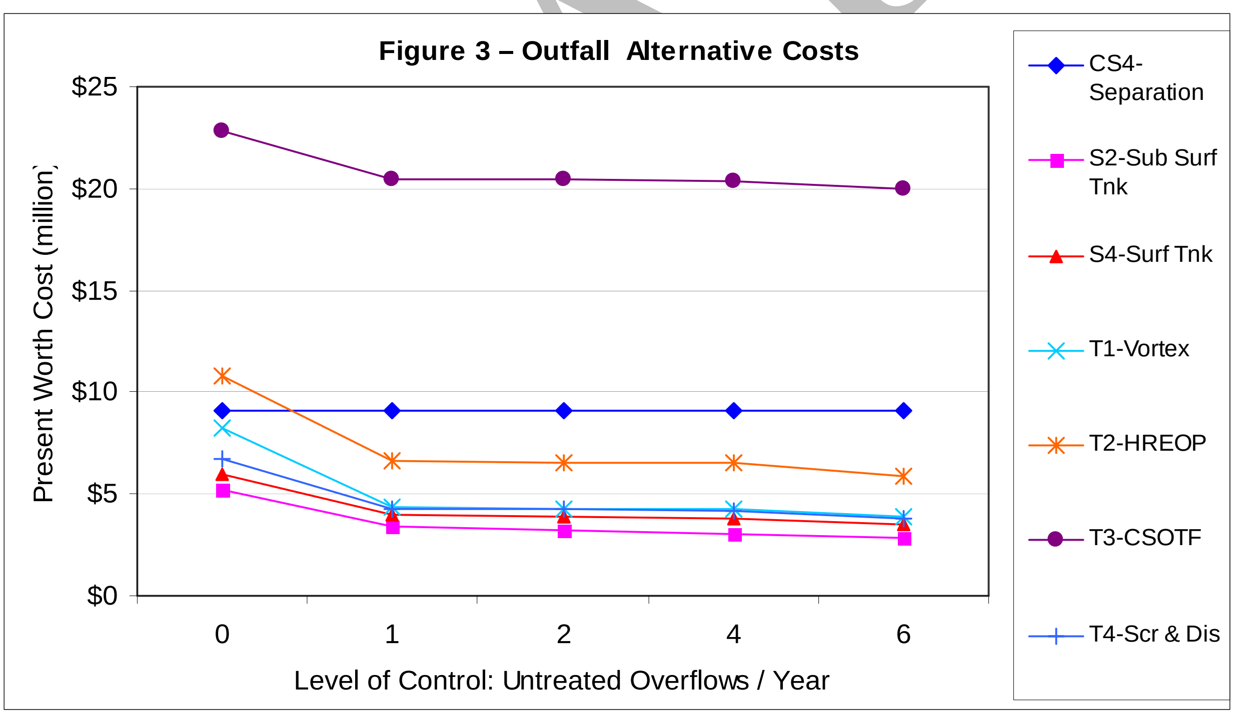
T4-015PS31: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 015PS31 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

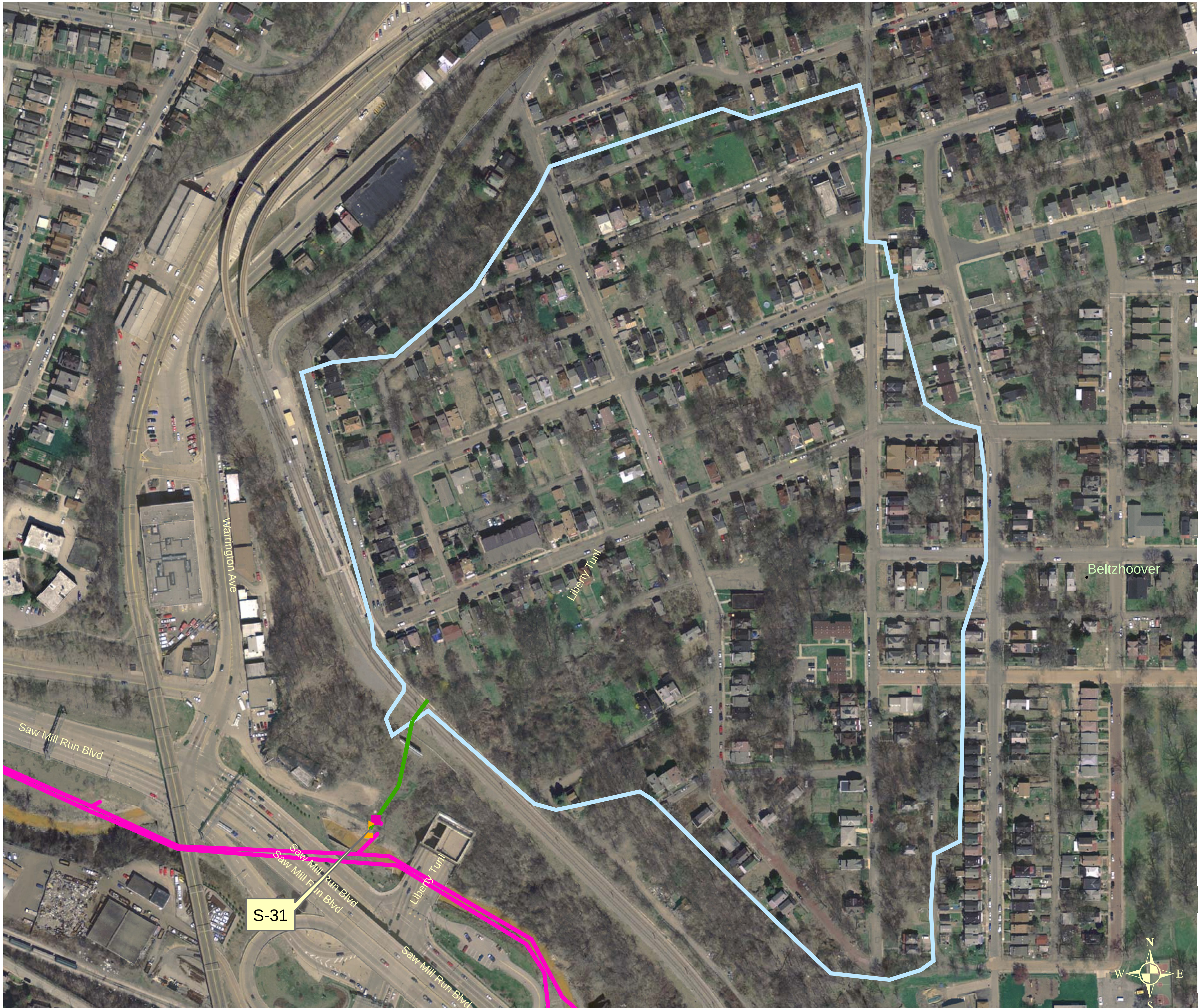
Recommendations

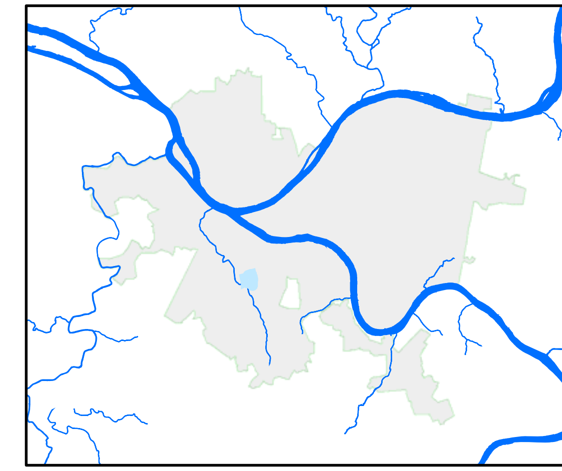
Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-015PS31: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

It appears that space is limited for a storage facility. However, since the site requires a relatively small storage area, it appears that an adequate site could be procured for construction of the facility.





Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

200 0 200
Feet

Attachment 1
S-31
Tributary Area Map
Olympia/Shaler/Woodruff Sewershed

CSO Controls Alternatives

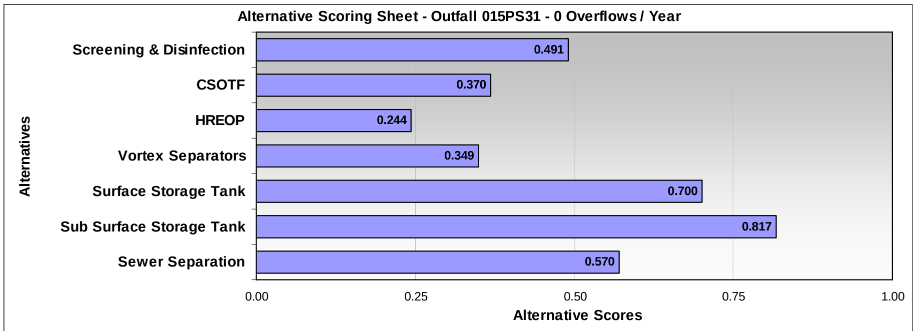
PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

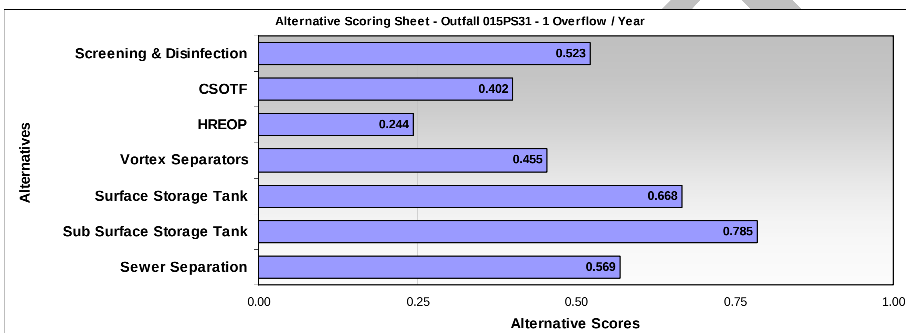
SW-D-0232.pdf

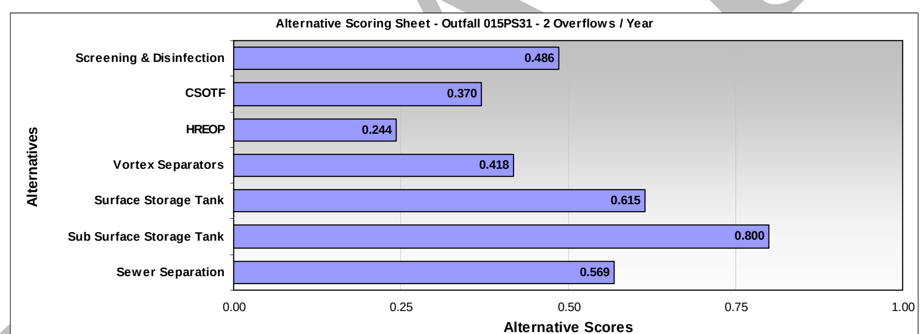
Attachment 2 - CSO Alternatives Development Worksheet

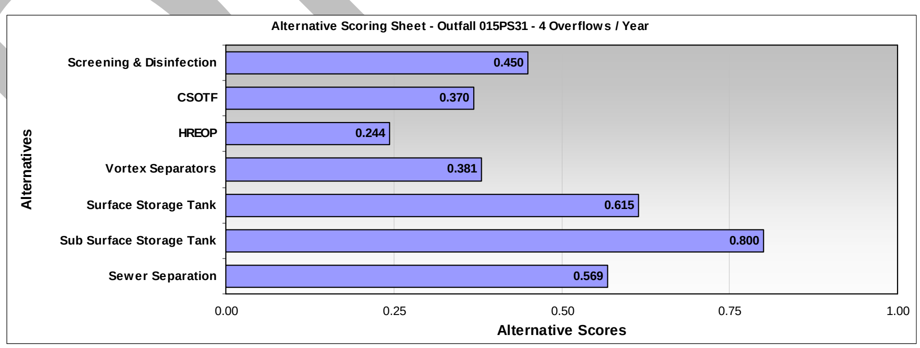
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not provide adequate CSO control.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only.
Sewer separation	Y	Sewer separation within the 45 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will be not evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

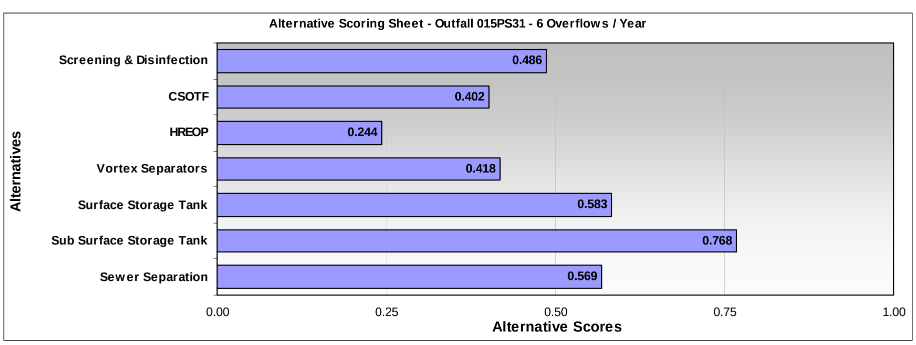
Attachment 3 – Alternative Scoring Sheet

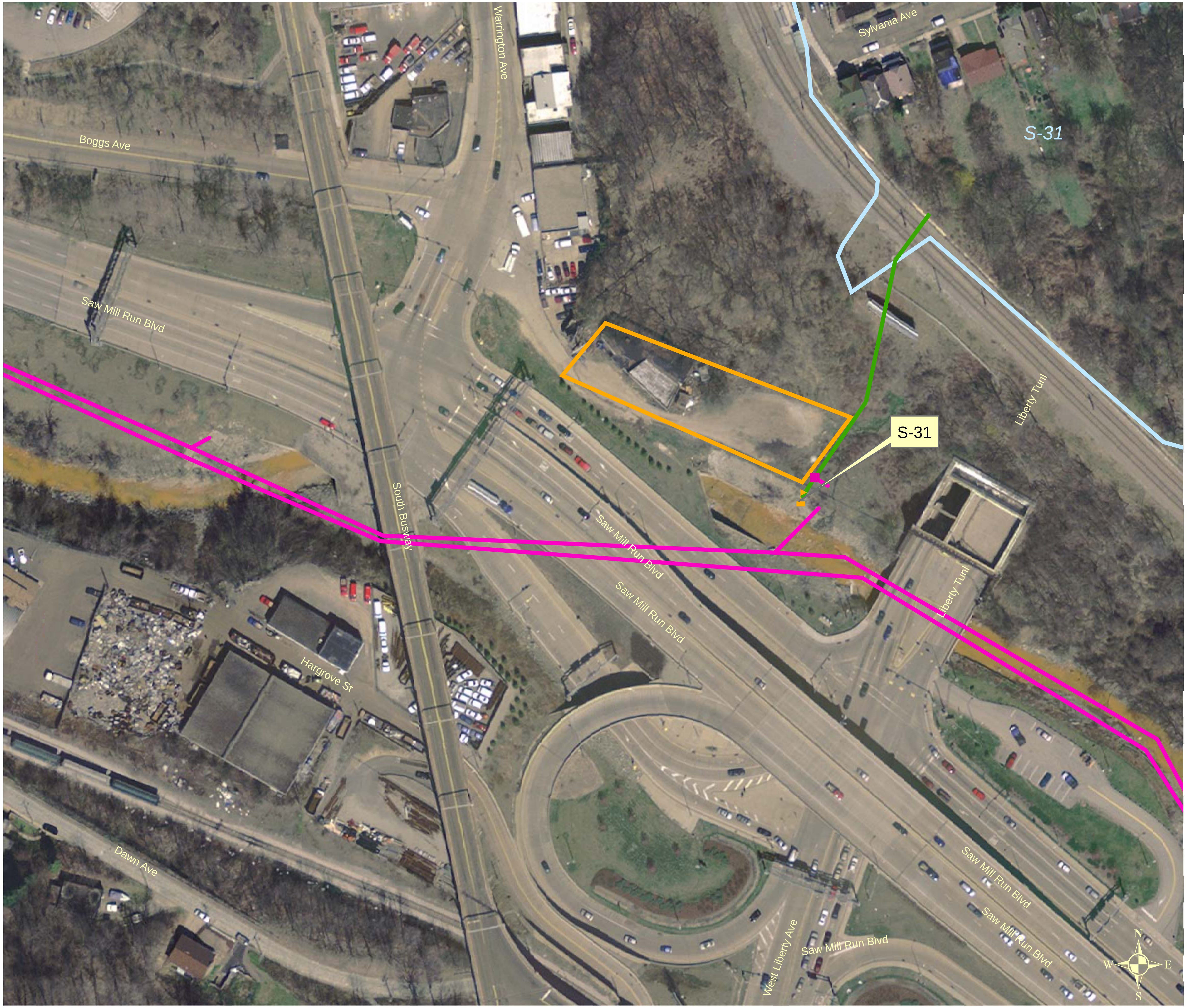


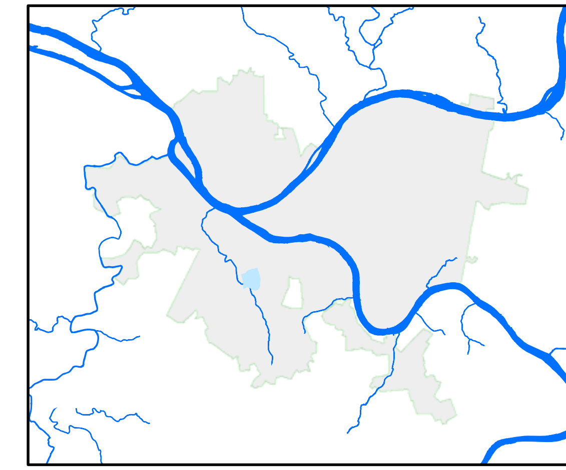












Area Overview

Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

Attachment 4
S-31
Facilities Boundary Map
Olympia/Shaler/Woodruff Sewershed

CSO Controls Alternatives

PWSA

SW-D-0232.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	3	3	2	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	2	2	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	3	3	3	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	4	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	2
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.614**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.751**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.735**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.698**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.661**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.568**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.605**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.588**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.552**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.520**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.487**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.288**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.558**

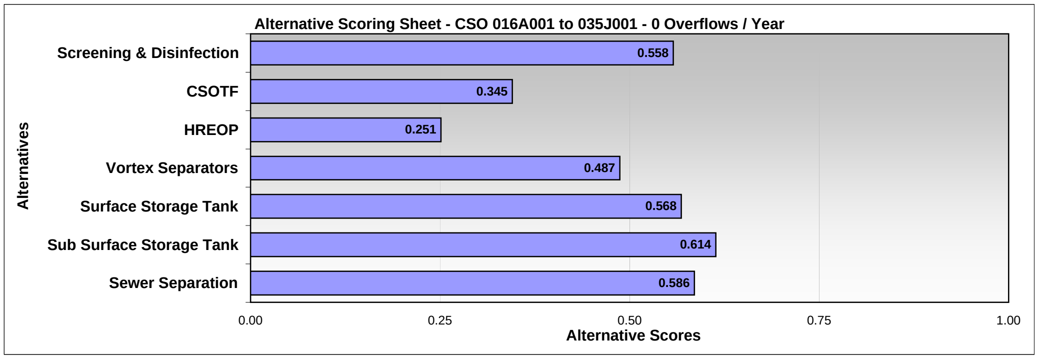
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

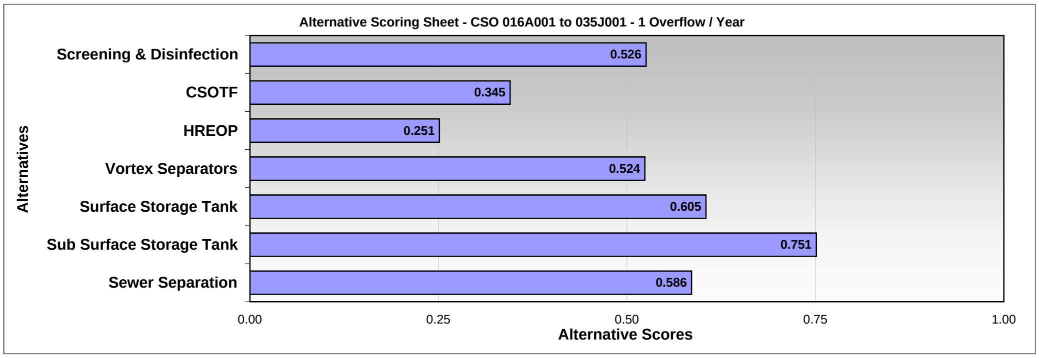
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

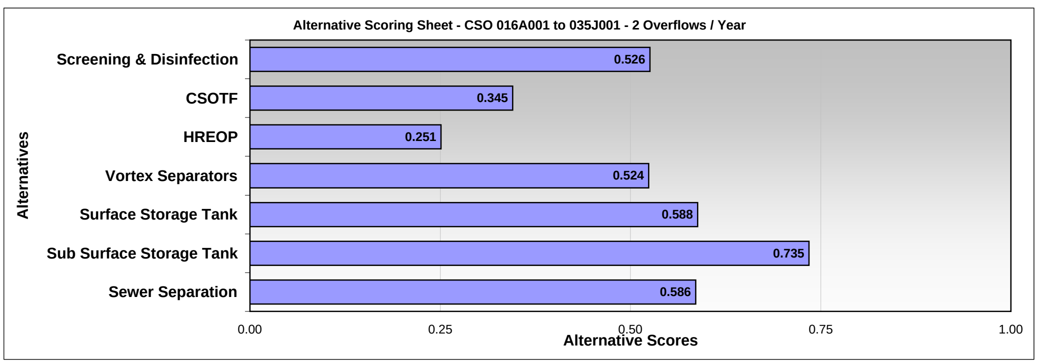
Total Score

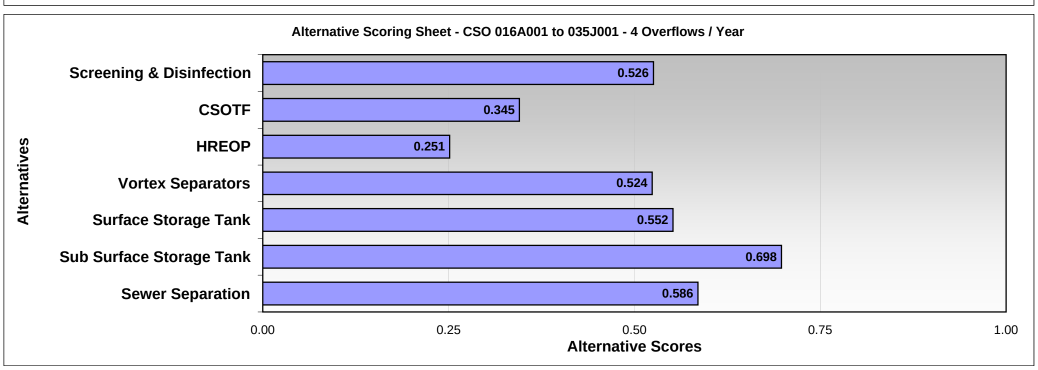
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

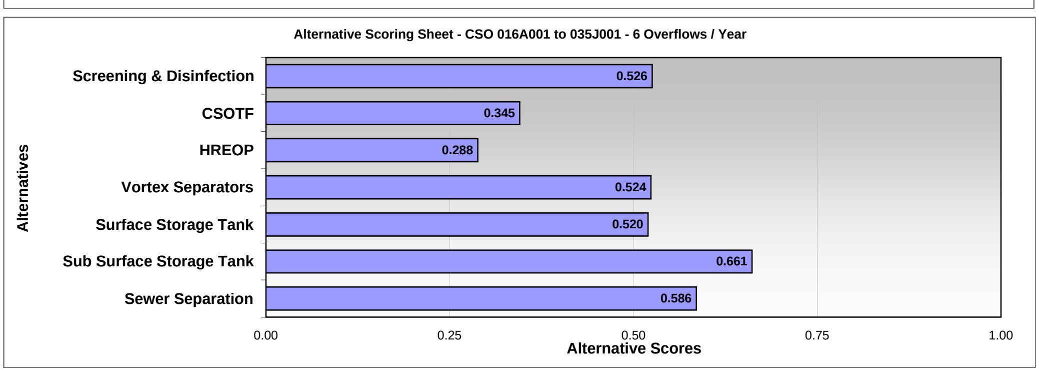
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**


Alternative Scoring Sheet - CSO 016A001 to 035J001 - 0 Overflows / Year
Alternatives
Screening & Disinfection 0.558
CSOTF 0.345
HREOP 0.251
Vortex Separators 0.487
Surface Storage Tank 0.568
Sub Surface Storage Tank 0.614
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - CSO 016A001 to 035J001 - 1 Overflow / Year
Alternatives
Screening & Disinfection 0.526
CSOTF 0.345
HREOP 0.251
Vortex Separators 0.524
Surface Storage Tank 0.605
Sub Surface Storage Tank 0.751
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - CSO 016A001 to 035J001 - 2 Overflows / Year
Alternatives
Screening & Disinfection 0.526
CSOTF 0.345
HREOP 0.251
Vortex Separators 0.524
Surface Storage Tank 0.588
Sub Surface Storage Tank 0.735
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - CSO 016A001 to 035J001 - 4 Overflows / Year
Alternatives
Screening & Disinfection 0.526
CSOTF 0.345
HREOP 0.251
Vortex Separators 0.524
Surface Storage Tank 0.552
Sub Surface Storage Tank 0.698
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - CSO 016A001 to 035J001 - 6 Overflows / Year
Alternatives
Screening & Disinfection 0.526
CSOTF 0.345
HREOP 0.288
Vortex Separators 0.524
Surface Storage Tank 0.520
Sub Surface Storage Tank 0.661
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	0	
Peak Volume	467,888	CF
	3.50	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	51.96	CFS
	33.58	MGD

#N/A			
CONSOLIDATION SEWERS			
0 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		5,875	Input by Engineer
Peak Flow (CFS)		12.99	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	919,000	
Peak Flow (CFS)		25.98	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		38.97	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		51.96	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,840,000	
Construction Cost (Consolidation Sewers)	**$**	**5,219,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections			Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 5,351,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	0	
Peak Volume	467,888	CF
	3.50	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	51.96	CFS
	33.58	MGD

		#N/A		
		SEWER SEPARATION		
		0 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		207		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		-		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,050,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		5		Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**195,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		90,169		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**180,000**		
			TOTAL CAPITAL COST	**$ 31,425,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	0	
Peak Volume	467,888	CF
	3.50	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	51.96	CFS
	33.58	MGD

#N/A				
SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.50	468,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.12	551,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		236		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		157		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.16	555,780	**Sufficient Volume**
Tank Area (SF)		37,000		= Length x Width
Construction Cost (Storage Tank)		**3,694,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		33.58	51.96	= Peak Rate
Force Main Diameter (In)		40		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,748,000**	**$ 48,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		51.96		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		827,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,140		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**279,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		33.58		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,967,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.50		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.75		= Peak Vol/DW Time
Construction Cost	**$**	**8,849,644**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		71,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**142,000**		
			TOTAL CAPITAL COST	**$ 26,377,644**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	0	
Peak Volume	467,888	CF
	3.50	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	51.96	CFS
	33.58	MGD

#N/A				
SUB-SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.50	468,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.12	551,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		236		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		157		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.16	555,780	**Sufficient Volume**
Tank Area (SF)		37,000		= Length x Width
Construction Cost (Storage Tank)		**11,692,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.50	5.42	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		13		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,969,000**	**$ 22,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		51.96		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		827,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		41,350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,692,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		33.58		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,967,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.50		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.75		= Peak Vol/DW Time
Construction Cost	**$**	**8,849,644**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		71,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**142,000**		
			TOTAL CAPITAL COST	**$ 31,983,644**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	0	
Peak Volume	467,888	CF
	3.50	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	51.96	CFS
	33.58	MGD

#N/A

SWIRL CONCENTRATOR / VORTEX SEPARATOR

0 Overflows / Year

1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		33.58		51.96	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		4			
Construction Cost (Swirl / Vortex)	**$**	**2,584,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		36.94		57.15	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		42			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,158,000**	**$**	**51,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		51.96			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		115,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		5,750			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**361,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		33.58			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,967,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		36.94			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		96		46	
Passes / Detention (Min)		3		**15.45**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,060,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		35,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**			
			TOTAL CAPITAL COST	**$**	**17,901,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	0	
Peak Volume	467,888	CF
	3.50	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	51.96	CFS
	33.58	MGD

#N/A					
SEDIMENTATION BASIN (CSOTF)					
0 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		33.58		51.96	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		5,600			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		107		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		53		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.51		68,052	
Construction Cost (CSOTF)	**$**	**16,372,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		33.58		51.96	= Peak Rate
Force Main Diameter (In)		40			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,748,000**	**$**	**48,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		51.96			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		102,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		5,100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**328,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		33.58			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,967,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		33.58			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		91		44	
Passes / Detention (Min)		3		**15.41**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**999,000**			
7. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.51			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.25			= Peak Vol/DW Time
Construction Cost	**$**	**8,123,544**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
9. Land Acquisition Parameters					
Land Required - CSOTF (SF)		19,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**			
				TOTAL CAPITAL COST	**$ 39,273,544**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	0	
Peak Volume	467,888	CF
	3.50	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	51.96	CFS
	33.58	MGD

#N/A

HIGH RATE END OF PIPE TREATMENT (HREOP)

0 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		33.58		51.96	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		400			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		29		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		15		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**6,552,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		36.94		57.15	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		42			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,158,000**	**$**	**51,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		51.96			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		10,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		500			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**53,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		33.58			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,967,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		36.94			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		96		46	
Passes / Detention (Min)		3		**15.45**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,060,000	$	943,000	
Construction Cost (Disinfection)	**$**	**2,003,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		37,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**74,000**			
				TOTAL CAPITAL COST	**$ 22,508,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	0	
Peak Volume	467,888	CF
	3.50	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	51.96	CFS
	33.58	MGD

#N/A					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		33.58		51.96	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,967,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		33.58		51.96	= Peak Flow x % Req Pump
Force Main Diameter (In)		40			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,748,000**	**$**	**48,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		51.96			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		10,400			=CFS x 200
Odor Control Flow Rate (CFM)		520			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**55,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		33.58			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		91		44	
Passes / Detention (Min)		3		**15.41**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	999,000	$	880,000	
Construction Cost (Disinfection)	**$**	**1,879,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		26,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST	**$ 15,399,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	1	
Peak Volume	132,787	CF
	0.99	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	47.51	CFS
	30.70	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	1 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		5,875	Width of Sewershed along Riverline
Peak Flow (CFS)		12.99	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	919,000	
Peak Flow (CFS)		25.98	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		38.97	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		51.96	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,840,000	
Construction Cost (Consolidation Sewers)	**$**	**5,219,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 5,351,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	1	
Peak Volume	132,787	CF
	0.99	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	47.51	CFS
	30.70	MGD

		#N/A		
		SEWER SEPARATION		
		1 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		207		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,050,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		90,169		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**180,000**		
			TOTAL CAPITAL COST $	**31,230,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	1	
Peak Volume	132,787	CF
	0.99	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	47.51	CFS
	30.70	MGD

		#N/A			
		SURFACE STORAGE TANK			
		1 Overflows / Year			
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.99		133,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.17		156,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		126			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		84			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.19		158,760	**Sufficient Volume**
Tank Area (SF)		11,000			= Length x Width
Construction Cost (Storage Tank)		**936,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		30.70		47.51	= Peak Rate
Force Main Diameter (In)		38			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,397,000**	**$**	**46,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		47.51			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		234,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,170			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**104,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		30.70			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,834,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.99			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.50			= Peak Vol/DW Time
Construction Cost	**$**	**8,241,076**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		34,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**			
			TOTAL CAPITAL COST	**$**	**22,276,076**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	1	
Peak Volume	132,787	CF
	0.99	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	47.51	CFS
	30.70	MGD

#N/A					
SUB-SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.99		133,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.17		156,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		126			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		84			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.19		158,760	**Sufficient Volume**
Tank Area (SF)		11,000			= Length x Width
Construction Cost (Storage Tank)		**3,973,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.99		1.54	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		7			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,129,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		47.51			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		234,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,700			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**629,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		30.70			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,834,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.99			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.50			= Peak Vol/DW Time
Construction Cost	**$**	**8,241,076**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		34,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**			
				TOTAL CAPITAL COST	**$ 21,541,076**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	1	
Peak Volume	132,787	CF
	0.99	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	47.51	CFS
	30.70	MGD

		#N/A			
		SWIRL CONCENTRATOR / VORTEX SEPARATOR			
		1 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		30.70		47.51	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		33.77		52.26	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		40			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,772,000**	**$**	**48,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		47.51			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		30.70			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,834,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		33.77			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		91		44	
Passes		3		**15.32**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,003,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		32,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**64,000**			
				TOTAL CAPITAL COST	**$ 14,371,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	1	
Peak Volume	132,787	CF
	0.99	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	47.51	CFS
	30.70	MGD

	#N/A		
	SEDIMENTATION BASIN (CSOTF)		
	1 Overflows / Year		
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	30.70	47.51	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	5,200		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	103	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	51	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.47	63,036	
Construction Cost (CSOTF) $	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	30.70	47.51	= Peak Rate
Force Main Diameter (In)	38		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**5,397,000**	**$ 46,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	47.51		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	95,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	4,750		= ACH x Volume / 60
Construction Cost (Odor Control) $	**310,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	30.70		Ref: CSO Statistics
Construction Cost (Screening) $	**1,834,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	30.70		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	87	42	
Passes	3	**15.38**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**947,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	0.99		Sed Basin Volume
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	0.50		= Peak Vol/DW Time
Construction Cost $	**8,241,076**		
8. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	17,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**34,000**		
		TOTAL CAPITAL COST	**$ 38,830,076**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	1	
Peak Volume	132,787	CF
	0.99	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	47.51	CFS
	30.70	MGD

#N/A					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		30.70		47.51	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		370			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		28		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		14		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**6,085,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		33.77		52.26	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		40			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,772,000**	**$**	**48,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		47.51			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		30.70			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,834,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		33.77			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		91		44	
Passes		3		**15.32**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,003,000	$	880,000	
Construction Cost (Disinfection)	**$**	**1,883,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		36,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**72,000**			
				TOTAL CAPITAL COST	**$ 21,393,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	1	
Peak Volume	132,787	CF
	0.99	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	47.51	CFS
	30.70	MGD

#N/A				
SCREENING AND DISINFECTION				
1 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		30.70	47.51	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,834,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		30.70	47.51	= Peak Flow x % Req Pump
Force Main Diameter (In)		38		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,397,000**	**$ 46,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		47.51		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,500		=CFS x 200
Odor Control Flow Rate (CFM)		480		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**51,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		30.70		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		87	42	
Passes		3	**15.38**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	947,000	$ 827,000	
Construction Cost (Disinfection)	**$**	**1,774,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		26,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**		
			TOTAL CAPITAL COST	**$ 14,804,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	2	
Peak Volume	102,794	CF
	0.77	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	46.85	CFS
	30.28	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	2 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		5,875	Width of Sewershed along Riverline
Peak Flow (CFS)		12.99	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	919,000	
Peak Flow (CFS)		25.98	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		38.97	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		51.96	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,840,000	
Construction Cost (Consolidation Sewers)	**$**	**5,219,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 5,351,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	2	
Peak Volume	102,794	CF
	0.77	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	46.85	CFS
	30.28	MGD

		#N/A		
		SEWER SEPARATION		
		2 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		207		Typ 0, Rev as Req'd
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,050,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		90,169		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**180,000**		
			TOTAL CAPITAL COST **$**	**31,230,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	2	
Peak Volume	102,794	CF
	0.77	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	46.85	CFS
	30.28	MGD

#N/A				
SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.77	103,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.90	121,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		111		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		74		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		0.92	123,210	**Sufficient Volume**
Tank Area (SF)		8,000		= Length x Width
Construction Cost (Storage Tank)		**708,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		30.28	46.85	= Peak Rate
Force Main Diameter (In)		38		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,345,000**	**$ 46,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		46.85		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		182,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		910		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**85,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		30.28		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,814,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.77		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.38		= Peak Vol/DW Time
Construction Cost	**$**	**8,186,621**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		31,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**62,000**		
			TOTAL CAPITAL COST	**$ 21,896,621**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	2	
Peak Volume	102,794	CF
	0.77	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	46.85	CFS
	30.28	MGD

#N/A

SUB-SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.77	103,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.90	121,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		111		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		74		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.92	123,210	**Sufficient Volume**
Tank Area (SF)		8,000		= Length x Width
Construction Cost (Storage Tank)		**3,282,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.77	1.19	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		6		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**938,000**	**$ 16,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		46.85		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		182,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		9,100		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**517,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		30.28		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,814,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.77		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.38		= Peak Vol/DW Time
Construction Cost	**$**	**8,186,621**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		31,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**62,000**		
			TOTAL CAPITAL COST	**$ 20,465,621**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	2	
Peak Volume	102,794	CF
	0.77	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	46.85	CFS
	30.28	MGD

#N/A				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
2 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		30.28	46.85	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		33.31	51.53	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		40		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,715,000**	**$ 48,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		46.85		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		30.28		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,814,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		33.31		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		91	43	
Passes		3	**15.19**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**995,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		31,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**62,000**		
			TOTAL CAPITAL COST	**$ 14,284,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	2	
Peak Volume	102,794	CF
	0.77	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	46.85	CFS
	30.28	MGD

		#N/A		
		SEDIMENTATION BASIN (CSOTF)		
		2 Overflows / Year		
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		30.28	46.85	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		5,100		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		102	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		51	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.47	62,424	
Construction Cost (CSOTF)	**$**	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		30.28	46.85	= Peak Rate
Force Main Diameter (In)		38		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,345,000**	**$ 46,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		46.85		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		94,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,700		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**308,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		30.28		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,814,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		30.28		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		87	41	
Passes		3	**15.23**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**939,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.77		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.38		= Peak Vol/DW Time
Construction Cost	**$**	**8,186,621**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		17,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**34,000**		
			TOTAL CAPITAL COST	**$ 38,693,621**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	2	
Peak Volume	102,794	CF
	0.77	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	46.85	CFS
	30.28	MGD

#N/A

HIGH RATE END OF PIPE TREATMENT (HREOP)

2 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		30.28		46.85	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		360			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		28		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		14		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**6,016,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		33.31		51.53	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		40			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,715,000**	**$**	**48,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.85			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		30.28			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,814,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		33.31			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		91		43	
Passes		3		**15.19**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	995,000	$	869,000	
Construction Cost (Disinfection)	**$**	**1,864,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		36,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**72,000**			
			TOTAL CAPITAL COST	**$**	**21,228,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	2	
Peak Volume	102,794	CF
	0.77	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	46.85	CFS
	30.28	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		2 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		30.28		46.85	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,814,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		30.28		46.85	= Peak Flow x % Req Pump
Force Main Diameter (In)		38			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,345,000**	**$**	**46,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.85			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,400			=CFS x 200
Odor Control Flow Rate (CFM)		470			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**51,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		30.28			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		87		41	
Passes		3		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	939,000	$	816,000	
Construction Cost (Disinfection)	**$**	**1,755,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		26,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST	**$ 14,713,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	4	
Peak Volume	56,493	CF
	0.42	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	25.94	CFS
	16.76	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	4 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		5,875	Width of Sewershed along Riverline
Peak Flow (CFS)		12.99	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	919,000	
Peak Flow (CFS)		25.98	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		38.97	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		51.96	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,840,000	
Construction Cost (Consolidation Sewers)	**$**	**5,219,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 5,351,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	4	
Peak Volume	56,493	CF
	0.42	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	25.94	CFS
	16.76	MGD

		#N/A		
		SEWER SEPARATION		
		4 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		207		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,050,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		90,169		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**180,000**		
			TOTAL CAPITAL COST **$**	**31,230,000**

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RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	4	
Peak Volume	56,493	CF
	0.42	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	25.94	CFS
	16.76	MGD

	#N/A			
	SURFACE STORAGE TANK			
	4 Overflows / Year			
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.42	56,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.50	66,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		82		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		55		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.51	67,650	**Sufficient Volume**
Tank Area (SF)		5,000		= Length x Width
Construction Cost (Storage Tank)		**369,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		16.76	25.94	= Peak Rate
Force Main Diameter (In)		28		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,697,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.94		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		99,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		500		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**53,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.76		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,188,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.42		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.21		= Peak Vol/DW Time
Construction Cost	**$**	**8,102,559**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		25,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST	**$ 19,145,559**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	4	
Peak Volume	56,493	CF
	0.42	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	25.94	CFS
	16.76	MGD

#N/A				
SUB-SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.42	56,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.50	66,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		82		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		55		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.51	67,650	**Sufficient Volume**
Tank Area (SF)		5,000		= Length x Width
Construction Cost (Storage Tank)		**2,215,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.42	0.65	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		4		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		7.5	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**644,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.94		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		99,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,950		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**321,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.76		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,188,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.42		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.21		= Peak Vol/DW Time
Construction Cost	**$**	**8,102,559**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		25,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST	**$ 18,184,559**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	4	
Peak Volume	56,493	CF
	0.42	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	25.94	CFS
	16.76	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		16.76		25.94	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		18.44		28.53	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		30			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,901,000**	**$**	**38,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		25.94			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.76			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,188,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		18.44			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		68		32	
Passes		3		**15.25**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**715,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		17,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**34,000**			
				TOTAL CAPITAL COST	**$ 11,526,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	4	
Peak Volume	56,493	CF
	0.42	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	25.94	CFS
	16.76	MGD

#N/A					
SEDIMENTATION BASIN (CSOTF)					
4 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		16.76		25.94	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		2,800			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		76		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		38		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.26		34,656	
Construction Cost (CSOTF)	**$**	**16,374,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		16.76		25.94	= Peak Rate
Force Main Diameter (In)		28			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,697,000**	**$**	**36,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		25.94			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		52,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,600			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**194,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.76			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,188,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		16.76			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		65		31	
Passes		3		**15.54**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**682,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.42			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.21			= Peak Vol/DW Time
Construction Cost	**$**	**8,102,559**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		12,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**24,000**			
				TOTAL CAPITAL COST	**$ 35,947,559**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	4	
Peak Volume	56,493	CF
	0.42	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	25.94	CFS
	16.76	MGD

#N/A

HIGH RATE END OF PIPE TREATMENT (HREOP)

4 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		16.76		25.94	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		200			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		11		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**3,844,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		18.44		28.53	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		30			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,901,000**	**$**	**38,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		25.94			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		16.76			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,188,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		18.44			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		68		32	
Passes		3		15.25	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	715,000	$	591,000	
Construction Cost (Disinfection)	**$**	**1,306,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		30,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
			TOTAL CAPITAL COST	**$**	**16,023,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	4	
Peak Volume	56,493	CF
	0.42	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	25.94	CFS
	16.76	MGD

#N/A					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		16.76		25.94	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,188,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		16.76		25.94	= Peak Flow x % Req Pump
Force Main Diameter (In)		28			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,697,000**	**$**	**36,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		25.94			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		5,200			=CFS x 200
Odor Control Flow Rate (CFM)		260			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**32,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		16.76			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		65		31	
Passes		3		**15.54**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	682,000	$	563,000	
Construction Cost (Disinfection)	**$**	**1,245,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
				TOTAL CAPITAL COST	**$ 11,896,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	6	
Peak Volume	48,495	CF
	0.36	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	18.86	CFS
	12.19	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	6 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		5,875	Width of Sewershed along Riverline
Peak Flow (CFS)		12.99	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	919,000	
Peak Flow (CFS)		25.98	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		38.97	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,230,000	
Peak Flow (CFS)		51.96	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,469	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,840,000	
Construction Cost (Consolidation Sewers)	**$**	**5,219,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 5,351,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	6	
Peak Volume	48,495	CF
	0.36	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	18.86	CFS
	12.19	MGD

		#N/A		
		SEWER SEPARATION		
		6 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		207		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,050,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		90,169		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**180,000**		
			TOTAL CAPITAL COST	**$ 31,230,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	6	
Peak Volume	48,495	CF
	0.36	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	18.86	CFS
	12.19	MGD

#N/A					
SURFACE STORAGE TANK					
6 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.36		48,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.43		56,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		76			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		51			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.43		58,140	**Sufficient Volume**
Tank Area (SF)		4,000			= Length x Width
Construction Cost (Storage Tank)		**312,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		12.19		18.86	= Peak Rate
Force Main Diameter (In)		24			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,984,000**	**$**	**32,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		18.86			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		84,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		420			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**46,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		12.19			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**977,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.36			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.18			= Peak Vol/DW Time
Construction Cost	**$**	**8,088,038**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		25,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST	**$ 18,139,038**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	6	
Peak Volume	48,495	CF
	0.36	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	18.86	CFS
	12.19	MGD

#N/A					
SUB-SURFACE STORAGE TANK					
6 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.36		48,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.43		56,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		76			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		51			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.43		58,140	**Sufficient Volume**
Tank Area (SF)		4,000			= Length x Width
Construction Cost (Storage Tank)		**2,031,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.36		0.56	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		4			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**593,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		18.86			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		84,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**282,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		12.19			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**977,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.36			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.18			= Peak Vol/DW Time
Construction Cost	**$**	**8,088,038**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		25,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST	**$ 17,685,038**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	6	
Peak Volume	48,495	CF
	0.36	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	18.86	CFS
	12.19	MGD

		#N/A		
		SWIRL CONCENTRATOR / VORTEX SEPARATOR		
		6 Overflows / Year		
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		12.19	18.86	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		13.40	20.74	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		25		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,287,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		18.86		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		12.19		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**977,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		13.40		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		58	28	
Passes		3	**15.66**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**615,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		13,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**26,000**		
			TOTAL CAPITAL COST	**$ 10,588,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	6	
Peak Volume	48,495	CF
	0.36	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	18.86	CFS
	12.19	MGD

#N/A

SEDIMENTATION BASIN (CSOTF)

6 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		12.19		18.86	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		2,100			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		66		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		33		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.20		26,136	
Construction Cost (CSOTF)	**$**	**16,379,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		12.19		18.86	= Peak Rate
Force Main Diameter (In)		24			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,984,000**	**$**	**32,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		18.86			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		39,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,950			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**154,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		12.19			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**977,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		12.19			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		55		27	
Passes		3		**15.75**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**591,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.36			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.18			= Peak Vol/DW Time
Construction Cost	**$**	**8,088,038**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		10,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**20,000**			
			TOTAL CAPITAL COST	**$**	**34,875,038**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	6	
Peak Volume	48,495	CF
	0.36	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	18.86	CFS
	12.19	MGD

#N/A				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
6 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		12.19	18.86	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		150		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		18	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		9	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**3,117,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		13.40	20.74	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		25		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,287,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		18.86		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		12.19		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**977,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		13.40		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		58	28	
Passes		3	**15.66**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	615,000	$ 493,000	
Construction Cost (Disinfection)	**$**	**1,108,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		27,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**		
			TOTAL CAPITAL COST	**$ 14,252,000**

RESULTS SUMMARY		
Number of Events / Year	79	
Number of Overflows / Year	6	
Peak Volume	48,495	CF
	0.36	MG
Total Volume	1,607,169	CF
	12.02	MG
Peak Rate	18.86	CFS
	12.19	MGD

#N/A					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		12.19		18.86	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**977,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		12.19		18.86	= Peak Flow x % Req Pump
Force Main Diameter (In)		24			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,984,000**	**$**	**32,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		18.86			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,351,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,800			=CFS x 200
Odor Control Flow Rate (CFM)		190			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**25,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		12.19			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		55		27	
Passes		3		**15.75**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	591,000	$	467,000	
Construction Cost (Disinfection)	**$**	**1,058,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
			TOTAL CAPITAL COST	**$**	**10,774,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	33.58	$196,626	20	10.910	$2,145,183
	Tank O&M	No. Events / Yr	79	$57,773	50	14.484	$836,755
		Const Cost ($)	$3,694,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	34	$10,425	20	10.910	$113,733
	Odor Control O&M	Capacity (cfm)	4,140	$14,490	20	10.910	$158,085
	Reserve / Replace	10% Gravity / 15% Pump					$29,561
			Total Annual O&M	**$280,000**		**Total PW O&M**	**$3,283,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.50	$43,407	20	10.910	$473,573
	Tank O&M	No. Events / Yr	79	$77,768	50	14.484	$1,126,354
		Const Cost ($)	$11,692,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	34	$10,425	20	10.910	$113,733
	Odor Control O&M	Capacity (cfm)	41,350	$144,725	20	10.910	$1,578,941
	Reserve / Replace	10% Gravity / 15% Pump					$17,986
			Total Annual O&M	**$277,000**		**Total PW O&M**	**$3,311,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)							
#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	33.58	$196,626	20	10.910	$2,145,183
	Sed. Basin O&M	Flow Rate (mgd)	33.58	$3,777	50	14.484	$54,711
	Screening O&M	Flow Rate (mgd)	33.58	$10,425	20	10.910	$113,733
	Disinfection O&M	Flow Rate (mgd)	33.58	$136,759	20	10.910	$1,492,030
	Odor Control O&M	Capacity (cfm)	5,100.00	$17,850	20	10.910	$194,742
	Reserve / Replace	10% Gravity / 15% Pump					$32,412
			Total Annual O&M	**$366,000**		**Total PW O&M**	**$4,033,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	36.94	$209,554	20	10.910	$2,286,224
	HREP O&M	Flow Rate (mgd)	33.58	$183,940	20	10.910	$2,006,774
	Screening O&M	Flow Rate (mgd)	33.58	$10,425	20	10.910	$113,733
	Disinfection O&M	Flow Rate (mgd)	36.94	$144,934	20	10.910	$1,581,226
	Odor Control O&M	Capacity (cfm)	500.00	$1,750	20	10.910	$19,092
	Reserve / Replace	10% Gravity / 15% Pump					$51,324
			Total Annual O&M	**$551,000**		**Total PW O&M**	**$6,058,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	36.94	$209,554	20	10.910	$2,286,224
	Swirl / Vortex O&M	Flow Rate (mgd)	33.58	$3,777	20	10.910	$41,212
	Screening O&M	Flow Rate (mgd)	33.58	$10,425	20	10.910	$113,733
	Disinfection O&M	Flow Rate (mgd)	36.94	$144,934	20	10.910	$1,581,226
	Odor Control O&M	Capacity (cfm)	5,750.00	$20,125	20	10.910	$219,563
	Reserve / Replace	10% Gravity / 15% Pump					$37,854
			Total Annual O&M	**$389,000**		**Total PW O&M**	**$4,280,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	33.58	$196,626	20	10.910	$2,145,183
	Screening O&M	Flow Rate (mgd)	33.58	$10,425	20	10.910	$113,733
	Disinfection O&M	Flow Rate (mgd)	33.58	$136,759	20	10.910	$1,492,030
	Odor Control O&M	Capacity (cfm)	520.00	$1,820	20	10.910	$19,856
	Reserve / Replace	10% Gravity / 15% Pump					$31,669
			Total Annual O&M	**$346,000**		**Total PW O&M**	**$3,802,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	30.70	$185,212	20	10.910	$2,020,647
	Tank O&M	No. Events / Yr	79	$50,878	50	14.484	$736,890
		Const Cost ($)	$936,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	31	$10,153	20	10.910	$110,765
	Odor Control O&M	Capacity (cfm)	1,170	$4,095	20	10.910	$44,676
	Reserve / Replace	10% Gravity / 15% Pump					$27,291
			Total Annual O&M	**$251,000**		**Total PW O&M**	**$2,940,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.99	$18,712	20	10.910	$204,148
	Tank O&M	No. Events / Yr	79	$58,470	50	14.484	$846,857
		Const Cost ($)	$3,973,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	31	$10,153	20	10.910	$110,765
	Odor Control O&M	Capacity (cfm)	11,700	$40,950	20	10.910	$446,762
	Reserve / Replace	10% Gravity / 15% Pump					$11,306
			Total Annual O&M	**$129,000**		**Total PW O&M**	**$1,620,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	30.70	$185,212	20	10.910	$2,020,647
	Sed. Basin O&M	Flow Rate (mgd)	30.70	$3,454	50	14.484	$50,027
	Screening O&M	Flow Rate (mgd)	30.70	$10,153	20	10.910	$110,765
	Disinfection O&M	Flow Rate (mgd)	30.70	$129,500	20	10.910	$1,412,842
	Odor Control O&M	Capacity (cfm)	4,750.00	$16,625	20	10.910	$181,378
	Reserve / Replace	10% Gravity / 15% Pump					$30,427
			Total Annual O&M	**$345,000**		**Total PW O&M**	**$3,806,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	33.77	$197,389	20	10.910	$2,153,500
	HREP O&M	Flow Rate (mgd)	30.70	$174,507	20	10.910	$1,903,859
	Screening O&M	Flow Rate (mgd)	30.70	$10,153	20	10.910	$110,765
	Disinfection O&M	Flow Rate (mgd)	33.77	$137,242	20	10.910	$1,497,304
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$47,951
			Total Annual O&M	**$521,000**		**Total PW O&M**	**$5,731,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	33.77	$197,389	20	10.910	$2,153,500
	Swirl / Vortex O&M	Flow Rate (mgd)	30.70	$3,454	20	10.910	$37,683
	Screening O&M	Flow Rate (mgd)	30.70	$10,153	20	10.910	$110,765
	Disinfection O&M	Flow Rate (mgd)	33.77	$137,242	20	10.910	$1,497,304
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$31,266
			Total Annual O&M	**$349,000**		**Total PW O&M**	**$3,831,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	30.70	$185,212	20	10.910	$2,020,647
	Screening O&M	Flow Rate (mgd)	30.70	$10,153	20	10.910	$110,765
	Disinfection O&M	Flow Rate (mgd)	30.70	$129,500	20	10.910	$1,412,842
	Odor Control O&M	Capacity (cfm)	480.00	$1,680	20	10.910	$18,329
	Reserve / Replace	10% Gravity / 15% Pump					$29,723
			Total Annual O&M	**$327,000**		**Total PW O&M**	**$3,592,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	30.28	$183,496	20	10.910	$2,001,929
	Tank O&M	No. Events / Yr	79	$50,308	50	14.484	$728,635
		Const Cost ($)	$708,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	30	$10,113	20	10.910	$110,329
	Odor Control O&M	Capacity (cfm)	910	$3,185	20	10.910	$34,748
	Reserve / Replace	10% Gravity / 15% Pump					$26,973
			Total Annual O&M	**$248,000**		**Total PW O&M**	**$2,903,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.77	$15,770	20	10.910	$172,052
	Tank O&M	No. Events / Yr	79	$56,743	50	14.484	$821,837
		Const Cost ($)	$3,282,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	30	$10,113	20	10.910	$110,329
	Odor Control O&M	Capacity (cfm)	9,100	$31,850	20	10.910	$347,482
	Reserve / Replace	10% Gravity / 15% Pump					$10,167
			Total Annual O&M	**$115,000**		**Total PW O&M**	**$1,462,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)							
#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	30.28	$183,496	20	10.910	$2,001,929
	Sed. Basin O&M	Flow Rate (mgd)	30.28	$3,406	50	14.484	$49,335
	Screening O&M	Flow Rate (mgd)	30.28	$10,113	20	10.910	$110,329
	Disinfection O&M	Flow Rate (mgd)	30.28	$128,406	20	10.910	$1,400,903
	Odor Control O&M	Capacity (cfm)	4,700.00	$16,450	20	10.910	$179,469
	Reserve / Replace	10% Gravity / 15% Pump					$30,134
			Total Annual O&M	**$342,000**		**Total PW O&M**	**$3,772,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	33.31	$195,560	20	10.910	$2,133,551
	HREP O&M	Flow Rate (mgd)	30.28	$173,083	20	10.910	$1,888,327
	Screening O&M	Flow Rate (mgd)	30.28	$10,113	20	10.910	$110,329
	Disinfection O&M	Flow Rate (mgd)	33.31	$136,082	20	10.910	$1,484,651
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$47,454
			Total Annual O&M	**$517,000**		**Total PW O&M**	**$5,681,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	33.31	$195,560	20	10.910	$2,133,551
	Swirl / Vortex O&M	Flow Rate (mgd)	30.28	$3,406	20	10.910	$37,162
	Screening O&M	Flow Rate (mgd)	30.28	$10,113	20	10.910	$110,329
	Disinfection O&M	Flow Rate (mgd)	33.31	$136,082	20	10.910	$1,484,651
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$30,958
			Total Annual O&M	**$346,000**		**Total PW O&M**	**$3,797,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	30.28	$183,496	20	10.910	$2,001,929
	Screening O&M	Flow Rate (mgd)	30.28	$10,113	20	10.910	$110,329
	Disinfection O&M	Flow Rate (mgd)	30.28	$128,406	20	10.910	$1,400,903
	Odor Control O&M	Capacity (cfm)	470.00	$1,645	20	10.910	$17,947
	Reserve / Replace	10% Gravity / 15% Pump					$29,434
			Total Annual O&M	**$324,000**		**Total PW O&M**	**$3,561,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	16.76	$123,615	20	10.910	$1,348,633
	Tank O&M	No. Events / Yr	79	$49,460	50	14.484	$716,360
		Const Cost ($)	$369,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	17	$8,876	20	10.910	$96,840
	Odor Control O&M	Capacity (cfm)	500	$1,750	20	10.910	$19,092
	Reserve / Replace	10% Gravity / 15% Pump					$18,459
			Total Annual O&M	**$184,000**		**Total PW O&M**	**$2,199,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.42	$10,572	20	10.910	$115,338
	Tank O&M	No. Events / Yr	79	$54,075	50	14.484	$783,202
		Const Cost ($)	$2,215,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	17	$8,876	20	10.910	$96,840
	Odor Control O&M	Capacity (cfm)	4,950	$17,325	20	10.910	$189,015
	Reserve / Replace	10% Gravity / 15% Pump					$6,732
			Total Annual O&M	**$91,000**		**Total PW O&M**	**$1,191,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	16.76	$123,615	20	10.910	$1,348,633
	Sed. Basin O&M	Flow Rate (mgd)	16.76	$1,886	50	14.484	$27,313
	Screening O&M	Flow Rate (mgd)	16.76	$8,876	20	10.910	$96,840
	Disinfection O&M	Flow Rate (mgd)	16.76	$89,568	20	10.910	$977,187
	Odor Control O&M	Capacity (cfm)	2,600.00	$9,100	20	10.910	$99,280
	Reserve / Replace	10% Gravity / 15% Pump					$20,698
			Total Annual O&M	**$234,000**		**Total PW O&M**	**$2,570,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	18.44	$131,743	20	10.910	$1,437,303
	HREP O&M	Flow Rate (mgd)	16.76	$122,248	20	10.910	$1,333,720
	Screening O&M	Flow Rate (mgd)	16.76	$8,876	20	10.910	$96,840
	Disinfection O&M	Flow Rate (mgd)	18.44	$94,923	20	10.910	$1,035,605
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$31,646
			Total Annual O&M	**$359,000**		**Total PW O&M**	**$3,947,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	18.44	$131,743	20	10.910	$1,437,303
	Swirl / Vortex O&M	Flow Rate (mgd)	16.76	$1,886	20	10.910	$20,574
	Screening O&M	Flow Rate (mgd)	16.76	$8,876	20	10.910	$96,840
	Disinfection O&M	Flow Rate (mgd)	18.44	$94,923	20	10.910	$1,035,605
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$21,092
			Total Annual O&M	**$238,000**		**Total PW O&M**	**$2,611,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	16.76	$123,615	20	10.910	$1,348,633
	Screening O&M	Flow Rate (mgd)	16.76	$8,876	20	10.910	$96,840
	Disinfection O&M	Flow Rate (mgd)	16.76	$89,568	20	10.910	$977,187
	Odor Control O&M	Capacity (cfm)	260.00	$910	20	10.910	$9,928
	Reserve / Replace	10% Gravity / 15% Pump					$20,257
			Total Annual O&M	**$223,000**		**Total PW O&M**	**$2,453,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	12.19	$99,898	20	10.910	$1,089,884
	Tank O&M	No. Events / Yr	79	$49,318	50	14.484	$714,296
		Const Cost ($)	$312,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	12	$8,473	20	10.910	$92,438
	Odor Control O&M	Capacity (cfm)	420	$1,470	20	10.910	$16,038
	Reserve / Replace	10% Gravity / 15% Pump					$14,957
			Total Annual O&M	**$160,000**		**Total PW O&M**	**$1,928,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.36	$9,547	20	10.910	$104,154
	Tank O&M	No. Events / Yr	79	$53,615	50	14.484	$776,539
		Const Cost ($)	$2,031,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	12	$8,473	20	10.910	$92,438
	Odor Control O&M	Capacity (cfm)	4,200	$14,700	20	10.910	$160,376
	Reserve / Replace	10% Gravity / 15% Pump					$5,844
			Total Annual O&M	**$87,000**		**Total PW O&M**	**$1,139,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	12.19	$99,898	20	10.910	$1,089,884
	Sed. Basin O&M	Flow Rate (mgd)	12.19	$1,371	50	14.484	$19,856
	Screening O&M	Flow Rate (mgd)	12.19	$8,473	20	10.910	$92,438
	Disinfection O&M	Flow Rate (mgd)	12.19	$73,756	20	10.910	$804,674
	Odor Control O&M	Capacity (cfm)	1,950.00	$6,825	20	10.910	$74,460
	Reserve / Replace	10% Gravity / 15% Pump					$16,859
			Total Annual O&M	**$191,000**		**Total PW O&M**	**$2,098,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	13.40	$106,466	20	10.910	$1,161,542
	HREP O&M	Flow Rate (mgd)	12.19	$101,346	20	10.910	$1,105,679
	Screening O&M	Flow Rate (mgd)	12.19	$8,473	20	10.910	$92,438
	Disinfection O&M	Flow Rate (mgd)	13.40	$78,165	20	10.910	$852,779
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$26,290
			Total Annual O&M	**$296,000**		**Total PW O&M**	**$3,246,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	13.40	$106,466	20	10.910	$1,161,542
	Swirl / Vortex O&M	Flow Rate (mgd)	12.19	$1,371	20	10.910	$14,957
	Screening O&M	Flow Rate (mgd)	12.19	$8,473	20	10.910	$92,438
	Disinfection O&M	Flow Rate (mgd)	13.40	$78,165	20	10.910	$852,779
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$17,741
			Total Annual O&M	**$195,000**		**Total PW O&M**	**$2,139,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	12.19	$99,898	20	10.910	$1,089,884
	Screening O&M	Flow Rate (mgd)	12.19	$8,473	20	10.910	$92,438
	Disinfection O&M	Flow Rate (mgd)	12.19	$73,756	20	10.910	$804,674
	Odor Control O&M	Capacity (cfm)	190.00	$665	20	10.910	$7,255
	Reserve / Replace	10% Gravity / 15% Pump					$16,508
			Total Annual O&M	**$183,000**		**Total PW O&M**	**$2,011,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$31.4	$31,425,000	$0
1	$31.4	$31,425,000	$0
2	$31.4	$31,425,000	$0
4	$31.4	$31,425,000	$0
6	$31.4	$31,425,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$35.3	$31,983,644	$3,311,000
1	$23.2	$21,541,076	$1,620,000
2	$21.9	$20,465,621	$1,462,000
4	$19.4	$18,184,559	$1,191,000
6	$18.8	$17,685,038	$1,139,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$29.7	$26,377,644	$3,283,000
1	$25.2	$22,276,076	$2,940,000
2	$24.8	$21,896,621	$2,903,000
4	$21.3	$19,145,559	$2,199,000
6	$20.1	$18,139,038	$1,928,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$22.2	$17,901,000	$4,280,000
1	$18.2	$14,371,000	$3,831,000
2	$18.1	$14,284,000	$3,797,000
4	$14.1	$11,526,000	$2,611,000
6	$12.7	$10,588,000	$2,139,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$28.6	$22,508,000	$6,058,000
1	$27.1	$21,393,000	$5,731,000
2	$26.9	$21,228,000	$5,681,000
4	$20.0	$16,023,000	$3,947,000
6	$17.5	$14,252,000	$3,246,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$43.3	$39,273,544	$4,033,000
1	$42.6	$38,830,076	$3,806,000
2	$42.5	$38,693,621	$3,772,000
4	$38.5	$35,947,559	$2,570,000
6	$37.0	$34,875,038	$2,098,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$19.2	$15,399,000	$3,802,000
1	$18.4	$14,804,000	$3,592,000
2	$18.3	$14,713,000	$3,561,000
4	$14.3	$11,896,000	$2,453,000
6	$12.8	$10,774,000	$2,011,000

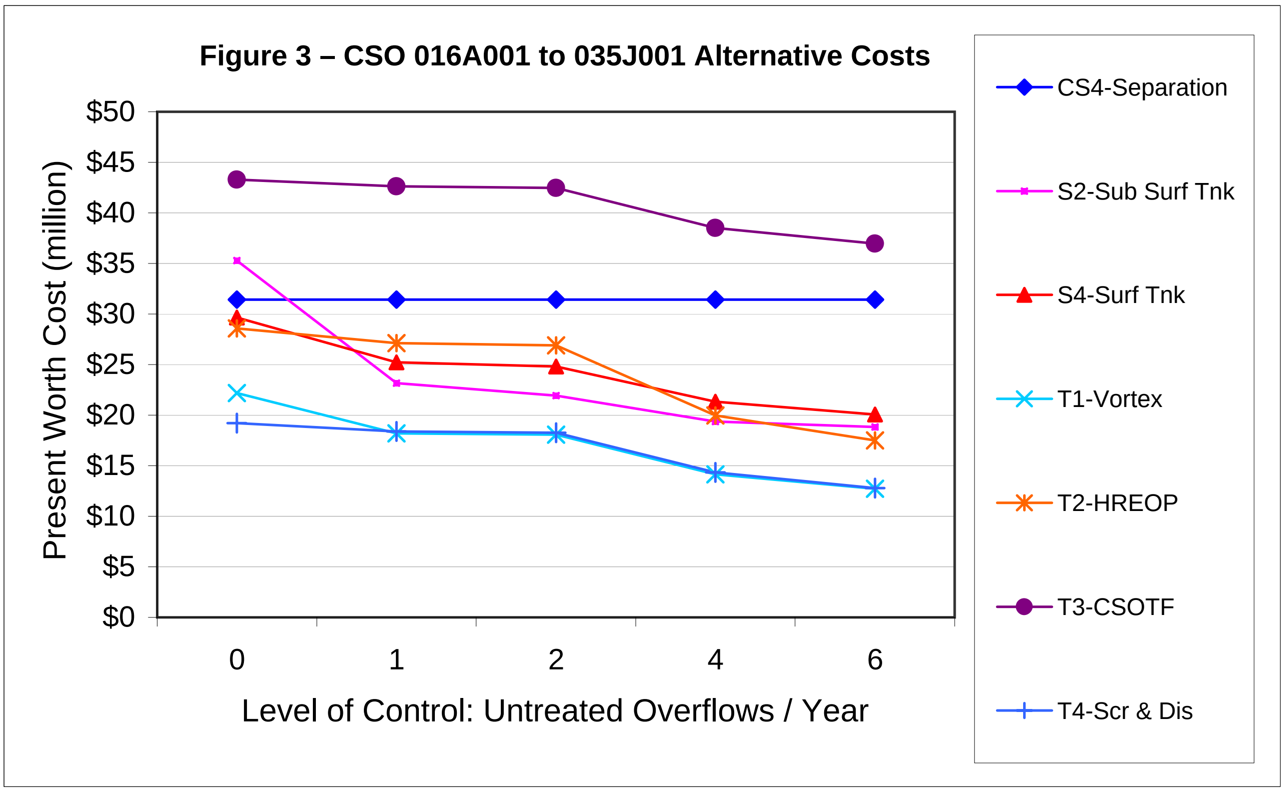


Figure 3 – CSO 016A001 to 035J001 Alternative Costs
$50
$45
$40
$35
$30
$25
$20
$15
$10
$5
$0
Present Worth Cost (million)
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	CSO 016A001 to 035J001
Structures within Region	CSO 016A001, CSO 016A002new, CSO 035A001, CSO 035E001, and CSO 035J001
Model ID	CSO 016A001 to 035J001.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	79
Peak Volume:	467,888 ft^3
	3.50 MG
Total Volume:	1,607,169 ft^3
	12.02 MG
Peak Rate:	51.96 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/3/2005 4:19	9567	1/5/2005 14:30	467888.45	3500.040	0	7.28	19
1/11/2005 8:06	6170	1/12/2005 1:30	132786.79	993.312	1	6.15	24
5/13/2005 22:20	2817	5/13/2005 22:45	102794.24	768.952	2	51.96	0
8/20/2005 18:15	125	8/20/2005 19:00	90159.46	674.438	3	47.51	1
7/26/2005 19:40	59	7/26/2005 20:00	56493.24	422.598	4	46.85	2
11/29/2005 1:40	1786	11/29/2005 7:00	48818.91	365.190	5	7.60	18
2/14/2005 4:35	4771	2/14/2005 19:50	48494.79	362.765	6	1.46	46
3/28/2005 9:00	3147	3/28/2005 19:00	45830.91	342.838	7	6.42	21
7/5/2005 16:30	115	7/5/2005 16:45	43587.65	326.057	8	35.21	3
10/24/2005 11:22	2214	10/25/2005 3:45	40625.27	303.897	9	1.74	43
11/14/2005 21:40	869	11/15/2005 3:00	38957.01	291.418	10	6.35	22
7/15/2005 17:30	73	7/15/2005 18:00	37703.19	282.039	11	25.94	4
4/23/2005 3:35	509	4/23/2005 4:00	30026.85	224.616	12	21.98	5
10/21/2005 18:55	764	10/22/2005 6:30	29981.75	224.279	13	11.32	10
4/1/2005 19:15	3627	4/2/2005 6:30	29805.02	222.956	14	2.60	36
5/11/2005 22:30	114	5/11/2005 23:00	21979.26	164.416	15	9.51	14
7/21/2005 14:20	94	7/21/2005 14:45	21888.13	163.734	16	18.86	6
2/20/2005 15:20	2582	2/20/2005 20:30	21447.52	160.438	17	5.35	25
12/15/2005 8:35	2236	12/15/2005 14:00	20940.39	156.645	18	4.09	28
9/29/2005 5:10	129	9/29/2005 5:45	19866.02	148.608	19	17.00	8
8/29/2005 9:05	424	8/29/2005 13:45	18456.94	138.067	20	6.27	23
2/9/2005 14:50	1364	2/9/2005 16:45	18101.47	135.408	21	8.71	17
11/9/2005 19:25	44	11/9/2005 19:45	14576.96	109.043	22	17.14	7
3/23/2005 2:20	765	3/23/2005 12:30	13252.11	99.132	23	1.48	44
6/11/2005 17:30	140	6/11/2005 17:45	12210.71	91.342	24	10.00	13
8/27/2005 15:05	59	8/27/2005 15:30	11710.76	87.602	25	12.73	9
11/16/2005 4:00	475	11/16/2005 4:15	10537.49	78.826	26	11.09	12
10/7/2005 7:20	612	10/7/2005 10:45	9824.66	73.493	27	3.69	29
5/28/2005 8:25	159	5/28/2005 9:30	9722.88	72.732	28	2.65	35
5/23/2005 16:16	82	5/23/2005 16:30	9664.71	72.297	29	9.10	16
9/26/2005 5:35	274	9/26/2005 5:45	9655.52	72.228	30	3.34	31
7/17/2005 16:15	79	7/17/2005 16:30	8252.77	61.735	31	9.42	15
4/22/2005 15:45	318	4/22/2005 18:00	7199.78	53.858	32	2.00	40

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
10/22/2005 15:35	524	10/22/2005 16:30	6886.80	51.517	33	3.24	32
7/25/2005 13:20	238	7/25/2005 13:30	6482.88	48.495	34	11.13	11
11/1/2005 14:50	209	11/1/2005 16:30	6348.60	47.491	35	1.74	42
5/20/2005 2:06	598	5/20/2005 7:45	5263.88	39.376	36	0.83	54
4/30/2005 4:30	179	4/30/2005 6:45	5006.29	37.450	37	1.17	50
6/14/2005 18:55	57	6/14/2005 19:15	4744.93	35.494	38	3.42	30
3/27/2005 16:50	158	3/27/2005 17:00	4255.50	31.833	39	1.95	41
8/26/2005 20:45	141	8/26/2005 21:00	4186.26	31.315	40	4.36	26
10/21/2005 7:10	101	10/21/2005 7:30	3838.26	28.712	41	2.41	37
4/24/2005 2:36	1743	4/24/2005 16:30	3792.48	28.370	42	0.19	68
5/7/2005 12:05	105	5/7/2005 13:30	3768.00	28.187	43	3.11	33
12/25/2005 10:46	182	12/25/2005 12:45	3568.84	26.697	44	1.42	47
6/28/2005 18:05	68	6/28/2005 18:15	3513.75	26.285	45	7.25	20
11/9/2005 4:15	62	11/9/2005 4:30	3344.94	25.022	46	4.22	27
4/20/2005 19:30	285	4/20/2005 19:45	3008.12	22.502	47	1.24	49
6/3/2005 8:31	83	6/3/2005 9:00	2989.29	22.361	48	2.00	39
11/8/2005 14:12	86	11/8/2005 14:45	2934.04	21.948	49	1.10	51
9/16/2005 21:25	203	9/16/2005 21:45	2244.28	16.788	50	2.78	34
4/26/2005 21:41	282	4/27/2005 0:45	2236.52	16.730	51	0.99	52
11/24/2005 5:18	411	11/24/2005 8:15	2112.93	15.806	52	0.52	57
8/8/2005 8:42	60	8/8/2005 9:00	2066.33	15.457	53	2.10	38
5/30/2005 19:25	55	5/30/2005 19:45	1954.83	14.623	54	1.32	48
12/26/2005 2:40	578	12/26/2005 11:45	1951.98	14.602	55	0.26	66
5/28/2005 17:21	93	5/28/2005 18:30	1867.44	13.969	56	0.85	53
1/30/2005 5:08	593	1/30/2005 11:15	1786.01	13.360	57	0.33	62
3/7/2005 22:20	377	3/8/2005 0:15	1618.90	12.110	58	0.18	71
8/5/2005 10:55	114	8/5/2005 11:30	1573.30	11.769	59	0.82	55
3/20/2005 3:40	309	3/20/2005 7:15	1566.87	11.721	60	0.77	56
11/23/2005 19:04	197	11/23/2005 20:00	1275.24	9.539	61	0.38	58
12/4/2005 5:48	546	12/4/2005 6:45	1087.46	8.135	62	0.28	64
10/24/2005 1:47	123	10/24/2005 3:00	1036.40	7.753	63	0.34	60
2/8/2005 5:46	410	2/8/2005 6:00	822.84	6.155	64	0.24	67
1/22/2005 10:17	101	1/22/2005 11:15	761.53	5.697	65	0.38	59
9/23/2005 2:50	19	9/23/2005 3:00	730.40	5.464	66	1.47	45
2/26/2005 12:35	160	2/26/2005 14:00	709.28	5.306	67	0.17	72
11/6/2005 9:55	254	11/6/2005 10:00	648.03	4.848	68	0.34	61
10/26/2005 7:20	215	10/26/2005 7:30	615.32	4.603	69	0.27	65
6/17/2005 1:22	72	6/17/2005 1:30	410.52	3.071	70	0.29	63
6/16/2005 11:38	101	6/16/2005 13:15	396.59	2.967	71	0.18	70
6/22/2005 5:20	58	6/22/2005 5:30	120.21	0.899	72	0.09	75
12/11/2005 19:12	42	12/11/2005 19:45	119.22	0.892	73	0.10	74
3/11/2005 14:00	24	3/11/2005 14:15	92.66	0.693	74	0.10	73
8/16/2005 8:05	27	8/16/2005 8:15	84.82	0.635	75	0.08	76
7/12/2005 20:10	9	7/12/2005 20:15	60.29	0.451	76	0.18	69
1/26/2005 10:04	13	1/26/2005 10:15	25.00	0.187	77	0.03	78
3/20/2005 15:42	10	3/20/2005 15:45	19.55	0.146	78	0.04	77

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	CSO 016A001 to 035J001
Structures within Region	CSO 016A001, CSO 016A002new, CSO 035A001, CSO 035E001, and CSO 035J001
Model ID	CSO 016A001 to 035J001.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	79
Peak Volume:	467,888 ft^3
	3.50 MG
Total Volume:	1,607,169 ft^3
	12.02 MG
Peak Rate:	51.96 cfs

Figure 1 - CSO 016A001 to 035J001 CSO Volume

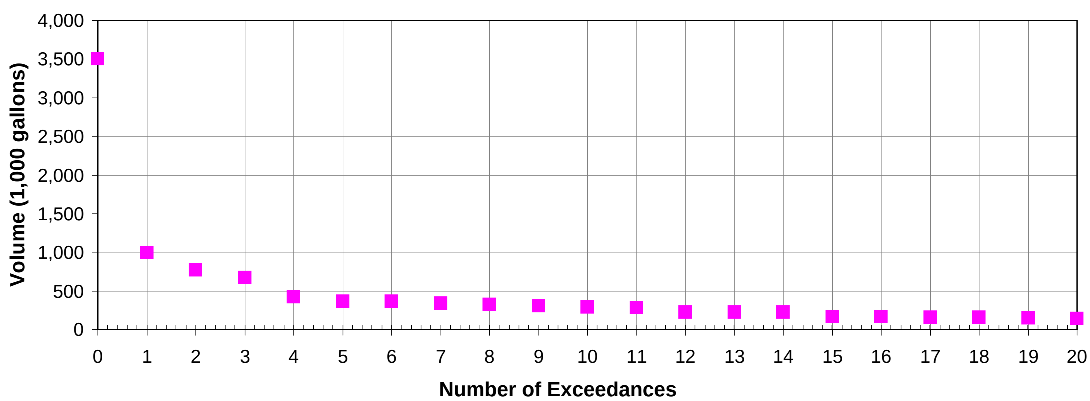
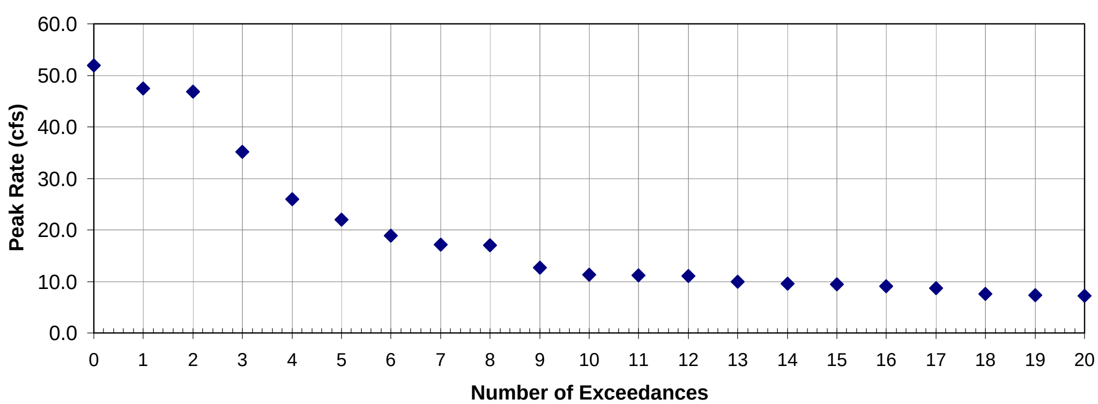


Figure 2 - CSO 016A001 to 035J001 CSO Peak Flow Rate



D.29.1 016A001 TO 035J001 – LITTLE SAWMILL RUN SEWERSHEDS – NPDES# 016A001, 016A002, 035A001, 035E001, AND 035J001

Description of Outfalls

The Little Sawmill Run Sewershed is located in portions of Banksville, Beechview and Ridgemont sections in the City of Pittsburgh and in portions of Dormont Borough, Green Tree Borough, the Municipality of Mount Lebanon, and Scott Township. The Little Sawmill Run Sewershed includes approximately 1,819 acres of residential, business and commercial users. The CSO 016A001 to 035J001 outfall consolidation consists of the following outfalls:

- CSO016A001, NPDES# 016A002
- CSO016A002, NPDES# 016A002
- CSO035A001, NPDES# 035A001
- CSO035E001, NPDES# 035E001
- CSO035J001, NPDES# 035J001

The tributary area for the diversion chambers upstream of the above outfalls is approximately 207 acres. The individual diversion chambers overflow to Little Saw Mill Run, a tributary of Saw Mill Run. The NPDES locations correspond to a combination of individual outfalls that connect to an open channel portion of stream or locations where a culverted portion of the stream daylights. Nearly all of the service area is combined sewer. *Attachment 1, Tributary Area Map,* shows the CSO locations and the tributary areas.

Outfalls 016A001 to 035J001 typically experience overflow events 79 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 3.50 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from the outfalls is approximately 52 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

Figure 1 - CSO 016A001 to 035J001 CSO Volume

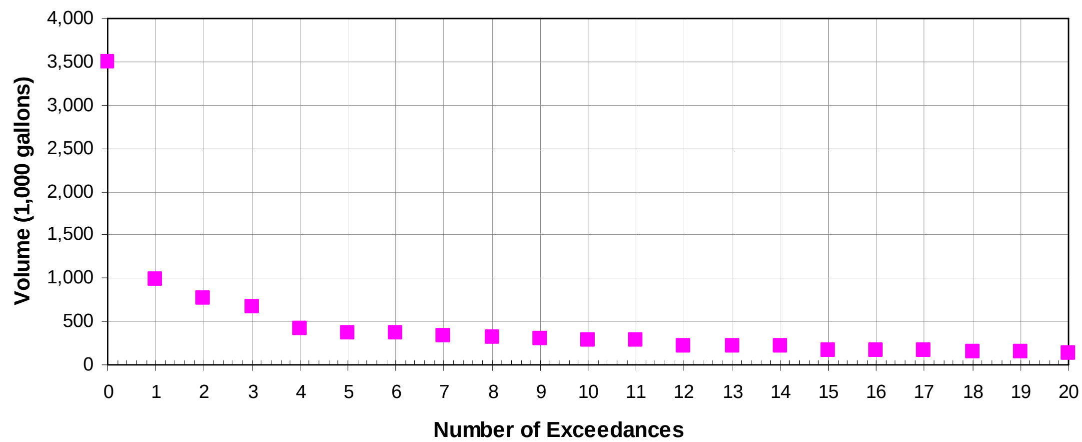
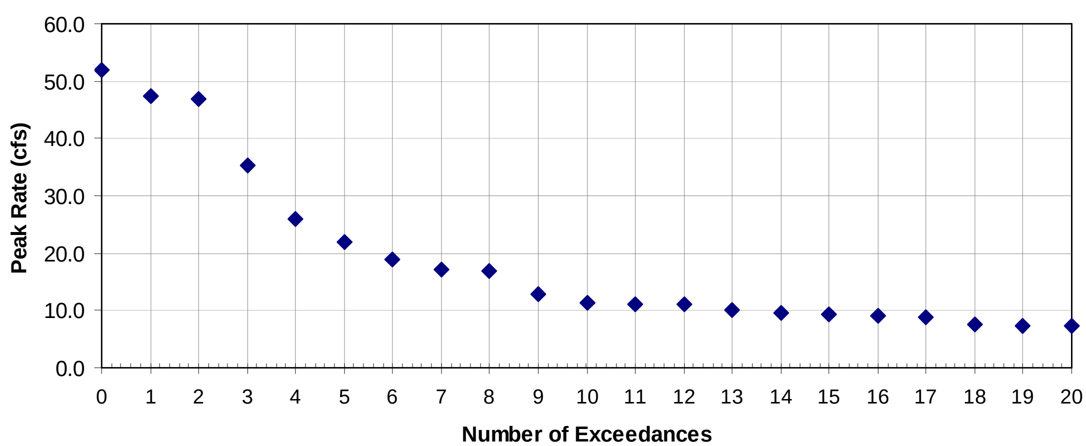


Figure 2 - CSO 016A001 to 035J001 CSO Peak Flow Rate



A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers in order to control the CSO flows from each of the diversion structures and not the stream flows or additional stormwater that enters the stream. The sewers are required to convey CSOs from outfalls 035J001, 035E001, 035A001, 016A001 and 016A002 to an area along Banksville Road for storage and treatment. There appears to be a limited amount space available approximately 600 feet south of the CSO 016A001 in an existing parking facility that may be able to be procured for a storage or treatment facility. The site is generally bounded by Banksville Road to the east, Banksville Avenue to the north and west and private development to the south.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4-016A001 TO 035J001: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-016A001 TO 035J001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-016A001 TO 035J001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-016A001 TO 035J001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-016A001 TO 035J001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities.   Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-016A001 TO 035J001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

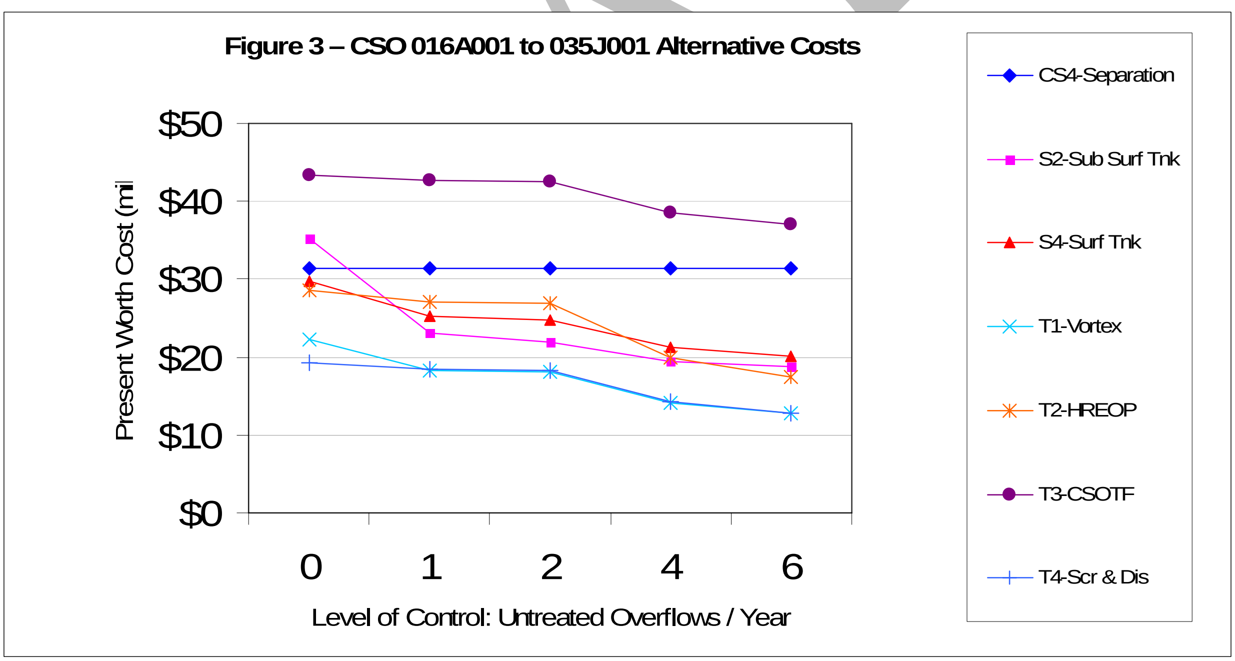
T4-016A001 TO 035J001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – 016A001 to 035J001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

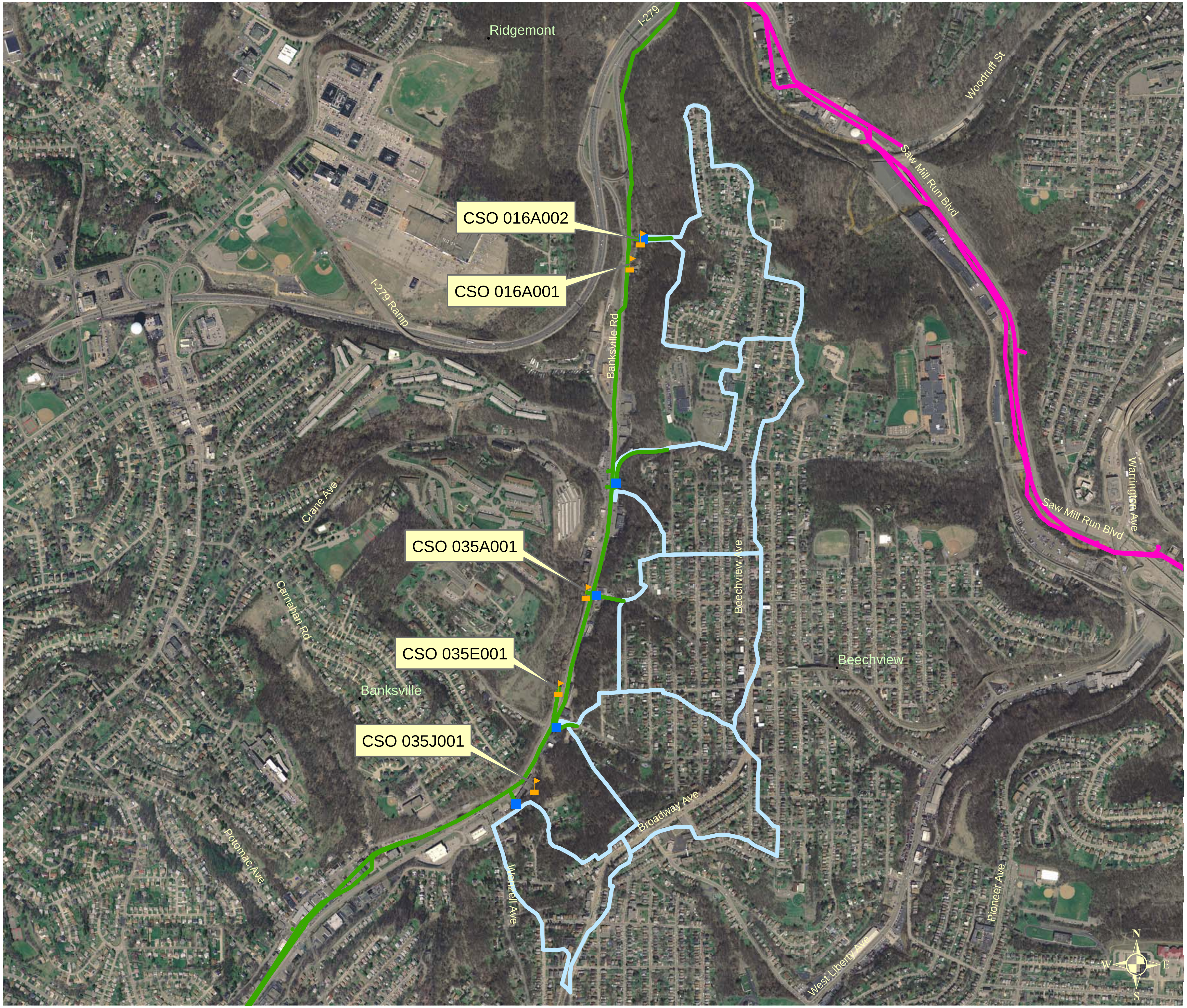
Recommendations

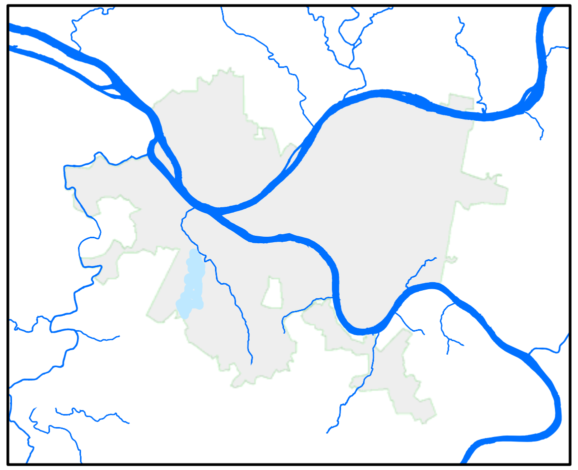
Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-016A001 to 036R001: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

There appears to be a significant amount of critical infrastructure and underground utilities that would need to be dealt with during construction of a sub-surface storage tank.   A large area would be required for a storage facility for control level 0. Enough space for a sub-surface storage tank may not be available for control level 0. A much smaller area would be needed for control levels 1, 2, 4 and 6 and a storage facility would be easier to construct in the potential site identified on Attachment 4.





Area Overview

Legend

- Sewershed Boundary
- Trunk Sewer
- ALCOSAN Interceptor
- PWSA Diversion Structure
- Combined Sewer Outfall

1,000 0 1,000 Feet

Attachment 1 CSO 016A001 to CSO 035J001 Tributary Area Map Little Sawmill Run Sewershed

CSO Controls Alternatives

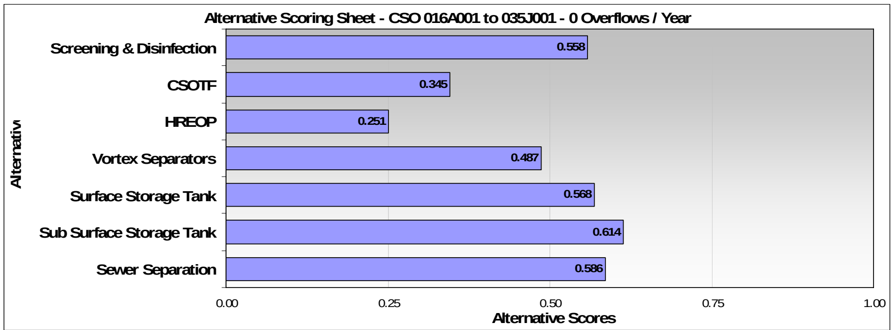
PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

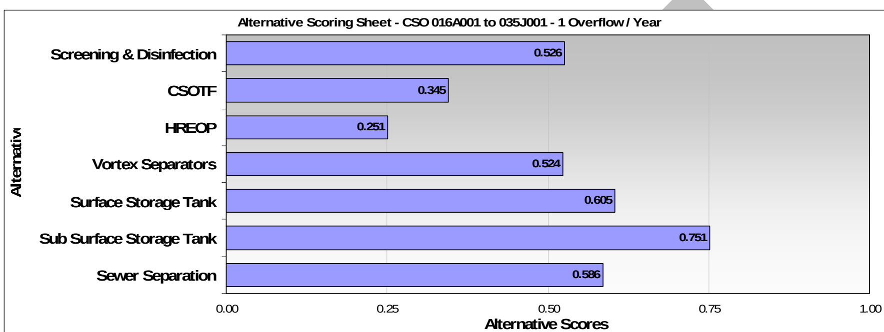
SW-D-0234.pdf

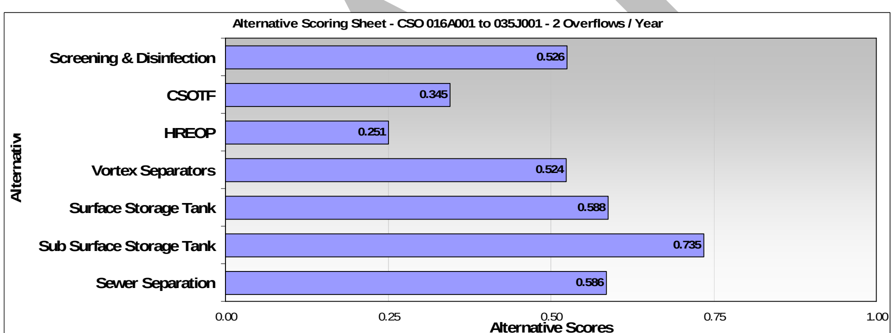
Attachment 2 - CSO Alternatives Development Worksheet

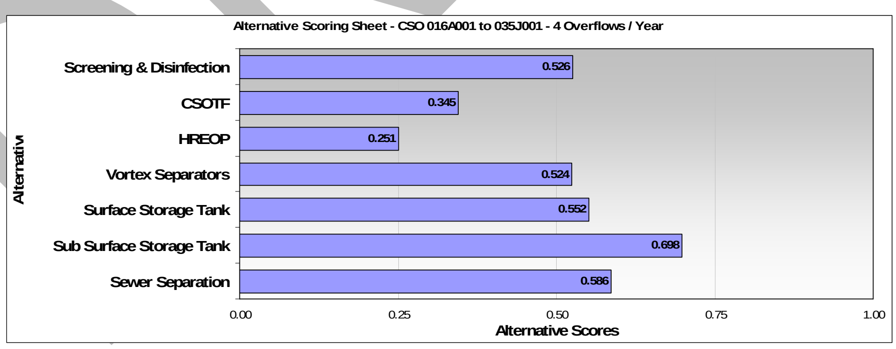
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	Y	Inter-basin flow balance/relief will be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

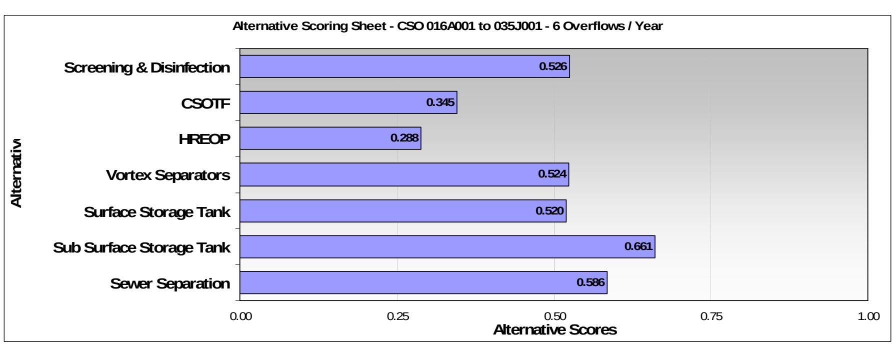
Attachment 3 – Alternative Scoring Sheet

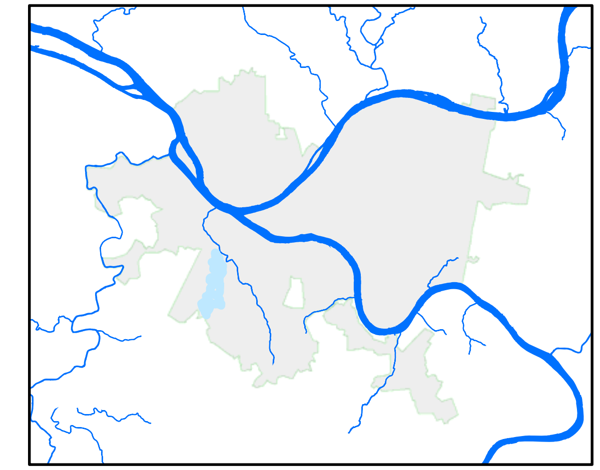












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

1,000 0 1,000 Feet

Attachment 4 CSO 016A001 to CSO 035J001 Facilities Boundary Map Little Sawmill Run Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0234.pdf

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	3	3	3	3	3
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	5	5	5	5	5
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	3	3	3	3	2
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	2	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	2	2	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team

›f Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.570**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.695**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.663**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.647**

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.647**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.610**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Total Score

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.422**

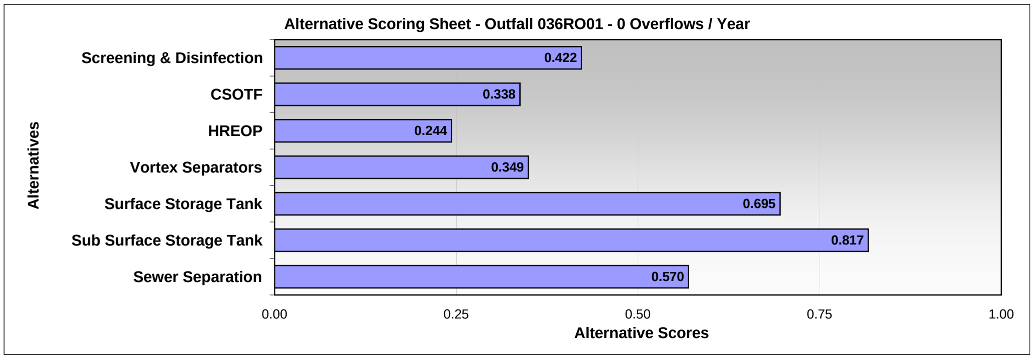
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.422**

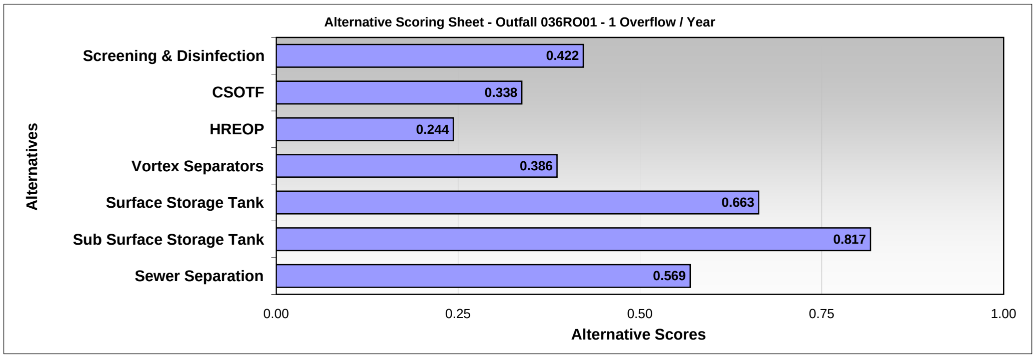
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

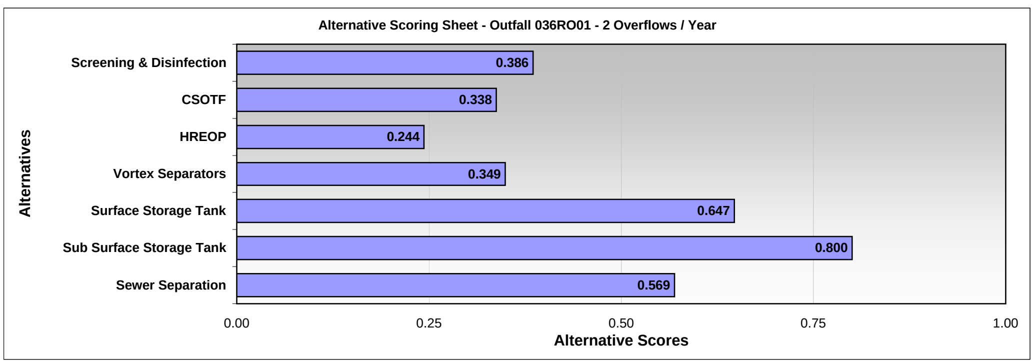
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

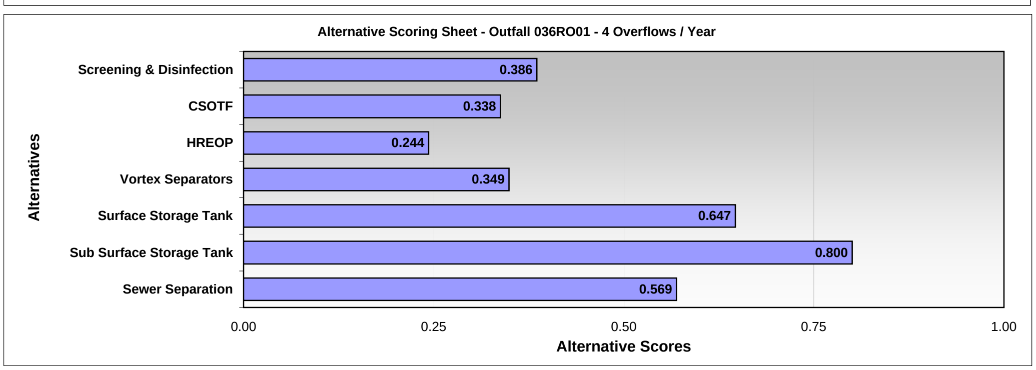
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

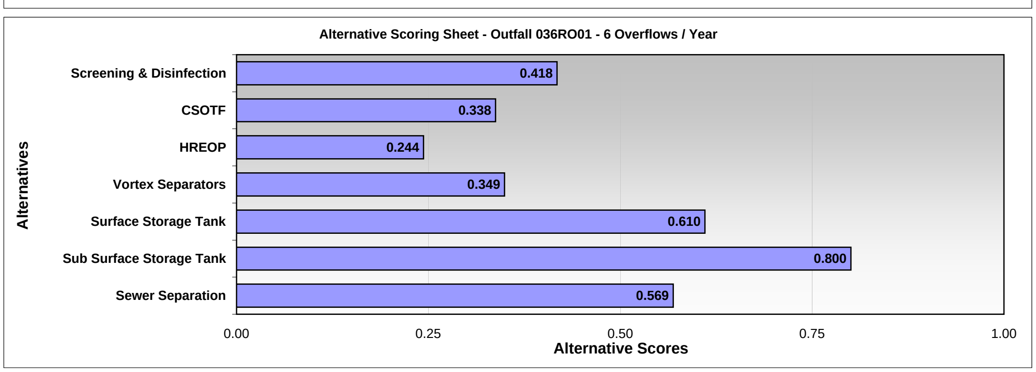
Alternative Scoring Sheet











RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	0	
Peak Volume	245,024	CF
	1.83	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	109.83	CFS
	70.98	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		303		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		75%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**34,088,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		5		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**195,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		98,990		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**198,000**		
			TOTAL CAPITAL COST $	**34,481,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	0	
Peak Volume	245,024	CF
	1.83	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	109.83	CFS
	70.98	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)			
SURFACE STORAGE TANK			
0 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	1.83	245,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	2.16	288,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	171		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	114		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	2.19	292,410	**Sufficient Volume**
Tank Area (SF)	19,000		= Length x Width
Construction Cost (Storage Tank)	**1,825,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	70.98	109.83	= Peak Rate
Force Main Diameter (In)	58		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 10,311,000**	**$ 69,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	109.83		Ref: Technical Parameters
Diameter (In)	78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,850		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe)	**$ 6,143,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	432,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	2,160		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$ 167,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	70.98		Ref: CSO Statistics
Construction Cost (Screening)	**$ 3,699,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes / Detention (Min)		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$ -	$ -	
Construction Cost (Disinfection)	**$ -**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	5		Input by Engineer
Construction Cost (Regulators)	**$ 195,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	46,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 92,000**		
		TOTAL CAPITAL COST $	**22,501,000**

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RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	0	
Peak Volume	245,024	CF
	1.83	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	109.83	CFS
	70.98	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SUB-SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank Default Value	
Sizing Basis: Peak Volume (MG / CF)		1.83	245,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.16	288,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		171		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		114		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.19	292,410	**Sufficient Volume**
Tank Area (SF)		19,000		= Length x Width
Construction Cost (Storage Tank)		**6,558,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.83	2.84	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		9		Input by Engineer
Force Main Velocity (FPS)		6.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,679,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		109.83		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**6,143,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		432,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		21,600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,017,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		70.98		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,699,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		46,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**92,000**		
			TOTAL CAPITAL COST $	**19,402,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	0	
Peak Volume	245,024	CF
	1.83	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	109.83	CFS
	70.98	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
0 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		70.98	109.83	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		8		
Construction Cost (Swirl / Vortex)	**$**	**4,082,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		78.08	120.81	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		61		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,177,000**	**$ 73,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		109.83		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**6,143,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		231,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		11,550		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**623,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		70.98		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,699,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		78.08		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		139	66	
Passes / Detention (Min)		5	**15.19**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,703,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		5		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**455,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		74,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**148,000**		
			TOTAL CAPITAL COST $	**28,103,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	0	
Peak Volume	245,024	CF
	1.83	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	109.83	CFS
	70.98	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SEDIMENTATION BASIN (CSOTF)

0 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		70.98	109.83	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		11,900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		155	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		78	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		1.09	145,080	
Construction Cost (CSOTF)	**$**	**16,456,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		70.98	109.83	= Peak Flow x % Req Pump
Force Main Diameter (In)		58		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,311,000**	**$ 69,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		109.83		Ref: CSO Statistics
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**6,143,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		218,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		10,900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**595,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		70.98		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,699,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		70.98		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		132	63	
Passes / Detention (Min)		5	15.14	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,604,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		34,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**		
			TOTAL CAPITAL COST $	**39,140,000**

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RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	0	
Peak Volume	245,024	CF
	1.83	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	109.83	CFS
	70.98	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
0 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		70.98		109.83	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		840			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		42		**OK**	Input by Engineer
Width (Ft)		21		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**12,778,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		78.08		120.81	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		61			Input by Engineer
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,177,000**	**$**	**73,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		109.83			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**6,143,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		21,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,050			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**95,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		70.98			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,699,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		78.08			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		139		66	Input by Engineer
Passes / Detention (Min)		5		**15.19**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,703,000	$	1,806,000	
Construction Cost (Disinfection)	**$**	**3,509,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		55,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**110,000**			
			TOTAL CAPITAL COST	**$**	**37,779,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	0	
Peak Volume	245,024	CF
	1.83	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	109.83	CFS
	70.98	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SCREENING AND DISINFECTION

0 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		70.98		109.83	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,699,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		70.98		109.83	= Peak Flow x % Req Pump
Force Main Diameter (In)		58			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,311,000**	**$**	**69,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		109.83			Ref: CSO Statistics
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**6,143,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		22,000			=CFS x 200
Odor Control Flow Rate (CFM)		1,100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**99,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		70.98			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		132		63	
Passes / Detention (Min)		5		**15.14**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,604,000	$	1,681,000	
Construction Cost (Disinfection)	**$**	**3,285,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		30,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
				TOTAL CAPITAL COST **$**	**23,861,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	1	
Peak Volume	103,997	CF
	0.78	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	50.57	CFS
	32.68	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		303		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		75%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**34,088,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		5		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**195,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		98,990		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**198,000**		
			TOTAL CAPITAL COST $	**34,481,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	1	
Peak Volume	103,997	CF
	0.78	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	50.57	CFS
	32.68	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SURFACE STORAGE TANK

1 Overflows / Year

1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.78	104,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.92	122,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	111		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	75		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.93	124,875	**Sufficient Volume**
Tank Area (SF)	8,000		= Length x Width
Construction Cost (Storage Tank)	**717,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	32.68	50.57	= Peak Rate
Force Main Diameter (In)	39		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 5,639,000**	**$ 47,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	50.57		Ref: Technical Parameters
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,850		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe)	**$ 4,824,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	183,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	920		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$ 86,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	32.68		Ref: CSO Statistics
Construction Cost (Screening)	**$ 1,925,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$ -	$ -	
Construction Cost (Disinfection)	**$ -**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	5		Input by Engineer
Construction Cost (Regulators)	**$ 195,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	31,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 62,000**		
		TOTAL CAPITAL COST $	**13,495,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	1	
Peak Volume	103,997	CF
	0.78	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	50.57	CFS
	32.68	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)					
SUB-SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.78		104,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.92		122,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		111			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		75			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.93		124,875	**Sufficient Volume**
Tank Area (SF)		8,000			= Length x Width
Construction Cost (Storage Tank)		**3,310,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.78		1.20	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		6			Input by Engineer
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**946,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		50.57			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**4,824,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		183,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		9,150			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**519,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		32.68			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,925,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		31,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**62,000**			
			TOTAL CAPITAL COST	**$**	**11,797,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	1	
Peak Volume	103,997	CF
	0.78	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	50.57	CFS
	32.68	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
1 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		32.68	50.57	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		Not Applicable - Insufficient Volume
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		35.95	55.63	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		41		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,037,000**	**$ 49,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		50.57		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**4,824,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		32.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,925,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		35.95		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		94	45	
Passes		3	15.21	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,042,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		5		Input by Engineer
New Vortex Drop Shaft		1		Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**455,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		34,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**		
			TOTAL CAPITAL COST $	**14,400,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	1	
Peak Volume	103,997	CF
	0.78	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	50.57	CFS
	32.68	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SEDIMENTATION BASIN (CSOTF)

1 Overflows / Year

Parameter		Value		Reference
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		32.68	50.57	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		5,500		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		106	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		53	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.50	67,416	
Construction Cost (CSOTF)	**$**	**16,372,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		32.68	50.57	= Peak Flow x % Req Pump
Force Main Diameter (In)		39		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,639,000**	**$ 47,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		50.57		Ref: CSO Statistics
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**4,824,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		101,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		5,050		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**326,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		32.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,925,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		32.68		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		90	43	
Passes		3	**15.31**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**983,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		18,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**36,000**		
			TOTAL CAPITAL COST $	**30,347,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	1	
Peak Volume	103,997	CF
	0.78	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	50.57	CFS
	32.68	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

HIGH RATE END OF PIPE TREATMENT (HREOP)

1 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		32.68	50.57	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		390		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		29	OK	Input by Engineer
Width (Ft)		14	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**6,406,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		35.95	55.63	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		41		Input by Engineer
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,037,000**	**$ 49,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		50.57		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**4,824,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		10,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**53,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		32.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,925,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		35.95		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		94	45	Input by Engineer
Passes		3	15.21	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,042,000	$ 915,000	
Construction Cost (Disinfection)	**$**	**1,957,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		37,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**74,000**		
			TOTAL CAPITAL COST $	**21,520,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	1	
Peak Volume	103,997	CF
	0.78	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	50.57	CFS
	32.68	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SCREENING AND DISINFECTION

1 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		32.68		50.57	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,925,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		32.68		50.57	= Peak Flow x % Req Pump
Force Main Diameter (In)		39			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,639,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		50.57			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**4,824,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		10,100			=CFS x 200
Odor Control Flow Rate (CFM)		510			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**54,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		32.68			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		90		43	
Passes		3		**15.31**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	983,000	$	861,000	
Construction Cost (Disinfection)	**$**	**1,844,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		26,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
			TOTAL CAPITAL COST	**$**	**14,580,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	2	
Peak Volume	93,664	CF
	0.70	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	46.02	CFS
	29.74	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		303		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		75%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**34,088,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		5		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**195,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		98,990		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**198,000**		
			TOTAL CAPITAL COST $	**34,481,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	2	
Peak Volume	93,664	CF
	0.70	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	46.02	CFS
	29.74	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)					
SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.70		94,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.82		111,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		106			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		71			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.84		112,890	**Sufficient Volume**
Tank Area (SF)		8,000			= Length x Width
Construction Cost (Storage Tank)		**640,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		29.74		46.02	= Peak Rate
Force Main Diameter (In)		37			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,280,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.02			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		167,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		840			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**80,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		29.74			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,789,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		30,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
				TOTAL CAPITAL COST $	**11,312,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	2	
Peak Volume	93,664	CF
	0.70	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	46.02	CFS
	29.74	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SUB-SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank Default Value	
Sizing Basis: Peak Volume (MG / CF)		0.70		94,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.82		111,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		106			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		71			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.84		112,890	**Sufficient Volume**
Tank Area (SF)		8,000			= Length x Width
Construction Cost (Storage Tank)		**3,072,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.70		1.08	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		6			Input by Engineer
Force Main Velocity (FPS)		5.5		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**880,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.02			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		167,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,350			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**483,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		29.74			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,789,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		30,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
			TOTAL CAPITAL COST	**$**	**9,718,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	2	
Peak Volume	93,664	CF
	0.70	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	46.02	CFS
	29.74	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
2 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		29.74		46.02	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		32.71		50.62	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		39			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,643,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.02			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		29.74			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,789,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		32.71			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		90		43	
Passes		3		**15.29**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**984,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**455,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		31,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**62,000**			
				TOTAL CAPITAL COST **$**	**12,203,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	2	
Peak Volume	93,664	CF
	0.70	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	46.02	CFS
	29.74	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SEDIMENTATION BASIN (CSOTF)

2 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		29.74	46.02	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		5,000		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		101	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		51	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.46	61,812	
Construction Cost (CSOTF)	**$**	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		29.74	46.02	= Peak Flow x % Req Pump
Force Main Diameter (In)		37		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,280,000**	**$ 45,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		46.02		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		93,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,650		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**305,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		29.74		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,789,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		29.74		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		86	41	
Passes		3	15.32	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**930,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		17,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**34,000**		

TOTAL CAPITAL COST	**$**	**28,172,000**

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RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	2	
Peak Volume	93,664	CF
	0.70	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	46.02	CFS
	29.74	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		29.74		46.02	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		350			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		27		**OK**	Input by Engineer
Width (Ft)		14		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**5,929,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		32.71		50.62	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		39			Input by Engineer
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,643,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.02			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		29.74			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,789,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		32.71			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		90		43	Input by Engineer
Passes		3		**15.29**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	984,000	$	861,000	
Construction Cost (Disinfection)	**$**	**1,845,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		36,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**72,000**			
				TOTAL CAPITAL COST $	**18,792,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	2	
Peak Volume	93,664	CF
	0.70	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	46.02	CFS
	29.74	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SCREENING AND DISINFECTION

2 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		29.74		46.02	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,789,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		29.74		46.02	= Peak Flow x % Req Pump
Force Main Diameter (In)		37			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,280,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.02			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,200			=CFS x 200
Odor Control Flow Rate (CFM)		460			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**50,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		29.74			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		86		41	
Passes		3		**15.32**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	930,000	$	808,000	
Construction Cost (Disinfection)	**$**	**1,738,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		26,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST $	**12,372,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	4	
Peak Volume	74,343	CF
	0.56	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	40.31	CFS
	26.05	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		303		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		75%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**34,088,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		5		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**195,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		98,990		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**198,000**		
			TOTAL CAPITAL COST $	**34,481,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	4	
Peak Volume	74,343	CF
	0.56	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	40.31	CFS
	26.05	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)				
SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.56	74,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.65	87,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		94		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		63		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.66	88,830	**Sufficient Volume**
Tank Area (SF)		6,000		= Length x Width
Construction Cost (Storage Tank)		**497,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		26.05	40.31	= Peak Rate
Force Main Diameter (In)		35		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,830,000**	**$ 43,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		40.31		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		131,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		660		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**66,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		26.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,619,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		27,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**		
			TOTAL CAPITAL COST $	**10,527,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	4	
Peak Volume	74,343	CF
	0.56	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	40.31	CFS
	26.05	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SUB-SURFACE STORAGE TANK

4 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.56	74,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.65	87,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		94		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		63		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.66	88,830	**Sufficient Volume**
Tank Area (SF)		6,000		= Length x Width
Construction Cost (Storage Tank)		**2,627,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.56	0.86	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		5		Input by Engineer
Force Main Velocity (FPS)		6.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**757,000**	**$ 15,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		40.31		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		131,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		6,550		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**399,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		26.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,619,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		27,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**		
			TOTAL CAPITAL COST $	**8,889,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	4	
Peak Volume	74,343	CF
	0.56	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	40.31	CFS
	26.05	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		26.05		40.31	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		28.66		44.34	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		37			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,148,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		40.31			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		26.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,619,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		28.66			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		84		41	
Passes		3		**15.53**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**910,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**455,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		27,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**			
			TOTAL CAPITAL COST	**$**	**11,454,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	4	
Peak Volume	74,343	CF
	0.56	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	40.31	CFS
	26.05	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		26.05	40.31	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		4,400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		95	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		47	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.40	53,580	
Construction Cost (CSOTF)	**$**	**16,370,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		26.05	40.31	= Peak Flow x % Req Pump
Force Main Diameter (In)		35		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,830,000**	**$ 43,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		40.31		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		80,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,000		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**271,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		26.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,619,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		26.05		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		80	39	
Passes		3	**15.48**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**861,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		15,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**30,000**		
			TOTAL CAPITAL COST $	**27,442,000**

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RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	4	
Peak Volume	74,343	CF
	0.56	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	40.31	CFS
	26.05	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
4 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		26.05		40.31	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		310			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		26		**OK**	Input by Engineer
Width (Ft)		13		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**5,333,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		28.66		44.34	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		37			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,148,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		40.31			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		26.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,619,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		28.66			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		84		41	Input by Engineer
Passes		3		**15.53**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	910,000	$	793,000	
Construction Cost (Disinfection)	**$**	**1,703,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		34,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**			
				TOTAL CAPITAL COST $	**17,379,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	4	
Peak Volume	74,343	CF
	0.56	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	40.31	CFS
	26.05	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		26.05		40.31	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,619,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		26.05		40.31	= Peak Flow x % Req Pump
Force Main Diameter (In)		35			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,830,000**	**$**	**43,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		40.31			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,100			=CFS x 200
Odor Control Flow Rate (CFM)		410			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**46,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		26.05			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		80		39	
Passes		3		**15.48**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	861,000	$	742,000	
Construction Cost (Disinfection)	**$**	**1,603,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		25,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
			TOTAL CAPITAL COST	**$**	**11,609,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	6	
Peak Volume	62,729	CF
	0.47	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	36.68	CFS
	23.70	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		303		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		75%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**34,088,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		5		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**195,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		98,990		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**198,000**		
			TOTAL CAPITAL COST $	**34,481,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	6	
Peak Volume	62,729	CF
	0.47	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	36.68	CFS
	23.70	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.47	63,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.55	74,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		87		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		58		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.57	75,690	**Sufficient Volume**
Tank Area (SF)		5,000		= Length x Width
Construction Cost (Storage Tank)		**413,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		23.70	36.68	= Peak Rate
Force Main Diameter (In)		33		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,544,000**	**$ 41,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		36.68		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		111,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		560		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**58,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		23.70		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,510,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		26,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**		
			TOTAL CAPITAL COST $	**10,036,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	6	
Peak Volume	62,729	CF
	0.47	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	36.68	CFS
	23.70	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)					
SUB-SURFACE STORAGE TANK					
6 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.47		63,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.55		74,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		87			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		58			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.57		75,690	**Sufficient Volume**
Tank Area (SF)		5,000			= Length x Width
Construction Cost (Storage Tank)		**2,359,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.47		0.73	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		5			Input by Engineer
Force Main Velocity (FPS)		5.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**683,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		36.68			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		111,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		5,550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**351,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		23.70			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,510,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		26,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
			TOTAL CAPITAL COST	**$**	**8,388,000**

RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	6	
Peak Volume	62,729	CF
	0.47	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	36.68	CFS
	23.70	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SWIRL CONCENTRATOR / VORTEX SEPARATOR

6 Overflows / Year

1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		23.70	36.68	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		26.07	40.35	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		35		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,833,000**	**$ 43,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		36.68		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		23.70		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,510,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		26.07		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		81	38	
Passes		3	**15.26**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**861,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		5		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**455,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		25,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST	**$ 10,975,000**

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RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	6	
Peak Volume	62,729	CF
	0.47	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	36.68	CFS
	23.70	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SEDIMENTATION BASIN (CSOTF)

6 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		23.70		36.68	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		4,000			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		90		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		45		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.36		48,600	
Construction Cost (CSOTF)	**$**	**16,371,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		23.70		36.68	= Peak Flow x % Req Pump
Force Main Diameter (In)		33			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,544,000**	**$**	**41,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		36.68			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		73,000			=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,650			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**252,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		23.70			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,510,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		23.70			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		77		37	
Passes		3		15.53	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**816,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		15,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**30,000**			
			TOTAL CAPITAL COST	**$**	**26,982,000**

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RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	6	
Peak Volume	62,729	CF
	0.47	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	36.68	CFS
	23.70	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

HIGH RATE END OF PIPE TREATMENT (HREOP)

6 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		23.70		36.68	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		280			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		25		OK	Input by Engineer
Width (Ft)		12		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**4,955,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		26.07		40.35	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		35			Input by Engineer
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,833,000**	**$**	**43,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		36.68			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		350			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**40,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		23.70			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,510,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		26.07			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		81		38	Input by Engineer
Passes		3		15.26	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	861,000	$	739,000	
Construction Cost (Disinfection)	**$**	**1,600,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		5			Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		33,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**			
			TOTAL CAPITAL COST	**$**	**16,465,000**

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RESULTS SUMMARY		
Number of Events / Year	78	
Number of Overflows / Year	6	
Peak Volume	62,729	CF
	0.47	MG
Total Volume	1,549,910	CF
	11.59	MG
Peak Rate	36.68	CFS
	23.70	MGD

Capital Costs - 036RO01 / Sewershed CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)

SCREENING AND DISINFECTION

6 Overflows / Year

1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		23.70	36.68	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,510,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		23.70	36.68	= Peak Flow x % Req Pump
Force Main Diameter (In)		33		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,544,000**	**$ 41,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		36.68		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,850		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**3,223,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,300		=CFS x 200
Odor Control Flow Rate (CFM)		370		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**42,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		23.70		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		77	37	
Passes		3	**15.53**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	816,000	$ 700,000	
Construction Cost (Disinfection)	**$**	**1,516,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		5		Input by Engineer
Construction Cost (Regulators)	**$**	**195,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		25,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**11,121,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	70.98	$324,212	20	10.910	$3,537,129
	Tank O&M	No. Events / Yr	78	$52,486	50	14.484	$760,181
		Const Cost ($)	$1,825,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	71	$14,239	20	10.910	$155,345
	Odor Control O&M	Capacity (cfm)	2,160	$7,560	20	10.910	$82,479
	Reserve / Replace	10% Gravity / 15% Pump					$52,584
			Total Annual O&M	**$399,000**		**Total PW O&M**	**$4,588,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.83	$28,176	20	10.910	$307,394
	Tank O&M	No. Events / Yr	78	$64,318	50	14.484	$931,559
		Const Cost ($)	$6,558,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	71	$14,239	20	10.910	$155,345
	Odor Control O&M	Capacity (cfm)	21,600	$75,600	20	10.910	$824,791
	Reserve / Replace	10% Gravity / 15% Pump					$19,678
			Total Annual O&M	**$183,000**		**Total PW O&M**	**$2,239,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	70.98	$324,212	20	10.910	$3,537,129
	Sed. Basin O&M	Flow Rate (mgd)	70.98	$7,985	50	14.484	$115,654
	Screening O&M	Flow Rate (mgd)	70.98	$14,239	20	10.910	$155,345
	Disinfection O&M	Flow Rate (mgd)	70.98	$215,772	20	10.910	$2,354,057
	Odor Control O&M	Capacity (cfm)	10,900.00	$38,150	20	10.910	$416,214
	Reserve / Replace	10% Gravity / 15% Pump					$58,111
			Total Annual O&M	**$601,000**		**Total PW O&M**	**$6,637,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	78.08	$345,528	20	10.910	$3,769,688
	HREP O&M	Flow Rate (mgd)	70.98	$285,665	20	10.910	$3,116,584
	Screening O&M	Flow Rate (mgd)	70.98	$14,239	20	10.910	$155,345
	Disinfection O&M	Flow Rate (mgd)	78.08	$228,671	20	10.910	$2,494,786
	Odor Control O&M	Capacity (cfm)	1,050.00	$3,675	20	10.910	$40,094
	Reserve / Replace	10% Gravity / 15% Pump					$95,310
			Total Annual O&M	**$878,000**		**Total PW O&M**	**$9,672,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	78.08	$345,528	20	10.910	$3,769,688
	Swirl / Vortex O&M	Flow Rate (mgd)	70.98	$7,985	20	10.910	$87,117
	Screening O&M	Flow Rate (mgd)	70.98	$14,239	20	10.910	$155,345
	Disinfection O&M	Flow Rate (mgd)	78.08	$228,671	20	10.910	$2,494,786
	Odor Control O&M	Capacity (cfm)	11,550.00	$40,425	20	10.910	$441,034
	Reserve / Replace	10% Gravity / 15% Pump					$67,542
			Total Annual O&M	**$637,000**		**Total PW O&M**	**$7,016,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	70.98	$324,212	20	10.910	$3,537,129
	Screening O&M	Flow Rate (mgd)	70.98	$14,239	20	10.910	$155,345
	Disinfection O&M	Flow Rate (mgd)	70.98	$215,772	20	10.910	$2,354,057
	Odor Control O&M	Capacity (cfm)	1,100.00	$3,850	20	10.910	$42,003
	Reserve / Replace	10% Gravity / 15% Pump					$56,762
			Total Annual O&M	**$559,000**		**Total PW O&M**	**$6,145,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	32.68	$193,103	20	10.910	$2,106,740
	Tank O&M	No. Events / Yr	78	$49,716	50	14.484	$720,062
		Const Cost ($)	$717,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	33	$10,340	20	10.910	$112,804
	Odor Control O&M	Capacity (cfm)	920	$3,220	20	10.910	$35,130
	Reserve / Replace	10% Gravity / 15% Pump					$28,477
			Total Annual O&M	**$257,000**		**Total PW O&M**	**$3,003,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.78	$15,893	20	10.910	$173,395
	Tank O&M	No. Events / Yr	78	$56,198	50	14.484	$813,952
		Const Cost ($)	$3,310,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	33	$10,340	20	10.910	$112,804
	Odor Control O&M	Capacity (cfm)	9,150	$32,025	20	10.910	$349,391
	Reserve / Replace	10% Gravity / 15% Pump					$10,507
			Total Annual O&M	**$115,000**		**Total PW O&M**	**$1,460,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)							
CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	32.68	$193,103	20	10.910	$2,106,740
	Sed. Basin O&M	Flow Rate (mgd)	32.68	$3,677	50	14.484	$53,250
	Screening O&M	Flow Rate (mgd)	32.68	$10,340	20	10.910	$112,804
	Disinfection O&M	Flow Rate (mgd)	32.68	$134,522	20	10.910	$1,467,630
	Odor Control O&M	Capacity (cfm)	5,050.00	$17,675	20	10.910	$192,833
	Reserve / Replace	10% Gravity / 15% Pump					$31,804
			Total Annual O&M	**$360,000**		**Total PW O&M**	**$3,965,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	35.95	$205,799	20	10.910	$2,245,253
	HREP O&M	Flow Rate (mgd)	32.68	$181,035	20	10.910	$1,975,084
	Screening O&M	Flow Rate (mgd)	32.68	$10,340	20	10.910	$112,804
	Disinfection O&M	Flow Rate (mgd)	35.95	$142,564	20	10.910	$1,555,367
	Odor Control O&M	Capacity (cfm)	500.00	$1,750	20	10.910	$19,092
	Reserve / Replace	10% Gravity / 15% Pump					$50,270
			Total Annual O&M	**$542,000**		**Total PW O&M**	**$5,958,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	35.95	$205,799	20	10.910	$2,245,253
	Swirl / Vortex O&M	Flow Rate (mgd)	32.68	$3,677	20	10.910	$40,112
	Screening O&M	Flow Rate (mgd)	32.68	$10,340	20	10.910	$112,804
	Disinfection O&M	Flow Rate (mgd)	35.95	$142,564	20	10.910	$1,555,367
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$32,701
			Total Annual O&M	**$363,000**		**Total PW O&M**	**$3,986,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	32.68	$193,103	20	10.910	$2,106,740
	Screening O&M	Flow Rate (mgd)	32.68	$10,340	20	10.910	$112,804
	Disinfection O&M	Flow Rate (mgd)	32.68	$134,522	20	10.910	$1,467,630
	Odor Control O&M	Capacity (cfm)	510.00	$1,785	20	10.910	$19,474
	Reserve / Replace	10% Gravity / 15% Pump					$31,064
			Total Annual O&M	**$340,000**		**Total PW O&M**	**$3,738,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	29.74	$181,313	20	10.910	$1,978,110
	Tank O&M	No. Events / Yr	78	$49,523	50	14.484	$717,274
		Const Cost ($)	$640,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	30	$10,062	20	10.910	$109,779
	Odor Control O&M	Capacity (cfm)	840	$2,940	20	10.910	$32,075
	Reserve / Replace	10% Gravity / 15% Pump					$26,626
			Total Annual O&M	**$244,000**		**Total PW O&M**	**$2,864,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.70	$14,820	20	10.910	$161,686
	Tank O&M	No. Events / Yr	78	$55,603	50	14.484	$805,334
		Const Cost ($)	$3,072,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	30	$10,062	20	10.910	$109,779
	Odor Control O&M	Capacity (cfm)	8,350	$29,225	20	10.910	$318,843
	Reserve / Replace	10% Gravity / 15% Pump					$9,770
			Total Annual O&M	**$110,000**		**Total PW O&M**	**$1,405,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	29.74	$181,313	20	10.910	$1,978,110
	Sed. Basin O&M	Flow Rate (mgd)	29.74	$3,346	50	14.484	$48,459
	Screening O&M	Flow Rate (mgd)	29.74	$10,062	20	10.910	$109,779
	Disinfection O&M	Flow Rate (mgd)	29.74	$127,012	20	10.910	$1,385,697
	Odor Control O&M	Capacity (cfm)	4,650.00	$16,275	20	10.910	$177,559
	Reserve / Replace	10% Gravity / 15% Pump					$29,768
			Total Annual O&M	**$339,000**		**Total PW O&M**	**$3,729,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	32.71	$193,234	20	10.910	$2,108,167
	HREP O&M	Flow Rate (mgd)	29.74	$171,269	20	10.910	$1,868,536
	Screening O&M	Flow Rate (mgd)	29.74	$10,062	20	10.910	$109,779
	Disinfection O&M	Flow Rate (mgd)	32.71	$134,605	20	10.910	$1,468,536
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$46,826
			Total Annual O&M	**$511,000**		**Total PW O&M**	**$5,619,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	32.71	$193,234	20	10.910	$2,108,167
	Swirl / Vortex O&M	Flow Rate (mgd)	29.74	$3,346	20	10.910	$36,502
	Screening O&M	Flow Rate (mgd)	29.74	$10,062	20	10.910	$109,779
	Disinfection O&M	Flow Rate (mgd)	32.71	$134,605	20	10.910	$1,468,536
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$30,566
			Total Annual O&M	**$342,000**		**Total PW O&M**	**$3,754,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	29.74	$181,313	20	10.910	$1,978,110
	Screening O&M	Flow Rate (mgd)	29.74	$10,062	20	10.910	$109,779
	Disinfection O&M	Flow Rate (mgd)	29.74	$127,012	20	10.910	$1,385,697
	Odor Control O&M	Capacity (cfm)	460.00	$1,610	20	10.910	$17,565
	Reserve / Replace	10% Gravity / 15% Pump					$29,074
			Total Annual O&M	**$320,000**		**Total PW O&M**	**$3,520,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	26.05	$165,963	20	10.910	$1,810,650
	Tank O&M	No. Events / Yr	78	$49,166	50	14.484	$712,096
		Const Cost ($)	$497,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	26	$9,719	20	10.910	$106,033
	Odor Control O&M	Capacity (cfm)	660	$2,310	20	10.910	$25,202
	Reserve / Replace	10% Gravity / 15% Pump					$24,290
			Total Annual O&M	**$228,000**		**Total PW O&M**	**$2,678,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.56	$12,700	20	10.910	$138,561
	Tank O&M	No. Events / Yr	78	$54,491	50	14.484	$789,221
		Const Cost ($)	$2,627,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	26	$9,719	20	10.910	$106,033
	Odor Control O&M	Capacity (cfm)	6,550	$22,925	20	10.910	$250,110
	Reserve / Replace	10% Gravity / 15% Pump					$8,578
			Total Annual O&M	**$100,000**		**Total PW O&M**	**$1,293,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	26.05	$165,963	20	10.910	$1,810,650
	Sed. Basin O&M	Flow Rate (mgd)	26.05	$2,931	50	14.484	$42,449
	Screening O&M	Flow Rate (mgd)	26.05	$9,719	20	10.910	$106,033
	Disinfection O&M	Flow Rate (mgd)	26.05	$117,170	20	10.910	$1,278,318
	Odor Control O&M	Capacity (cfm)	4,000.00	$14,000	20	10.910	$152,739
	Reserve / Replace	10% Gravity / 15% Pump					$27,189
			Total Annual O&M	**$310,000**		**Total PW O&M**	**$3,417,000**

Operation and Maintenance Costs

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	28.66	$176,875	20	10.910	$1,929,696
	HREP O&M	Flow Rate (mgd)	26.05	$158,439	20	10.910	$1,728,564
	Screening O&M	Flow Rate (mgd)	26.05	$9,719	20	10.910	$106,033
	Disinfection O&M	Flow Rate (mgd)	28.66	$124,175	20	10.910	$1,354,738
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$42,511
			Total Annual O&M	**$471,000**		**Total PW O&M**	**$5,177,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	28.66	$176,875	20	10.910	$1,929,696
	Swirl / Vortex O&M	Flow Rate (mgd)	26.05	$2,931	20	10.910	$31,975
	Screening O&M	Flow Rate (mgd)	26.05	$9,719	20	10.910	$106,033
	Disinfection O&M	Flow Rate (mgd)	28.66	$124,175	20	10.910	$1,354,738
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$27,883
			Total Annual O&M	**$314,000**		**Total PW O&M**	**$3,450,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	26.05	$165,963	20	10.910	$1,810,650
	Screening O&M	Flow Rate (mgd)	26.05	$9,719	20	10.910	$106,033
	Disinfection O&M	Flow Rate (mgd)	26.05	$117,170	20	10.910	$1,278,318
	Odor Control O&M	Capacity (cfm)	410.00	$1,435	20	10.910	$15,656
	Reserve / Replace	10% Gravity / 15% Pump					$26,577
			Total Annual O&M	**$295,000**		**Total PW O&M**	**$3,237,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	23.70	$155,816	20	10.910	$1,699,945
	Tank O&M	No. Events / Yr	78	$48,956	50	14.484	$709,054
		Const Cost ($)	$413,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	24	$9,503	20	10.910	$103,678
	Odor Control O&M	Capacity (cfm)	560	$1,960	20	10.910	$21,383
	Reserve / Replace	10% Gravity / 15% Pump					$22,804
			Total Annual O&M	**$217,000**		**Total PW O&M**	**$2,557,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.47	$11,338	20	10.910	$123,695
	Tank O&M	No. Events / Yr	78	$53,821	50	14.484	$779,517
		Const Cost ($)	$2,359,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	24	$9,503	20	10.910	$103,678
	Odor Control O&M	Capacity (cfm)	5,550	$19,425	20	10.910	$211,926
	Reserve / Replace	10% Gravity / 15% Pump					$7,849
			Total Annual O&M	**$95,000**		**Total PW O&M**	**$1,227,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	23.70	$155,816	20	10.910	$1,699,945
	Sed. Basin O&M	Flow Rate (mgd)	23.70	$2,667	50	14.484	$38,624
	Screening O&M	Flow Rate (mgd)	23.70	$9,503	20	10.910	$103,678
	Disinfection O&M	Flow Rate (mgd)	23.70	$110,620	20	10.910	$1,206,855
	Odor Control O&M	Capacity (cfm)	3,650.00	$12,775	20	10.910	$139,374
	Reserve / Replace	10% Gravity / 15% Pump					$25,552
			Total Annual O&M	**$292,000**		**Total PW O&M**	**$3,214,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	26.07	$166,061	20	10.910	$1,811,713
	HREP O&M	Flow Rate (mgd)	23.70	$149,880	20	10.910	$1,635,185
	Screening O&M	Flow Rate (mgd)	23.70	$9,503	20	10.910	$103,678
	Disinfection O&M	Flow Rate (mgd)	26.07	$117,233	20	10.910	$1,279,002
	Odor Control O&M	Capacity (cfm)	350.00	$1,225	20	10.910	$13,365
	Reserve / Replace	10% Gravity / 15% Pump					$39,754
			Total Annual O&M	**$444,000**		**Total PW O&M**	**$4,883,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	26.07	$166,061	20	10.910	$1,811,713
	Swirl / Vortex O&M	Flow Rate (mgd)	23.70	$2,667	20	10.910	$29,094
	Screening O&M	Flow Rate (mgd)	23.70	$9,503	20	10.910	$103,678
	Disinfection O&M	Flow Rate (mgd)	26.07	$117,233	20	10.910	$1,279,002
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$26,168
			Total Annual O&M	**$296,000**		**Total PW O&M**	**$3,250,000**

CSO 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001)	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	23.70	$155,816	20	10.910	$1,699,945
	Screening O&M	Flow Rate (mgd)	23.70	$9,503	20	10.910	$103,678
	Disinfection O&M	Flow Rate (mgd)	23.70	$110,620	20	10.910	$1,206,855
	Odor Control O&M	Capacity (cfm)	370.00	$1,295	20	10.910	$14,128
	Reserve / Replace	10% Gravity / 15% Pump					$24,980
			Total Annual O&M	**$278,000**		**Total PW O&M**	**$3,050,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$34.5	$34,481,000	$0
1	$34.5	$34,481,000	$0
2	$34.5	$34,481,000	$0
4	$34.5	$34,481,000	$0
6	$34.5	$34,481,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$21.6	$19,402,000	$2,239,000
1	$13.3	$11,797,000	$1,460,000
2	$11.1	$9,718,000	$1,405,000
4	$10.2	$8,889,000	$1,293,000
6	$9.6	$8,388,000	$1,227,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$27.1	$22,501,000	$4,588,000
1	$16.5	$13,495,000	$3,003,000
2	$14.2	$11,312,000	$2,864,000
4	$13.2	$10,527,000	$2,678,000
6	$12.6	$10,036,000	$2,557,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$35.1	$28,103,000	$7,016,000
1	$18.4	$14,400,000	$3,986,000
2	$16.0	$12,203,000	$3,754,000
4	$14.9	$11,454,000	$3,450,000
6	$14.2	$10,975,000	$3,250,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$47.5	$37,779,000	$9,672,000
1	$27.5	$21,520,000	$5,958,000
2	$24.4	$18,792,000	$5,619,000
4	$22.6	$17,379,000	$5,177,000
6	$21.3	$16,465,000	$4,883,000

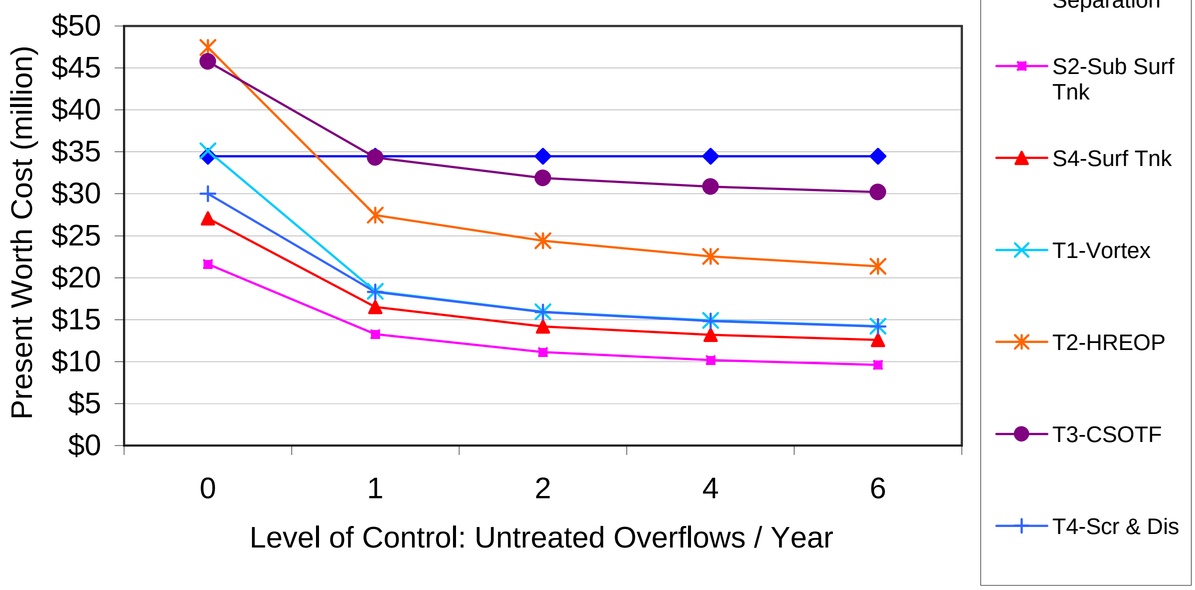
T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$45.8	$39,140,000	$6,637,000
1	$34.3	$30,347,000	$3,965,000
2	$31.9	$28,172,000	$3,729,000
4	$30.9	$27,442,000	$3,417,000
6	$30.2	$26,982,000	$3,214,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$30.0	$23,861,000	$6,145,000
1	$18.3	$14,580,000	$3,738,000
2	$15.9	$12,372,000	$3,520,000
4	$14.8	$11,609,000	$3,237,000
6	$14.2	$11,121,000	$3,050,000

Figure 3 – Outfall 036RO01 Alternative Costs



Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

Partnering to achieve long term benefits PWSA CSO Team Metcalf & Eddy Baker/Wade-Trim

Structure ID CSO 036R001 (DC 036P001, DC 036R001, DC 06
Location Name
Model ID LSMR - DCs.1
Structure Type Outfall
PWSA Sewershed Little Saw Mill Run
Stream of Discharge Saw Mill Run
NPDES Permit Number 036RO01
Owner PWSA

Results Summary

Number of Events:	78
Peak Volume:	245,024 ft^3
	1.83 MG
Total Volume:	1,549,910 ft^3
	11.59 MG
Peak Rate:	109.83 cfs

Model Network (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 1:30	2395	1/5/2005 14:45	245024.06	1832.903	0	7.53	20
6/11/2005 17:24	144	6/11/2005 17:45	103996.97	777.949	1	109.83	0
5/13/2005 22:16	693	5/13/2005 22:45	93663.90	700.653	2	43.41	3
8/20/2005 18:15	227	8/20/2005 18:30	87807.93	656.847	3	36.68	6
7/5/2005 16:15	122	7/5/2005 16:45	74342.99	556.123	4	50.57	1
1/11/2005 8:19	1055	1/11/2005 17:15	66621.66	498.363	5	6.45	23
7/26/2005 19:30	59	7/26/2005 20:00	62728.94	469.244	6	46.02	2
11/14/2005 21:45	401	11/15/2005 3:30	54855.53	410.347	7	8.35	17
3/28/2005 9:00	686	3/28/2005 19:15	54837.82	410.214	8	7.50	22
11/29/2005 1:45	736	11/29/2005 7:00	53213.17	398.061	9	9.43	16
7/15/2005 17:35	50	7/15/2005 18:00	47449.16	354.943	10	40.31	4
9/29/2005 5:01	77	9/29/2005 5:45	38705.83	289.539	11	37.29	5
5/11/2005 22:30	100	5/11/2005 22:45	36702.47	274.553	12	29.36	8
1/3/2005 8:00	904	1/3/2005 13:45	32697.98	244.597	13	3.62	39
10/21/2005 18:55	744	10/22/2005 6:30	28701.97	214.705	14	7.69	19
2/14/2005 5:05	904	2/14/2005 19:45	26047.33	194.847	15	1.82	54
4/23/2005 3:30	79	4/23/2005 4:00	25689.17	192.168	16	11.25	13
4/1/2005 19:15	1158	4/2/2005 6:30	24065.83	180.024	17	4.86	31
7/17/2005 16:15	35	7/17/2005 16:30	23909.21	178.853	18	31.53	7
7/21/2005 14:15	98	7/21/2005 14:45	23767.79	177.795	19	16.93	11
10/25/2005 1:05	1248	10/25/2005 2:30	23024.16	172.232	20	2.92	45
1/13/2005 22:40	268	1/14/2005 2:15	21044.16	157.421	21	5.14	29
8/29/2005 8:45	422	8/29/2005 13:30	19927.85	149.070	22	6.30	24
1/8/2005 1:00	414	1/8/2005 5:30	19663.46	147.093	23	4.92	30
5/23/2005 16:15	44	5/23/2005 16:45	18306.07	136.939	24	17.49	10
8/27/2005 15:00	42	8/27/2005 15:15	17960.77	134.356	25	15.87	12
12/15/2005 9:35	650	12/15/2005 14:00	16286.29	121.830	26	5.40	27
2/9/2005 15:05	132	2/9/2005 16:45	14820.70	110.866	27	7.52	21
11/6/2005 9:45	260	11/6/2005 10:00	14669.98	109.739	28	21.74	9
5/28/2005 8:17	96	5/28/2005 9:30	13240.76	99.047	29	3.69	38
2/20/2005 15:25	684	2/20/2005 20:30	12390.00	92.683	30	5.33	28
10/7/2005 7:35	227	10/7/2005 10:45	10556.64	78.969	31	4.67	33
9/26/2005 5:32	265	9/26/2005 9:30	10173.49	76.103	32	4.10	36

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
5/30/2005 19:15	56	5/30/2005 19:30	8880.51	66.431	33	8.33	18
4/22/2005 15:50	184	4/22/2005 18:00	7358.20	55.043	34	2.71	46
11/16/2005 4:00	117	11/16/2005 4:15	7093.02	53.059	35	9.48	15
3/23/2005 11:50	134	3/23/2005 12:30	7002.63	52.383	36	2.13	49
11/9/2005 19:20	34	11/9/2005 19:45	6775.94	50.687	37	5.94	25
3/23/2005 2:20	193	3/23/2005 4:15	6616.54	49.495	38	1.82	53
10/22/2005 15:40	144	10/22/2005 16:30	6136.59	45.905	39	2.99	44
7/25/2005 13:15	243	7/25/2005 13:30	5991.81	44.822	40	10.44	14
6/14/2005 18:45	54	6/14/2005 19:15	5595.19	41.855	41	4.21	35
4/30/2005 4:21	151	4/30/2005 5:30	5588.87	41.808	42	2.07	50
9/16/2005 21:03	51	9/16/2005 21:45	5461.45	40.854	43	3.61	40
5/20/2005 2:05	494	5/20/2005 7:45	5081.97	38.016	44	2.18	48
10/21/2005 7:00	63	10/21/2005 7:30	4954.33	37.061	45	2.70	47
11/1/2005 14:58	155	11/1/2005 16:30	4410.17	32.990	46	1.79	55
5/7/2005 12:06	93	5/7/2005 13:30	4131.41	30.905	47	3.92	37
5/14/2005 16:01	67	5/14/2005 16:15	4006.19	29.968	48	4.71	32
3/27/2005 16:45	79	3/27/2005 17:00	3949.00	29.541	49	3.17	42
12/25/2005 10:50	162	12/25/2005 13:00	3750.76	28.058	50	1.63	56
8/26/2005 20:45	124	8/26/2005 21:00	3564.75	26.666	51	4.67	34
8/8/2005 8:31	47	8/8/2005 8:45	3452.04	25.823	52	3.40	41
5/28/2005 17:20	79	5/28/2005 17:30	3447.88	25.792	53	1.89	51
10/24/2005 12:00	423	10/24/2005 13:15	3408.70	25.499	54	0.77	62
2/16/2005 7:08	73	2/16/2005 7:30	2869.32	21.464	55	1.86	52
6/3/2005 8:45	34	6/3/2005 9:00	2647.42	19.804	56	3.03	43
6/28/2005 18:00	64	6/28/2005 18:15	2376.41	17.777	57	5.89	26
8/5/2005 11:05	34	8/5/2005 11:30	1507.50	11.277	58	1.32	57
4/27/2005 0:20	33	4/27/2005 0:45	826.78	6.185	59	0.78	61
11/8/2005 14:06	51	11/8/2005 14:45	798.98	5.977	60	0.49	65
6/16/2005 12:50	29	6/16/2005 13:00	724.11	5.417	61	0.81	60
1/30/2005 12:35	91	1/30/2005 13:00	705.34	5.276	62	0.43	66
4/20/2005 19:40	144	4/20/2005 21:30	703.94	5.266	63	0.36	68
4/3/2005 1:50	182	4/3/2005 2:00	553.94	4.144	64	0.83	59
4/23/2005 11:42	25	4/23/2005 12:00	423.02	3.164	65	0.51	64
11/24/2005 7:56	217	11/24/2005 8:15	418.53	3.131	66	0.29	69
3/20/2005 3:41	226	3/20/2005 7:15	410.18	3.068	67	0.58	63
8/16/2005 8:00	24	8/16/2005 8:15	338.55	2.532	68	0.42	67
11/9/2005 4:25	10	11/9/2005 4:30	302.02	2.259	69	1.01	58
3/7/2005 22:21	117	3/7/2005 22:30	205.57	1.538	70	0.21	70
10/24/2005 2:22	41	10/24/2005 2:50	184.60	1.381	71	0.08	74
8/28/2005 11:50	13	8/28/2005 12:00	109.23	0.817	72	0.19	71
7/12/2005 19:51	27	7/12/2005 20:00	95.36	0.713	73	0.12	73
6/6/2005 9:36	27	6/6/2005 10:00	88.89	0.665	74	0.13	72
11/23/2005 20:05	12	11/23/2005 20:15	33.61	0.251	75	0.06	75
12/26/2005 6:24	8	12/26/2005 6:30	19.80	0.148	76	0.05	76
6/17/2005 2:10	6	6/17/2005 2:15	14.50	0.108	77	0.05	77

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	CSO 036R001 (DC 036P001, DC 036R001, DC (
Location Name	
Model ID	LSMR - DCs.1
Structure Type	Outfall
PWSA Sewershed	Little Saw Mill Run
Stream of Discharge	Saw Mill Run
NPDES Permit Number	036RO01
Owner	PWSA
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	78
Peak Volume:	245,024 ft^3
	1.83 MG
Total Volume:	1,549,910 ft^3
	11.59 MG
Peak Rate:	109.83 cfs

(DC 036R

Figure 1 - Outfall 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001) CSO Volume

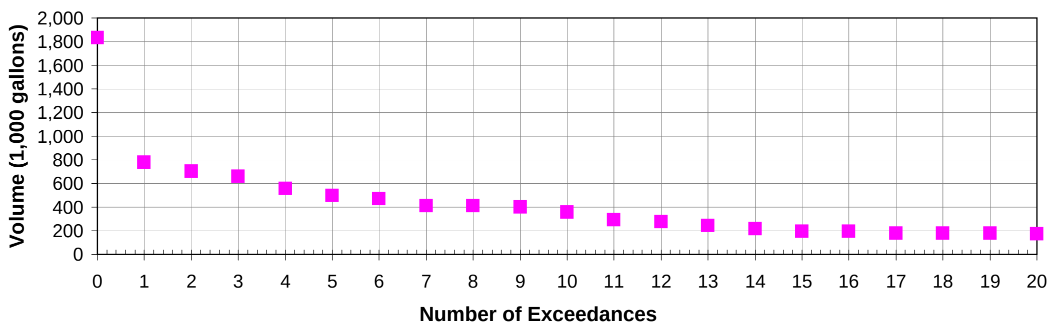
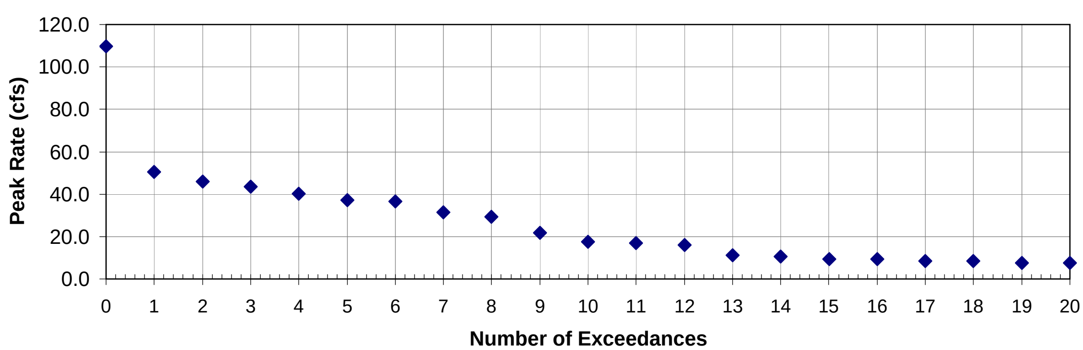


Figure 2 - Outfall 036R001 (DC 036P001, DC 036R001, DC 063B001, DC 063B002, DC 063F001) CSO Peak Flow Rate



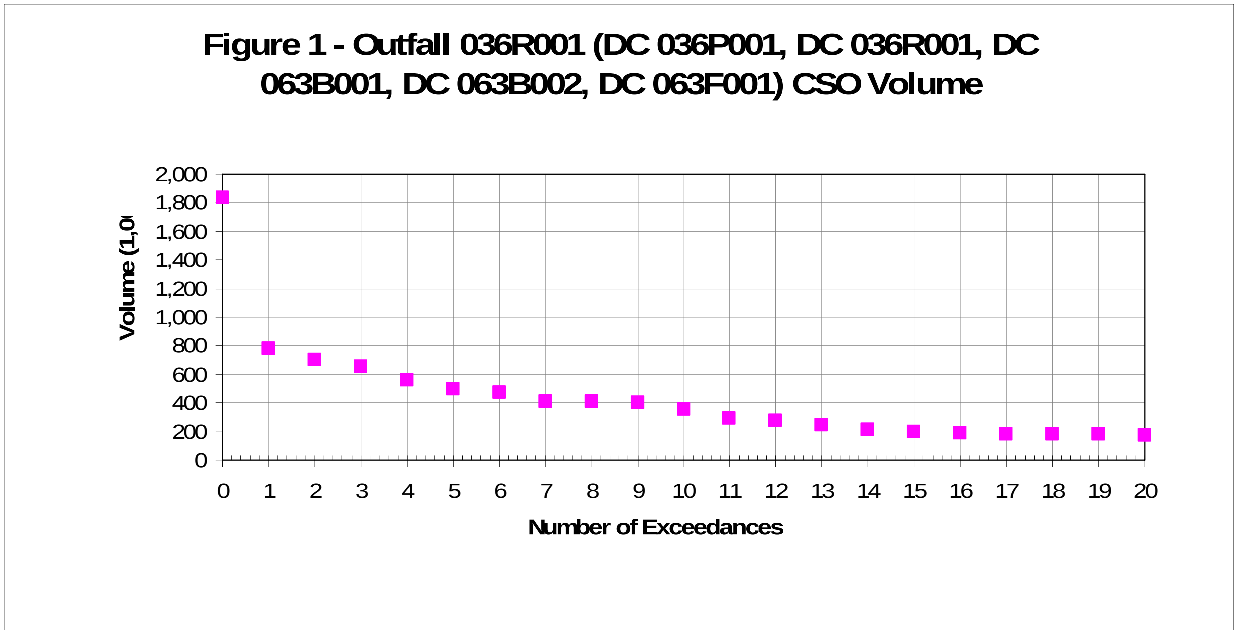
D.29.2 036R001 – LITTLE SAWMILL RUN – NPDES# 036R001

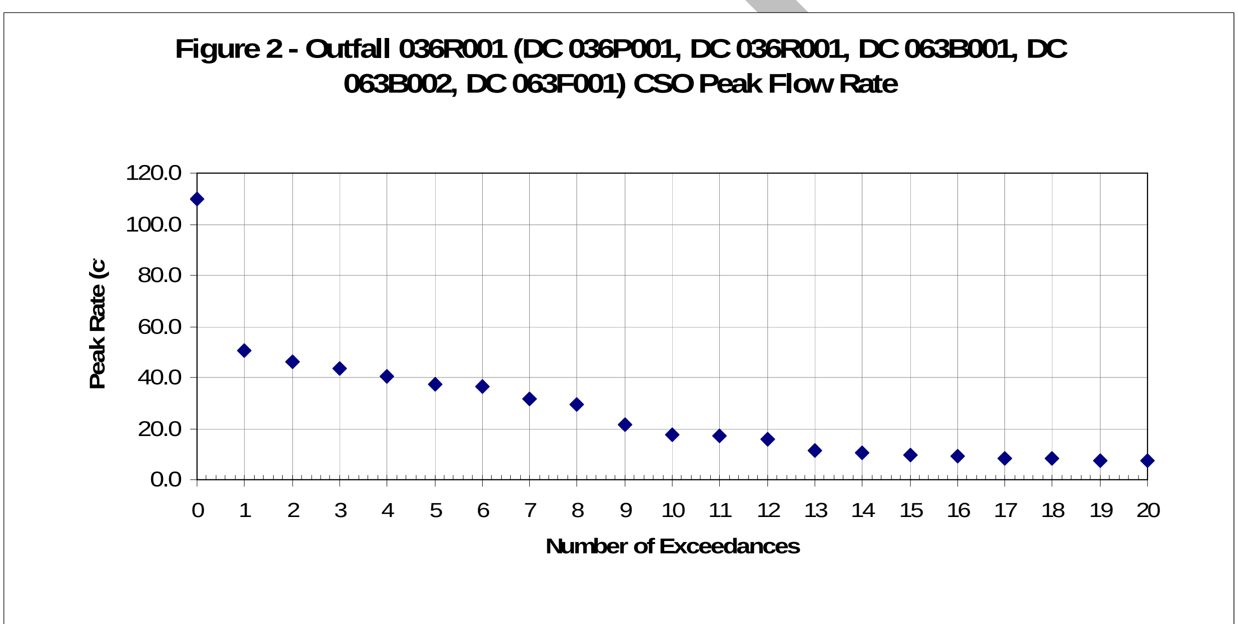
Description of Outfalls

The Little Sawmill Run Sewershed is located in portions of Banksville, Beechview and Ridgemont sections in the City of Pittsburgh and in portions of Dormont Borough, Green Tree Borough, the Municipality of Mount Lebanon, and Scott Township. The Little Sawmill Run Sewershed includes approximately 1,819 acres of residential, business and commercial users and is comprised of approximately 847 manholes and 188,900 linear feet (35.8 miles) of sewers up to 156 inches in diameter. Five PWSA diversion chambers contribute overflows to CSO 036R001: DC 036P001, DC 036R001, DC 063B001, DC 063B002, and DC 063F001. The tributary area for CSO 036R001 is 428 acres, of which approximately 303 acres are tributary to the individual PWSA diversion chambers and the remaining area is stormwater drainage tributary to CSO 036R001.

The individual diversion chambers overflow to Little Saw Mill Run, a tributary of Saw Mill Run, and the NPDES permit applies to the location where the culvert daylights. Nearly all of the service area is combined sewer. *Attachment 1, Tributary Area Map,* shows the CSO locations and the tributary areas.

Outfall 036R001 typically experiences overflow events 78 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 1.83 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from the outfalls is approximately 110 CFS. *Figure 1 – Outfall 036R001 CSO Volume* and Figure *2 – Outfall 036R001 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.





A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers in order to control the CSO flows from each of the diversion structures and not the stream flows or additional stormwater that enters the stream. There appears to be a limited amount space available between Banksville Road and Banksville Avenue/Old Banksville Road between Wenzell Avenue and Potomac Avenue for a facility. The area is an existing parking facility and billboard area that may be able to be procured for a storage or treatment facility.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4-036R001: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-036R001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-036R001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the the

collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-036R001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-036R001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-036R001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

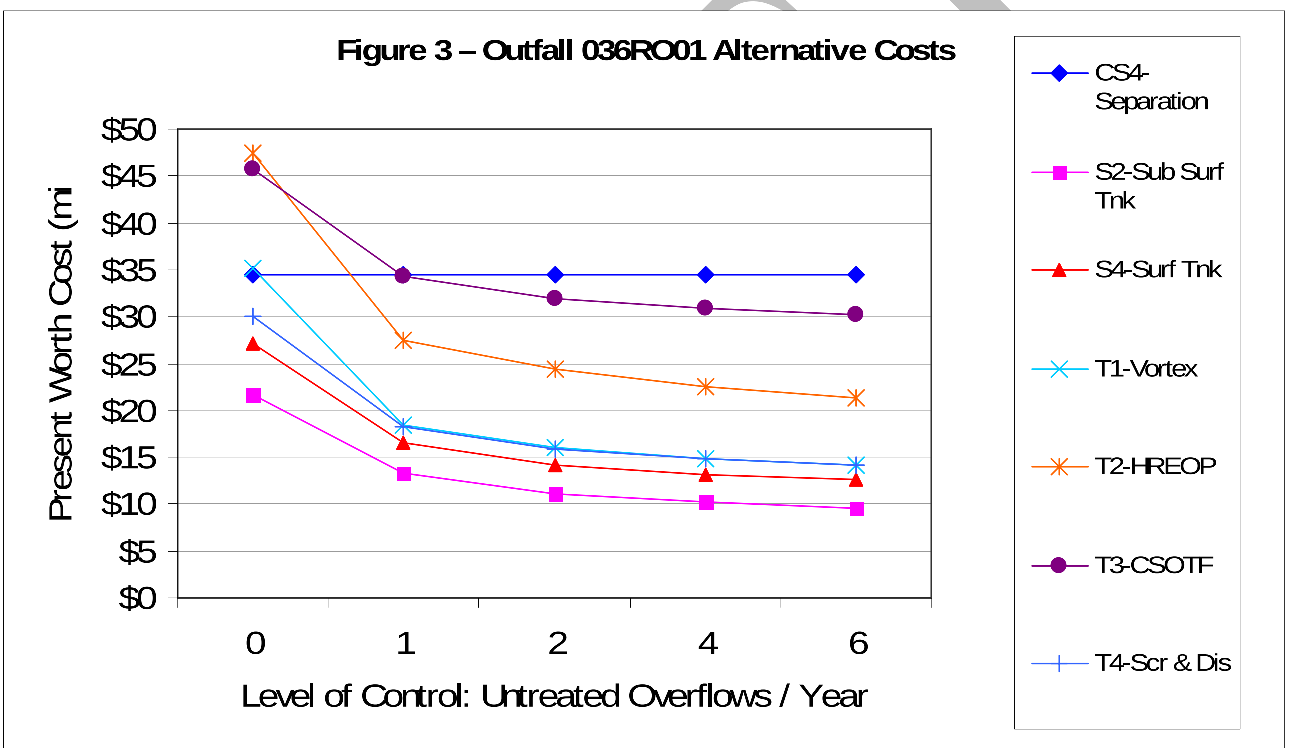
T4-036R001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 036R001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

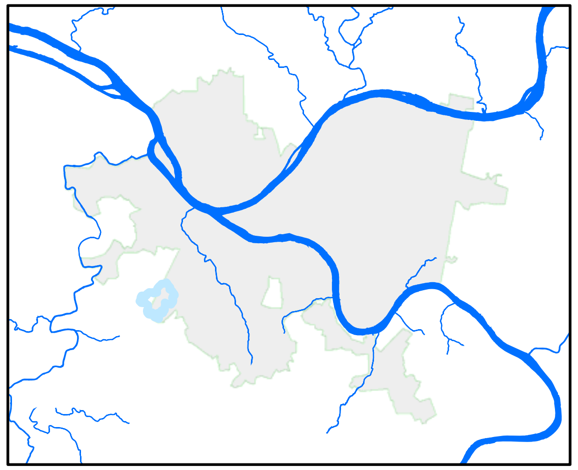
Recommendations

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-016A001 to 036R001: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

There appears to be a significant amount of critical infrastructure and underground utilities that would need to be dealt with during construction of a sub-surface storage tank.   A large area would be required for a storage facility for control level 0. Enough space for a sub-surface storage tank may not be available for control level 0. A much smaller area would be needed for control levels 1, 2, 4, and 6 and a storage facility would be easier to construct in the potential site identified on Attachment 4.



Area Overview

Legend

- Sewershed Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

600 0 600 Feet

Attachment 1
CSO 036R001
Tributary Area Map
Little Sawmill Run
Sewershed

CSO Controls Alternatives

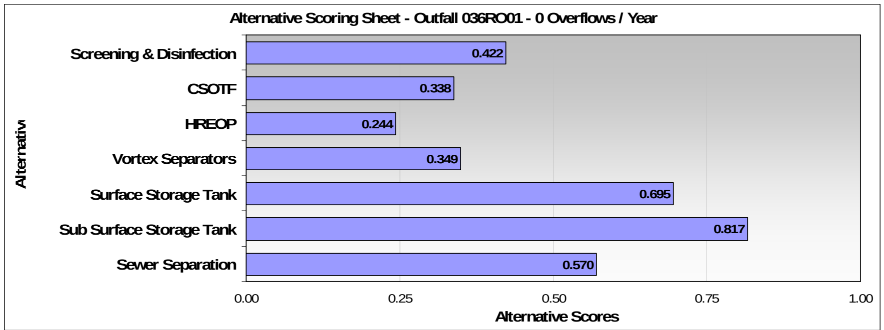
PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

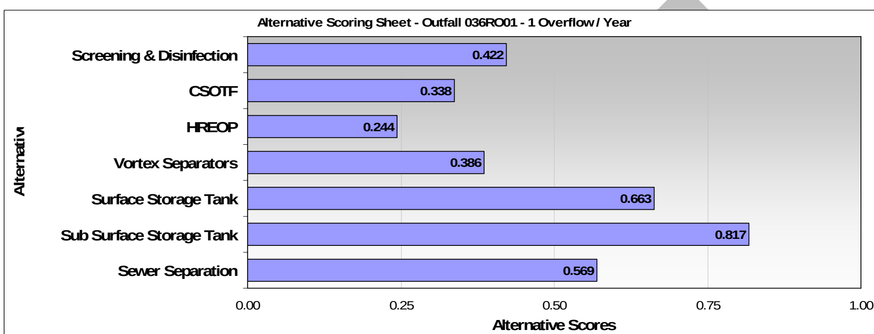
SW-D-0236.pdf

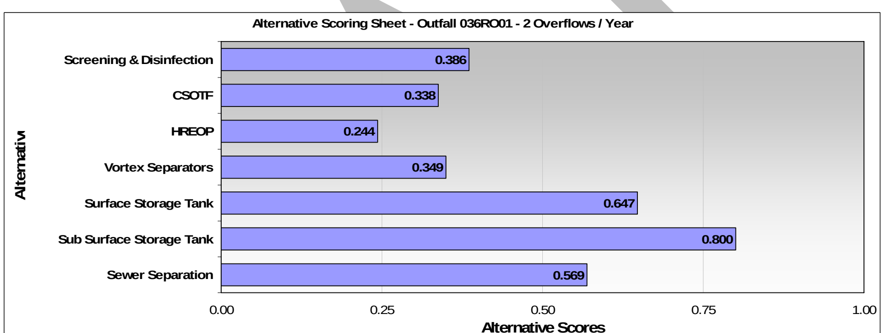
Attachment 2 - CSO Alternatives Development Worksheet

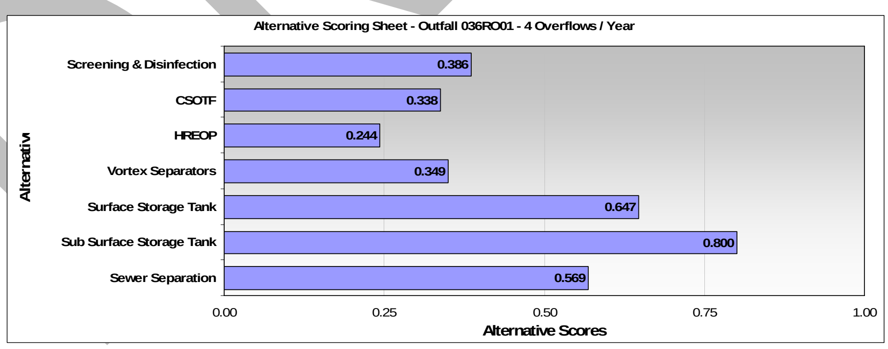
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	Y	Inter-basin flow balance/relief will be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

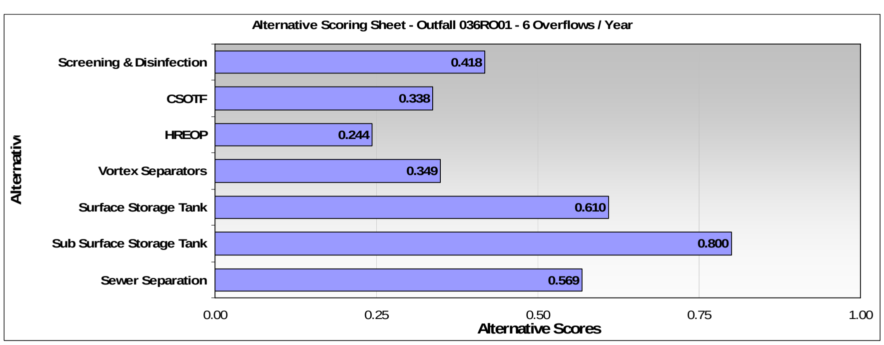
Attachment 3 – Alternative Scoring Sheet

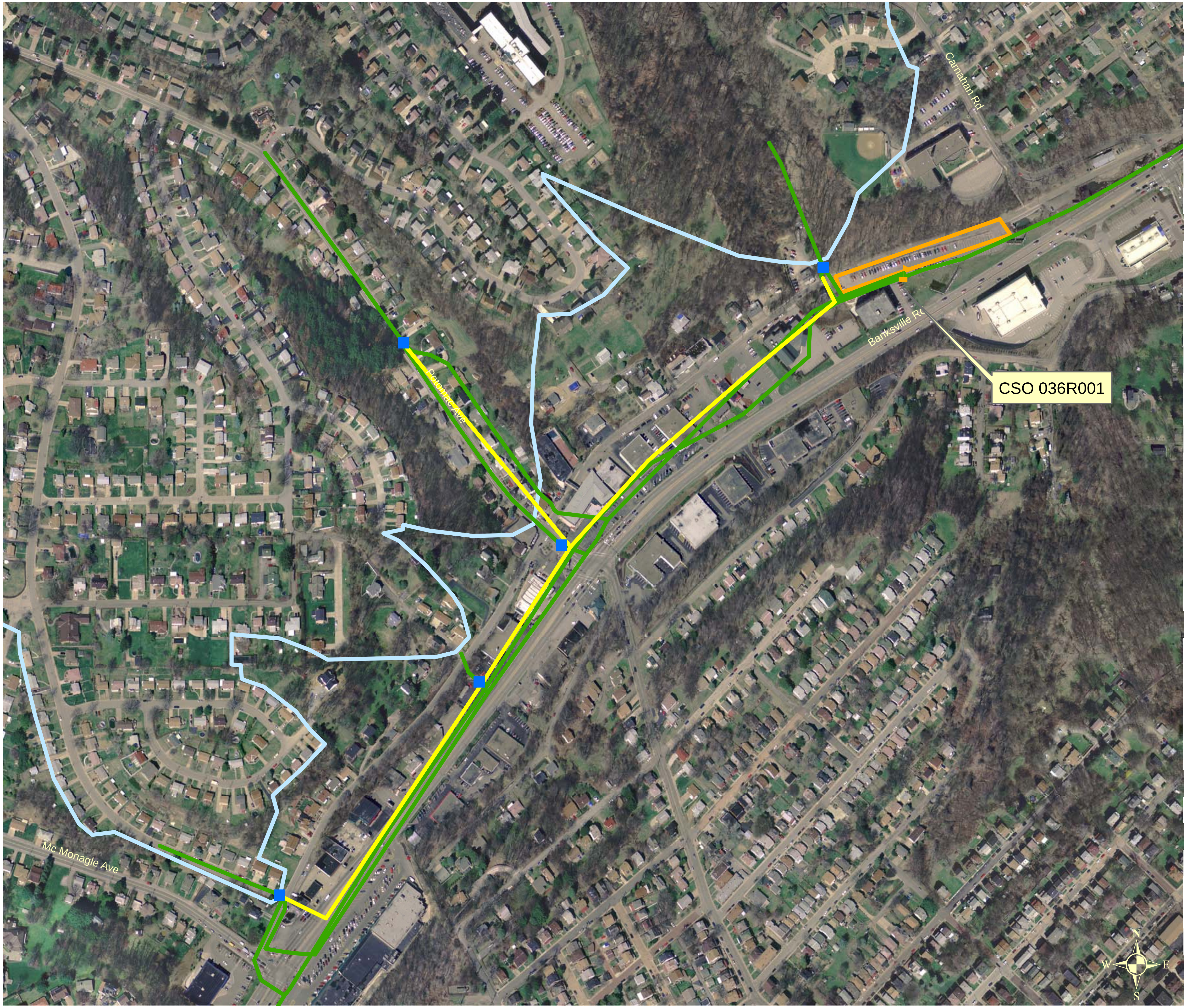


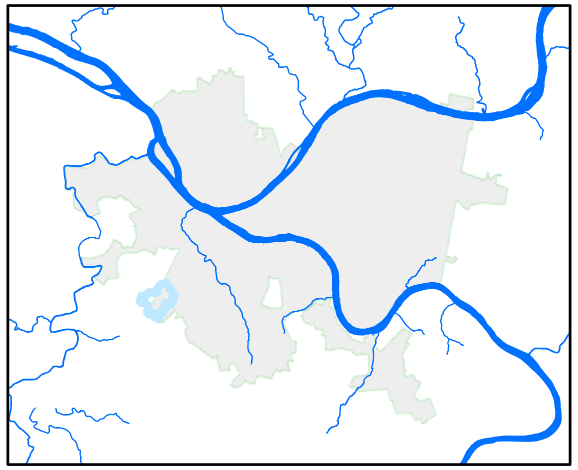












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

0 320 640 Feet

Attachment 4 CSO 036R001 Facilities Boundary Map Little Sawmill Run Sewershed

CSO Controls Alternatives

SW-D-0236.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	2	4	3	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	2	2	2	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	3	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	0	-0.25	0.053	-0.013
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.572**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.571**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.736**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.793**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.756**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.683**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.622**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.627**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.610**

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.610**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.573**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.504**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.546**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.546**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.546**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.546**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.273**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.273**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.273**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.273**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.273**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.431**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.367**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.367**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.367**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.367**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.611**

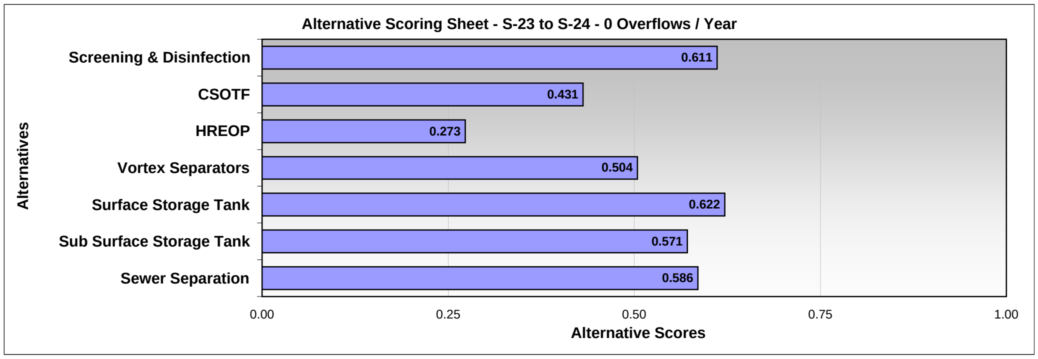
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.547**

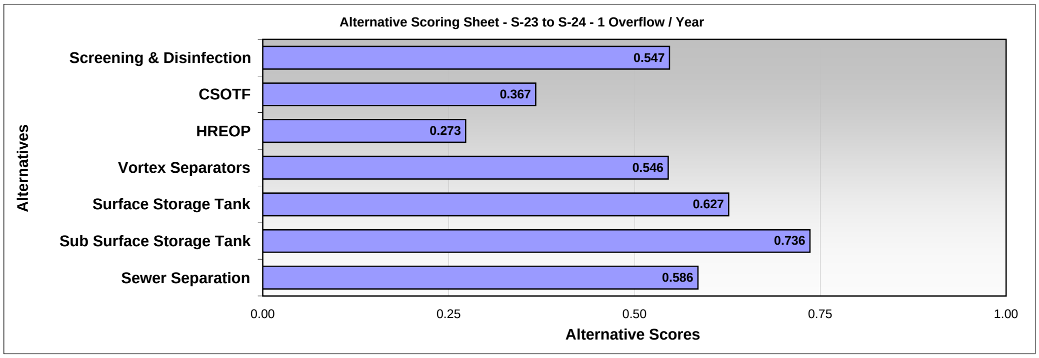
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.547**

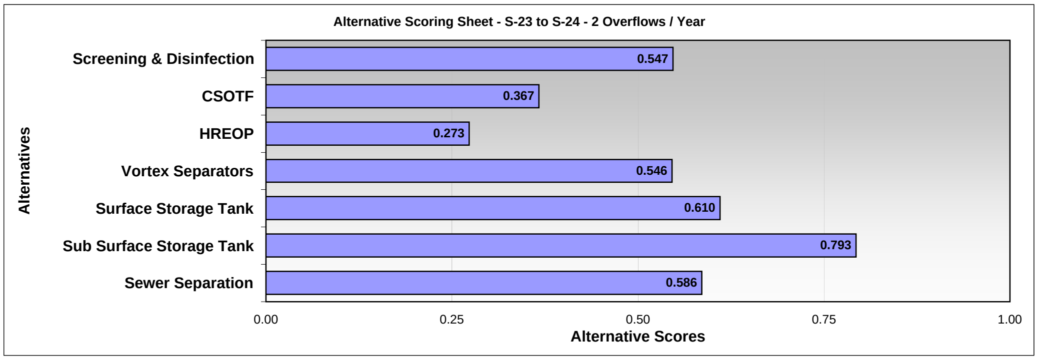
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.547**

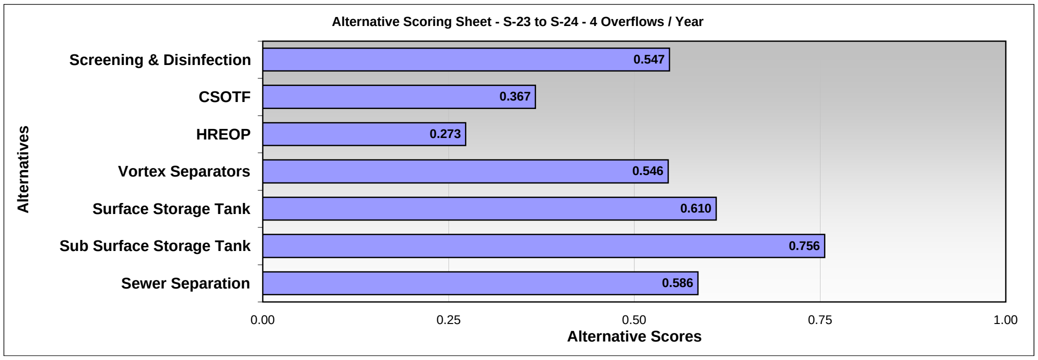
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.547**

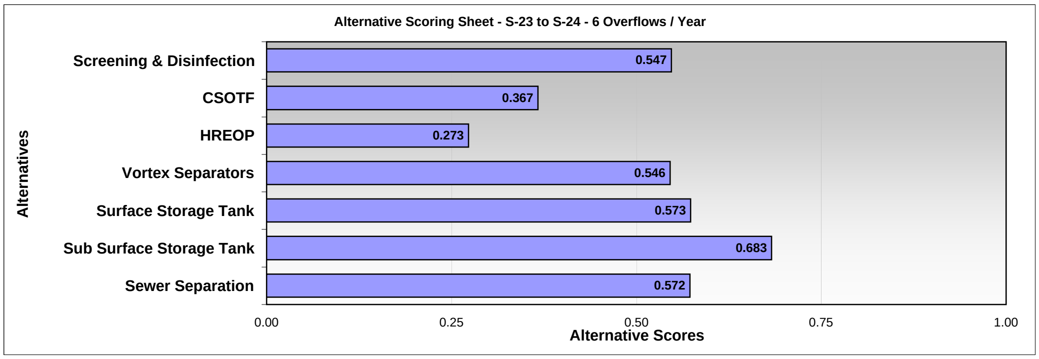
Alternative Scoring Sheet











RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	0	
Peak Volume	1,253,611	CF
	9.38	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	96.26	CFS
	62.21	MGD

#N/A			
CONSOLIDATION SEWERS			
0 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		125	Input by Engineer
Peak Flow (CFS)		24.06	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	20,000	
Peak Flow (CFS)		48.13	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	26,000	
Peak Flow (CFS)		72.19	75% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Peak Flow (CFS)		96.26	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Construction Cost (Consolidation Sewers)	**$**	**124,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections			Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections			Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
TOTAL CAPITAL COST	**$**		**256,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	0	
Peak Volume	1,253,611	CF
	9.38	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	96.26	CFS
	62.21	MGD

		#N/A		
		SEWER SEPARATION		
		0 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		-		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		470		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**94,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		204,732		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**409,000**		
			TOTAL CAPITAL COST $	**94,448,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	0	
Peak Volume	1,253,611	CF
	9.38	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	96.26	CFS
	62.21	MGD

		#N/A		
		SURFACE STORAGE TANK		
		0 Overflows / Year		
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		9.38	1,254,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		11.03	1,475,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		385		= $(\text{Vol / SWD} * 1.5)^{1/2}$
Width (Ft)		257		= $(\text{Vol / SWD} / 1.5)^{1/2}$
Total Volume (MG / CF)		11.10	1,484,175	**Sufficient Volume**
Tank Area (SF)		99,000		= Length x Width
Construction Cost (Storage Tank)		**10,813,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		62.21	96.26	= Peak Rate
Force Main Diameter (In)		54		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)				Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,241,000**	**$ -**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		96.26		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,213,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,070		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**602,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		62.21		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,293,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		9.38		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		4.69		= Peak Vol/DW Time
Construction Cost	**$**	**10,277,622**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		159,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**318,000**		
			TOTAL CAPITAL COST	**$ 35,099,622**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	0	
Peak Volume	1,253,611	CF
	9.38	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	96.26	CFS
	62.21	MGD

#N/A

SUB-SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		9.38	1,254,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		11.03	1,475,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		385		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		257		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		11.10	1,484,175	**Sufficient Volume**
Tank Area (SF)		99,000		= Length x Width
Construction Cost (Storage Tank)		**29,792,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		9.38	14.51	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		21		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,747,000**	**$ 29,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		96.26		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,213,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		110,650		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**3,660,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		62.21		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,293,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		9.38		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		4.69		= Peak Vol/DW Time
Construction Cost	**$**	**10,277,622**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		159,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**318,000**		
			TOTAL CAPITAL COST	**$ 50,671,622**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	0	
Peak Volume	1,253,611	CF
	9.38	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	96.26	CFS
	62.21	MGD

		#N/A			
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
0 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		62.21		96.26	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		7			
Construction Cost (Swirl / Vortex)	**$**	**3,766,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		68.43		105.88	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		57			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,000,000**	**$**	**68,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		96.26			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		202,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		10,100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**561,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		62.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,293,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		68.43			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		130		62	
Passes / Detention (Min)		5		**15.22**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,568,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		65,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**130,000**			
				TOTAL CAPITAL COST	**$ 19,941,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	0	
Peak Volume	1,253,611	CF
	9.38	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	96.26	CFS
	62.21	MGD

		#N/A			
		SEDIMENTATION BASIN (CSOTF)			
		0 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		62.21		96.26	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10,400			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		145		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		73		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.95		127,020	
Construction Cost (CSOTF)	**$**	**16,425,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		62.21		96.26	= Peak Rate
Force Main Diameter (In)		54			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,241,000**	**$**	**64,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		96.26			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		191,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		9,550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**537,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		62.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,293,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		62.21			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		124		59	
Passes / Detention (Min)		5		**15.20**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,475,000**			
7. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.95			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.48			= Peak Vol/DW Time
Construction Cost	**$**	**8,230,606**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
9. Land Acquisition Parameters					
Land Required - CSOTF (SF)		30,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
				TOTAL CAPITAL COST	**$ 39,880,606**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	0	
Peak Volume	1,253,611	CF
	9.38	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	96.26	CFS
	62.21	MGD

#N/A					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
0 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		62.21		96.26	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		740			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		39		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		20		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**11,293,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		68.43		105.88	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		57			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,000,000**	**$**	**68,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		96.26			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		19,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		950			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**88,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		62.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,293,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		68.43			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		130		62	
Passes / Detention (Min)		5		15.22	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,568,000	$	1,644,000	
Construction Cost (Disinfection)	**$**	**3,212,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		51,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**102,000**			
			TOTAL CAPITAL COST	**$**	**28,611,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	0	
Peak Volume	1,253,611	CF
	9.38	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	96.26	CFS
	62.21	MGD

#N/A					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		62.21		96.26	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,293,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		62.21		96.26	= Peak Flow x % Req Pump
Force Main Diameter (In)		54			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,241,000**	**$**	**64,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		96.26			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		19,300			=CFS x 200
Odor Control Flow Rate (CFM)		970			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**89,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		62.21			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		124		59	
Passes / Detention (Min)		5		**15.20**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,475,000	$	1,536,000	
Construction Cost (Disinfection)	**$**	**3,011,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		29,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**58,000**			
				TOTAL CAPITAL COST	**$ 16,311,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	1	
Peak Volume	316,652	CF
	2.37	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	83.77	CFS
	54.14	MGD

#N/A			
CONSOLIDATION SEWERS			
1 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		125	Width of Sewershed along Riverline
Peak Flow (CFS)		24.06	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	20,000	
Peak Flow (CFS)		48.13	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	26,000	
Peak Flow (CFS)		72.19	75% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Peak Flow (CFS)		96.26	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Construction Cost (Consolidation Sewers)	**$**	**124,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 256,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	1	
Peak Volume	316,652	CF
	2.37	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	83.77	CFS
	54.14	MGD

		#N/A		
		SEWER SEPARATION		
		1 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		Typ 0, Rev as Req'd
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		470		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**94,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		204,732		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**409,000**		
			TOTAL CAPITAL COST **$**	**94,409,000**

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RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	1	
Peak Volume	316,652	CF
	2.37	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	83.77	CFS
	54.14	MGD

		#N/A		
		SURFACE STORAGE TANK		
		1 Overflows / Year		
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.37	317,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.79	373,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		194		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		130		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.83	378,300	**Sufficient Volume**
Tank Area (SF)		25,000		= Length x Width
Construction Cost (Storage Tank)		**2,414,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		54.14	83.77	= Peak Rate
Force Main Diameter (In)		51		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		-		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,257,000**	**$ -**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		83.77		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		560,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,800		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**205,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		54.14		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,919,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.37		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.18		= Peak Vol/DW Time
Construction Cost	**$**	**8,574,955**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		54,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**108,000**		
			TOTAL CAPITAL COST	**$ 23,032,955**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	1	
Peak Volume	316,652	CF
	2.37	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	83.77	CFS
	54.14	MGD

#N/A					
SUB-SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.37		317,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.79		373,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		194			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		130			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.83		378,300	**Sufficient Volume**
Tank Area (SF)		25,000			= Length x Width
Construction Cost (Storage Tank)		**8,208,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.37		3.66	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		11			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,775,000**	**$**	**20,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		83.77			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		560,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		28,000			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,247,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		54.14			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,919,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		2.37			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.18			= Peak Vol/DW Time
Construction Cost	**$**	**8,574,955**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		54,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**108,000**			
			TOTAL CAPITAL COST	**$**	**23,406,955**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	1	
Peak Volume	316,652	CF
	2.37	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	83.77	CFS
	54.14	MGD

#N/A				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
1 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		54.14	83.77	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		59.55	92.15	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		53		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,917,000**	**$ 63,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		83.77		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		54.14		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,919,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		59.55		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		121	58	
Passes		5	**15.23**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,434,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		56,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**112,000**		
			TOTAL CAPITAL COST	**$ 14,000,000**

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RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	1	
Peak Volume	316,652	CF
	2.37	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	83.77	CFS
	54.14	MGD

#N/A					
SEDIMENTATION BASIN (CSOTF)					
1 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		54.14		83.77	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		9,100			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		136		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		68		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.83		110,976	
Construction Cost (CSOTF)	**$**	**16,404,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		54.14		83.77	= Peak Rate
Force Main Diameter (In)		51			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,257,000**	**$**	**61,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		83.77			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		166,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**481,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		54.14			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,919,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		54.14			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		116		55	
Passes		5		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,349,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		2.37			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.18			= Peak Vol/DW Time
Construction Cost	**$**	**8,574,955**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		27,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**			
				TOTAL CAPITAL COST	**$ 38,654,955**

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RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	1	
Peak Volume	316,652	CF
	2.37	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	83.77	CFS
	54.14	MGD

#N/A					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		54.14		83.77	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		640			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		37		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		18		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**9,940,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		59.55		92.15	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		53			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,917,000**	**$**	**63,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		83.77			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		16,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**77,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		54.14			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,919,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		59.55			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		121		58	
Passes		5		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,434,000	$	1,490,000	
Construction Cost (Disinfection)	**$**	**2,924,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		47,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**94,000**			
				TOTAL CAPITAL COST	**$ 25,489,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	1	
Peak Volume	316,652	CF
	2.37	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	83.77	CFS
	54.14	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		1 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		54.14		83.77	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,919,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		54.14		83.77	= Peak Flow x % Req Pump
Force Main Diameter (In)		51			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,257,000**	**$**	**61,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		83.77			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		16,800			=CFS x 200
Odor Control Flow Rate (CFM)		840			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**80,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		54.14			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		116		55	
Passes		5		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,349,000	$	1,397,000	
Construction Cost (Disinfection)	**$**	**2,746,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		28,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**			
				TOTAL CAPITAL COST	**$ 14,674,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	2	
Peak Volume	190,960	CF
	1.43	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	81.00	CFS
	52.35	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	2 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		125	Width of Sewershed along Riverline
Peak Flow (CFS)		24.06	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	20,000	
Peak Flow (CFS)		48.13	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	26,000	
Peak Flow (CFS)		72.19	75% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Peak Flow (CFS)		96.26	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Construction Cost (Consolidation Sewers)	**$**	**124,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 256,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	2	
Peak Volume	190,960	CF
	1.43	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	81.00	CFS
	52.35	MGD

#N/A				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		470		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**94,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		204,732		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**409,000**		
		TOTAL CAPITAL COST	**$**	**94,409,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	2	
Peak Volume	190,960	CF
	1.43	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	81.00	CFS
	52.35	MGD

#N/A			
SURFACE STORAGE TANK			
2 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	1.43	191,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	1.68	225,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	151		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)	101		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)	1.71	228,765	**Sufficient Volume**
Tank Area (SF)	15,000		= Length x Width
Construction Cost (Storage Tank)	**1,391,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	52.35	81.00	= Peak Rate
Force Main Diameter (In)	50		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	-		Input by Engineer
Construction Cost (PS / Force Main) $	**8,038,000**	**$ -**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	81.00		Ref: Technical Parameters
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	338,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	1,690		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**138,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	52.35		Ref: CSO Statistics
Construction Cost (Screening) $	**2,836,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	1.43		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	0.71		= Peak Vol/DW Time
Construction Cost $	**8,346,704**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	40,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**80,000**		
		TOTAL CAPITAL COST $	**21,384,704**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	2	
Peak Volume	190,960	CF
	1.43	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	81.00	CFS
	52.35	MGD

#N/A				
SUB-SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.43	191,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.68	225,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		151		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		101		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.71	228,765	**Sufficient Volume**
Tank Area (SF)		15,000		= Length x Width
Construction Cost (Storage Tank)		**5,313,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.43	2.21	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		8		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,499,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		81.00		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		338,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		16,900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**839,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		52.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,836,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.43		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.71		= Peak Vol/DW Time
Construction Cost	**$**	**8,346,704**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		40,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**80,000**		
			TOTAL CAPITAL COST	**$ 19,486,704**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	2	
Peak Volume	190,960	CF
	1.43	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	81.00	CFS
	52.35	MGD

#N/A				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
2 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		52.35	81.00	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		57.58	89.10	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		52		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,677,000**	**$ 62,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		81.00		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		52.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,836,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		57.58		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		119	57	
Passes		5	**15.23**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,404,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		54,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**108,000**		
			TOTAL CAPITAL COST $	**13,642,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	2	
Peak Volume	190,960	CF
	1.43	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	81.00	CFS
	52.35	MGD

#N/A					
SEDIMENTATION BASIN (CSOTF)					
2 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		52.35		81.00	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		8,800			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		134		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		67		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.81		107,736	
Construction Cost (CSOTF)	**$**	**16,400,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		52.35		81.00	= Peak Rate
Force Main Diameter (In)		50			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,038,000**	**$**	**60,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		81.00			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		162,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**472,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		52.35			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,836,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		52.35			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		114		54	
Passes		5		**15.20**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,321,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		1.43			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.71			= Peak Vol/DW Time
Construction Cost	**$**	**8,346,704**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		26,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST	**$ 38,080,704**

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RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	2	
Peak Volume	190,960	CF
	1.43	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	81.00	CFS
	52.35	MGD

		#N/A			
HIGH RATE END OF PIPE TREATMENT (HREOP)					
		2 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		52.35		81.00	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		620			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		36		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		18		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**9,642,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		57.58		89.10	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		52			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,677,000**	**$**	**62,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		81.00			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		16,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**77,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		52.35			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,836,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		57.58			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		119		57	
Passes		5		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,404,000	$	1,455,000	
Construction Cost (Disinfection)	**$**	**2,859,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		46,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**92,000**			
			TOTAL CAPITAL COST	**$**	**24,800,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	2	
Peak Volume	190,960	CF
	1.43	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	81.00	CFS
	52.35	MGD

#N/A

SCREENING AND DISINFECTION

2 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		52.35		81.00	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,836,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		52.35		81.00	= Peak Flow x % Req Pump
Force Main Diameter (In)		50			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,038,000**	**$**	**60,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		81.00			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		16,200			=CFS x 200
Odor Control Flow Rate (CFM)		810			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**78,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		52.35			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		114		54	
Passes		5		**15.20**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,321,000	$	1,363,000	
Construction Cost (Disinfection)	**$**	**2,684,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		28,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**			
				TOTAL CAPITAL COST	**$ 14,307,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	4	
Peak Volume	174,233	CF
	1.30	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	69.58	CFS
	44.97	MGD

		#N/A	
		CONSOLIDATION SEWERS	
		4 Overflows / Year	
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		125	Width of Sewershed along Riverline
Peak Flow (CFS)		24.06	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	20,000	
Peak Flow (CFS)		48.13	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	26,000	
Peak Flow (CFS)		72.19	75% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Peak Flow (CFS)		96.26	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Construction Cost (Consolidation Sewers)	**$**	**124,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 256,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	4	
Peak Volume	174,233	CF
	1.30	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	69.58	CFS
	44.97	MGD

		#N/A		
		SEWER SEPARATION		
		4 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		470		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**94,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		204,732		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**409,000**		
			TOTAL CAPITAL COST	**$ 94,409,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	4	
Peak Volume	174,233	CF
	1.30	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	69.58	CFS
	44.97	MGD

#N/A				
SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.30	174,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.53	205,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		144		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		96		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.55	207,360	**Sufficient Volume**
Tank Area (SF)		14,000		= Length x Width
Construction Cost (Storage Tank)		**1,259,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		44.97	69.58	= Peak Rate
Force Main Diameter (In)		46		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		-		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,138,000**	**$ -**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		69.58		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		308,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,540		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**128,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		44.97		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,494,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.30		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.65		= Peak Vol/DW Time
Construction Cost	**$**	**8,316,331**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		39,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**78,000**		
			TOTAL CAPITAL COST	**$ 19,968,331**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	4	
Peak Volume	174,233	CF
	1.30	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	69.58	CFS
	44.97	MGD

	#N/A		
	SUB-SURFACE STORAGE TANK		
	4 Overflows / Year		
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	1.30	174,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	1.53	205,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	144		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	96		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	1.55	207,360	**Sufficient Volume**
Tank Area (SF)	14,000		= Length x Width
Construction Cost (Storage Tank)	**4,928,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.30	2.02	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	8		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,392,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	69.58		Ref: Technical Parameters
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	308,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	15,400		= ACH x Volume / 60
Construction Cost (Odor Control) $	**780,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	44.97		Ref: CSO Statistics
Construction Cost (Screening) $	**2,494,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	1.30		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	0.65		= Peak Vol/DW Time
Construction Cost $	**8,316,331**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	39,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**78,000**		
		TOTAL CAPITAL COST $	**18,561,331**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	4	
Peak Volume	174,233	CF
	1.30	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	69.58	CFS
	44.97	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		44.97		69.58	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		49.47		76.54	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		48			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,686,000**	**$**	**57,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		69.58			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		44.97			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,494,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		49.47			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		111		53	
Passes		5		**15.37**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,274,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		47,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**94,000**			
				TOTAL CAPITAL COST	**$ 12,160,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	4	
Peak Volume	174,233	CF
	1.30	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	69.58	CFS
	44.97	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		44.97	69.58	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		7,500		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		123	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		62	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.68	91,512	
Construction Cost (CSOTF)	**$**	**16,385,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		44.97	69.58	= Peak Rate
Force Main Diameter (In)		46		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,138,000**	**$ 55,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		69.58		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		137,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		6,850		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**414,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		44.97		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,494,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		44.97		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		105	51	
Passes		5	**15.39**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,199,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.30		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.65		= Peak Vol/DW Time
Construction Cost	**$**	**8,316,331**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		23,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST	**$ 36,602,331**

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RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	4	
Peak Volume	174,233	CF
	1.30	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	69.58	CFS
	44.97	MGD

#N/A			
HIGH RATE END OF PIPE TREATMENT (HREOP)			
4 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	44.97	69.58	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	530		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	34	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	17	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Construction Cost (HREOP) $	**8,419,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	49.47	76.54	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)	48		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**7,686,000**	**$ 57,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	69.58		Ref: Technical Parameters
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	14,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)	700		= ACH x Volume / 60
Construction Cost (Odor Control) $	**69,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	44.97		Ref: CSO Statistics
Construction Cost (Screening) $	**2,494,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	49.47		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	111	53	
Passes	5	**15.37**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection / CC Tank) $	1,274,000	$ 1,320,000	
Construction Cost (Disinfection) $	**2,594,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - HREOP (SF)	43,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**86,000**		
		TOTAL CAPITAL COST $	**21,960,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	4	
Peak Volume	174,233	CF
	1.30	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	69.58	CFS
	44.97	MGD

#N/A					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		44.97		69.58	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,494,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		44.97		69.58	= Peak Flow x % Req Pump
Force Main Diameter (In)		46			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,138,000**	**$**	**55,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		69.58			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		13,900			=CFS x 200
Odor Control Flow Rate (CFM)		700			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**69,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		44.97			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		105		51	
Passes		5		**15.39**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,199,000	$	1,236,000	
Construction Cost (Disinfection)	**$**	**2,435,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		27,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**			
				TOTAL CAPITAL COST	**$ 12,800,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	6	
Peak Volume	139,955	CF
	1.05	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	44.26	CFS
	28.61	MGD

#N/A			
CONSOLIDATION SEWERS			
6 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		125	Width of Sewershed along Riverline
Peak Flow (CFS)		24.06	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	20,000	
Peak Flow (CFS)		48.13	50% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	26,000	
Peak Flow (CFS)		72.19	75% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Peak Flow (CFS)		96.26	100% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		31	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	39,000	
Construction Cost (Consolidation Sewers)	**$**	**124,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		66	
Number Connections		1	Input by Engineer, Total 49"-72" Connx
Subtotal	$	132,000	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**132,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 256,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	6	
Peak Volume	139,955	CF
	1.05	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	44.26	CFS
	28.61	MGD

		#N/A		
		SEWER SEPARATION		
		6 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		470		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**94,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		204,732		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**409,000**		
			TOTAL CAPITAL COST **$**	**94,409,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	6	
Peak Volume	139,955	CF
	1.05	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	44.26	CFS
	28.61	MGD

		#N/A			
		SURFACE STORAGE TANK			
		6 Overflows / Year			
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.05		140,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.23		165,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		129			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		87			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.26		168,345	**Sufficient Volume**
Tank Area (SF)		11,000			= Length x Width
Construction Cost (Storage Tank)		**991,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		28.61		44.26	= Peak Rate
Force Main Diameter (In)		37			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		-			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,142,000**	**$**	**-**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.26			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		248,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,240			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**108,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.61			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,737,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		1.05			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.52			= Peak Vol/DW Time
Construction Cost	**$**	**8,254,092**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		35,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**			
			TOTAL CAPITAL COST	**$**	**16,857,092**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	6	
Peak Volume	139,955	CF
	1.05	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	44.26	CFS
	28.61	MGD

#N/A

SUB-SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.05		140,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.23		165,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		129			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		87			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.26		168,345	**Sufficient Volume**
Tank Area (SF)		11,000			= Length x Width
Construction Cost (Storage Tank)		**4,138,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.05		1.62	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		7			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,174,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.26			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		248,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		12,400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**658,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.61			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,737,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		1.05			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.52			= Peak Vol/DW Time
Construction Cost	**$**	**8,254,092**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		35,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**			
				TOTAL CAPITAL COST	**$ 16,603,092**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	6	
Peak Volume	139,955	CF
	1.05	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	44.26	CFS
	28.61	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
6 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		28.61		44.26	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		31.47		48.69	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		39			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,491,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.26			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.61			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,737,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		31.47			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		88		42	
Passes		3		**15.18**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**961,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		30,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
				TOTAL CAPITAL COST	**$ 8,851,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	6	
Peak Volume	139,955	CF
	1.05	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	44.26	CFS
	28.61	MGD

		#N/A			
		SEDIMENTATION BASIN (CSOTF)			
		6 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		28.61		44.26	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		4,800			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		99		**OK**	$=(\text{Surf Area x } 2)^{1/2}$
Width (Ft)		49		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.44		58,212	
Construction Cost (CSOTF)	**$**	**16,371,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		28.61		44.26	= Peak Rate
Force Main Diameter (In)		37			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,142,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.26			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		87,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,350			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**290,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.61			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,737,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		28.61			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		84		41	
Passes		3		**15.56**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**909,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		1.05			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.52			= Peak Vol/DW Time
Construction Cost	**$**	**8,254,092**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		17,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**34,000**			
				TOTAL CAPITAL COST	**$ 33,337,092**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	6	
Peak Volume	139,955	CF
	1.05	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	44.26	CFS
	28.61	MGD

#N/A					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		28.61		44.26	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		340			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		27		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		14		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**5,746,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		31.47		48.69	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		39			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,491,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.26			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		28.61			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,737,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		31.47			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		88		42	
Passes		3		15.18	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	961,000	$	834,000	
Construction Cost (Disinfection)	**$**	**1,795,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		35,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**			
			TOTAL CAPITAL COST	**$**	**15,490,000**

RESULTS SUMMARY		
Number of Events / Year	91	
Number of Overflows / Year	6	
Peak Volume	139,955	CF
	1.05	MG
Total Volume	4,321,363	CF
	32.32	MG
Peak Rate	44.26	CFS
	28.61	MGD

#N/A					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		28.61		44.26	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,737,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		28.61		44.26	= Peak Flow x % Req Pump
Force Main Diameter (In)		37			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,142,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.26			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**256,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,900			=CFS x 200
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		28.61			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		84		41	
Passes		3		**15.56**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	909,000	$	793,000	
Construction Cost (Disinfection)	**$**	**1,702,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		25,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST	**$ 9,280,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	62.21	$296,867	20	10.910	$3,238,796
	Tank O&M	No. Events / Yr	91	$82,943	50	14.484	$1,201,311
		Const Cost ($)	$10,813,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	62	$13,299	20	10.910	$145,087
	Odor Control O&M	Capacity (cfm)	11,070	$38,745	20	10.910	$422,706
	Reserve / Replace	10% Gravity / 15% Pump					$48,298
			Total Annual O&M	**$432,000**		**Total PW O&M**	**$5,056,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	9.38	$83,854	20	10.910	$914,844
	Tank O&M	No. Events / Yr	91	$130,390	50	14.484	$1,888,521
		Const Cost ($)	$29,792,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	62	$13,299	20	10.910	$145,087
	Odor Control O&M	Capacity (cfm)	110,650	$387,275	20	10.910	$4,225,147
	Reserve / Replace	10% Gravity / 15% Pump					$30,120
			Total Annual O&M	**$615,000**		**Total PW O&M**	**$7,204,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	62.21	$296,867	20	10.910	$3,238,796
	Sed. Basin O&M	Flow Rate (mgd)	62.21	$6,998	50	14.484	$101,363
	Screening O&M	Flow Rate (mgd)	62.21	$13,299	20	10.910	$145,087
	Disinfection O&M	Flow Rate (mgd)	62.21	$199,114	20	10.910	$2,172,317
	Odor Control O&M	Capacity (cfm)	9,550.00	$33,425	20	10.910	$364,665
	Reserve / Replace	10% Gravity / 15% Pump					$52,133
			Total Annual O&M	**$550,000**		**Total PW O&M**	**$6,074,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	68.43	$316,385	20	10.910	$3,451,740
	HREP O&M	Flow Rate (mgd)	62.21	$264,345	20	10.910	$2,883,990
	Screening O&M	Flow Rate (mgd)	62.21	$13,299	20	10.910	$145,087
	Disinfection O&M	Flow Rate (mgd)	68.43	$211,017	20	10.910	$2,302,182
	Odor Control O&M	Capacity (cfm)	950.00	$3,325	20	10.910	$36,276
	Reserve / Replace	10% Gravity / 15% Pump					$84,978
			Total Annual O&M	**$809,000**		**Total PW O&M**	**$8,904,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	68.43	$316,385	20	10.910	$3,451,740
	Swirl / Vortex O&M	Flow Rate (mgd)	62.21	$6,998	20	10.910	$76,353
	Screening O&M	Flow Rate (mgd)	62.21	$13,299	20	10.910	$145,087
	Disinfection O&M	Flow Rate (mgd)	68.43	$211,017	20	10.910	$2,302,182
	Odor Control O&M	Capacity (cfm)	10,100.00	$35,350	20	10.910	$385,666
	Reserve / Replace	10% Gravity / 15% Pump					$60,670
			Total Annual O&M	**$584,000**		**Total PW O&M**	**$6,422,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	62.21	$296,867	20	10.910	$3,238,796
	Screening O&M	Flow Rate (mgd)	62.21	$13,299	20	10.910	$145,087
	Disinfection O&M	Flow Rate (mgd)	62.21	$199,114	20	10.910	$2,172,317
	Odor Control O&M	Capacity (cfm)	970.00	$3,395	20	10.910	$37,039
	Reserve / Replace	10% Gravity / 15% Pump					$50,914
			Total Annual O&M	**$513,000**		**Total PW O&M**	**$5,644,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	54.14	$270,548	20	10.910	$2,951,666
	Tank O&M	No. Events / Yr	91	$61,945	50	14.484	$897,192
		Const Cost ($)	$2,414,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	54	$12,458	20	10.910	$135,919
	Odor Control O&M	Capacity (cfm)	2,800	$9,800	20	10.910	$106,917
	Reserve / Replace	10% Gravity / 15% Pump					$42,186
			Total Annual O&M	**$355,000**		**Total PW O&M**	**$4,134,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.37	$33,441	20	10.910	$364,841
	Tank O&M	No. Events / Yr	91	$76,430	50	14.484	$1,106,987
		Const Cost ($)	$8,208,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	54	$12,458	20	10.910	$135,919
	Odor Control O&M	Capacity (cfm)	28,000	$98,000	20	10.910	$1,069,174
	Reserve / Replace	10% Gravity / 15% Pump					$18,574
			Total Annual O&M	**$221,000**		**Total PW O&M**	**$2,695,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	54.14	$270,548	20	10.910	$2,951,666
	Sed. Basin O&M	Flow Rate (mgd)	54.14	$6,091	50	14.484	$88,214
	Screening O&M	Flow Rate (mgd)	54.14	$12,458	20	10.910	$135,919
	Disinfection O&M	Flow Rate (mgd)	54.14	$182,953	20	10.910	$1,996,003
	Odor Control O&M	Capacity (cfm)	8,300.00	$29,050	20	10.910	$316,934
	Reserve / Replace	10% Gravity / 15% Pump					$46,606
			Total Annual O&M	**$502,000**		**Total PW O&M**	**$5,535,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	59.55	$288,336	20	10.910	$3,145,731
	HREP O&M	Flow Rate (mgd)	54.14	$243,603	20	10.910	$2,657,693
	Screening O&M	Flow Rate (mgd)	54.14	$12,458	20	10.910	$135,919
	Disinfection O&M	Flow Rate (mgd)	59.55	$193,890	20	10.910	$2,115,327
	Odor Control O&M	Capacity (cfm)	800.00	$2,800	20	10.910	$30,548
	Reserve / Replace	10% Gravity / 15% Pump					$75,468
			Total Annual O&M	**$742,000**		**Total PW O&M**	**$8,161,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	59.55	$288,336	20	10.910	$3,145,731
	Swirl / Vortex O&M	Flow Rate (mgd)	54.14	$6,091	20	10.910	$66,448
	Screening O&M	Flow Rate (mgd)	54.14	$12,458	20	10.910	$135,919
	Disinfection O&M	Flow Rate (mgd)	59.55	$193,890	20	10.910	$2,115,327
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$48,222
			Total Annual O&M	**$501,000**		**Total PW O&M**	**$5,512,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	54.14	$270,548	20	10.910	$2,951,666
	Screening O&M	Flow Rate (mgd)	54.14	$12,458	20	10.910	$135,919
	Disinfection O&M	Flow Rate (mgd)	54.14	$182,953	20	10.910	$1,996,003
	Odor Control O&M	Capacity (cfm)	840.00	$2,940	20	10.910	$32,075
	Reserve / Replace	10% Gravity / 15% Pump					$45,515
			Total Annual O&M	**$469,000**		**Total PW O&M**	**$5,161,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	52.35	$264,535	20	10.910	$2,886,056
	Tank O&M	No. Events / Yr	91	$59,388	50	14.484	$860,150
		Const Cost ($)	$1,391,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	52	$12,275	20	10.910	$133,919
	Odor Control O&M	Capacity (cfm)	1,690	$5,915	20	10.910	$64,532
	Reserve / Replace	10% Gravity / 15% Pump					$40,884
			Total Annual O&M	**$343,000**		**Total PW O&M**	**$3,986,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.43	$23,853	20	10.910	$260,233
	Tank O&M	No. Events / Yr	91	$69,193	50	14.484	$1,002,162
		Const Cost ($)	$5,313,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	52	$12,275	20	10.910	$133,919
	Odor Control O&M	Capacity (cfm)	16,900	$59,150	20	10.910	$645,323
	Reserve / Replace	10% Gravity / 15% Pump					$16,112
			Total Annual O&M	**$165,000**		**Total PW O&M**	**$2,058,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	52.35	$264,535	20	10.910	$2,886,056
	Sed. Basin O&M	Flow Rate (mgd)	52.35	$5,889	50	14.484	$85,295
	Screening O&M	Flow Rate (mgd)	52.35	$12,275	20	10.910	$133,919
	Disinfection O&M	Flow Rate (mgd)	52.35	$179,241	20	10.910	$1,955,507
	Odor Control O&M	Capacity (cfm)	8,100.00	$28,350	20	10.910	$309,297
	Reserve / Replace	10% Gravity / 15% Pump					$45,386
			Total Annual O&M	**$491,000**		**Total PW O&M**	**$5,415,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	57.58	$281,927	20	10.910	$3,075,807
	HREP O&M	Flow Rate (mgd)	52.35	$238,830	20	10.910	$2,605,621
	Screening O&M	Flow Rate (mgd)	52.35	$12,275	20	10.910	$133,919
	Disinfection O&M	Flow Rate (mgd)	57.58	$189,956	20	10.910	$2,072,410
	Odor Control O&M	Capacity (cfm)	800.00	$2,800	20	10.910	$30,548
	Reserve / Replace	10% Gravity / 15% Pump					$73,371
			Total Annual O&M	**$726,000**		**Total PW O&M**	**$7,992,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	57.58	$281,927	20	10.910	$3,075,807
	Swirl / Vortex O&M	Flow Rate (mgd)	52.35	$5,889	20	10.910	$64,250
	Screening O&M	Flow Rate (mgd)	52.35	$12,275	20	10.910	$133,919
	Disinfection O&M	Flow Rate (mgd)	57.58	$189,956	20	10.910	$2,072,410
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$46,935
			Total Annual O&M	**$491,000**		**Total PW O&M**	**$5,393,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	52.35	$264,535	20	10.910	$2,886,056
	Screening O&M	Flow Rate (mgd)	52.35	$12,275	20	10.910	$133,919
	Disinfection O&M	Flow Rate (mgd)	52.35	$179,241	20	10.910	$1,955,507
	Odor Control O&M	Capacity (cfm)	810.00	$2,835	20	10.910	$30,930
	Reserve / Replace	10% Gravity / 15% Pump					$44,314
			Total Annual O&M	**$459,000**		**Total PW O&M**	**$5,051,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	44.97	$238,999	20	10.910	$2,607,469
	Tank O&M	No. Events / Yr	91	$59,058	50	14.484	$855,371
		Const Cost ($)	$1,259,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	45	$11,532	20	10.910	$125,816
	Odor Control O&M	Capacity (cfm)	1,540	$5,390	20	10.910	$58,805
	Reserve / Replace	10% Gravity / 15% Pump					$36,255
			Total Annual O&M	**$315,000**		**Total PW O&M**	**$3,684,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.30	$22,436	20	10.910	$244,773
	Tank O&M	No. Events / Yr	91	$68,230	50	14.484	$988,221
		Const Cost ($)	$4,928,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	45	$11,532	20	10.910	$125,816
	Odor Control O&M	Capacity (cfm)	15,400	$53,900	20	10.910	$588,046
	Reserve / Replace	10% Gravity / 15% Pump					$14,585
			Total Annual O&M	**$157,000**		**Total PW O&M**	**$1,961,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	44.97	$238,999	20	10.910	$2,607,469
	Sed. Basin O&M	Flow Rate (mgd)	44.97	$5,059	50	14.484	$73,272
	Screening O&M	Flow Rate (mgd)	44.97	$11,532	20	10.910	$125,816
	Disinfection O&M	Flow Rate (mgd)	44.97	$163,395	20	10.910	$1,782,626
	Odor Control O&M	Capacity (cfm)	6,850.00	$23,975	20	10.910	$261,566
	Reserve / Replace	10% Gravity / 15% Pump					$40,294
			Total Annual O&M	**$443,000**		**Total PW O&M**	**$4,891,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	49.47	$254,713	20	10.910	$2,778,904
	HREP O&M	Flow Rate (mgd)	44.97	$218,415	20	10.910	$2,382,894
	Screening O&M	Flow Rate (mgd)	44.97	$11,532	20	10.910	$125,816
	Disinfection O&M	Flow Rate (mgd)	49.47	$173,163	20	10.910	$1,889,195
	Odor Control O&M	Capacity (cfm)	700.00	$2,450	20	10.910	$26,729
	Reserve / Replace	10% Gravity / 15% Pump					$64,695
			Total Annual O&M	**$661,000**		**Total PW O&M**	**$7,268,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	49.47	$254,713	20	10.910	$2,778,904
	Swirl / Vortex O&M	Flow Rate (mgd)	44.97	$5,059	20	10.910	$55,193
	Screening O&M	Flow Rate (mgd)	44.97	$11,532	20	10.910	$125,816
	Disinfection O&M	Flow Rate (mgd)	49.47	$173,163	20	10.910	$1,889,195
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$41,608
			Total Annual O&M	**$445,000**		**Total PW O&M**	**$4,891,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	44.97	$238,999	20	10.910	$2,607,469
	Screening O&M	Flow Rate (mgd)	44.97	$11,532	20	10.910	$125,816
	Disinfection O&M	Flow Rate (mgd)	44.97	$163,395	20	10.910	$1,782,626
	Odor Control O&M	Capacity (cfm)	700.00	$2,450	20	10.910	$26,729
	Reserve / Replace	10% Gravity / 15% Pump					$39,356
			Total Annual O&M	**$417,000**		**Total PW O&M**	**$4,582,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	28.61	$176,669	20	10.910	$1,927,445
	Tank O&M	No. Events / Yr	91	$58,388	50	14.484	$845,667
		Const Cost ($)	$991,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	29	$9,956	20	10.910	$108,622
	Odor Control O&M	Capacity (cfm)	1,240	$4,340	20	10.910	$47,349
	Reserve / Replace	10% Gravity / 15% Pump					$25,998
			Total Annual O&M	**$250,000**		**Total PW O&M**	**$2,955,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.05	$19,381	20	10.910	$211,446
	Tank O&M	No. Events / Yr	91	$66,255	50	14.484	$959,616
		Const Cost ($)	$4,138,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	29	$9,956	20	10.910	$108,622
	Odor Control O&M	Capacity (cfm)	12,400	$43,400	20	10.910	$473,491
	Reserve / Replace	10% Gravity / 15% Pump					$11,304
			Total Annual O&M	**$139,000**		**Total PW O&M**	**$1,764,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	28.61	$176,669	20	10.910	$1,927,445
	Sed. Basin O&M	Flow Rate (mgd)	28.61	$3,218	50	14.484	$46,613
	Screening O&M	Flow Rate (mgd)	28.61	$9,956	20	10.910	$108,622
	Disinfection O&M	Flow Rate (mgd)	28.61	$124,043	20	10.910	$1,353,297
	Odor Control O&M	Capacity (cfm)	4,350.00	$15,225	20	10.910	$166,104
	Reserve / Replace	10% Gravity / 15% Pump					$28,965
			Total Annual O&M	**$330,000**		**Total PW O&M**	**$3,631,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	31.47	$188,284	20	10.910	$2,054,171
	HREP O&M	Flow Rate (mgd)	28.61	$167,402	20	10.910	$1,826,343
	Screening O&M	Flow Rate (mgd)	28.61	$9,956	20	10.910	$108,622
	Disinfection O&M	Flow Rate (mgd)	31.47	$131,458	20	10.910	$1,434,200
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$45,504
			Total Annual O&M	**$499,000**		**Total PW O&M**	**$5,486,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	31.47	$188,284	20	10.910	$2,054,171
	Swirl / Vortex O&M	Flow Rate (mgd)	28.61	$3,218	20	10.910	$35,112
	Screening O&M	Flow Rate (mgd)	28.61	$9,956	20	10.910	$108,622
	Disinfection O&M	Flow Rate (mgd)	31.47	$131,458	20	10.910	$1,434,200
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$29,742
			Total Annual O&M	**$333,000**		**Total PW O&M**	**$3,662,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	28.61	$176,669	20	10.910	$1,927,445
	Screening O&M	Flow Rate (mgd)	28.61	$9,956	20	10.910	$108,622
	Disinfection O&M	Flow Rate (mgd)	28.61	$124,043	20	10.910	$1,353,297
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$28,310
			Total Annual O&M	**$313,000**		**Total PW O&M**	**$3,435,000**

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$94.4	$94,448,000	$0
1	$94.4	$94,448,000	$0
2	$94.4	$94,448,000	$0
4	$94.4	$94,448,000	$0
6	$94.4	$94,448,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$57.9	$50,671,622	$7,204,000
1	$26.1	$23,406,955	$2,695,000
2	$21.5	$19,486,704	$2,058,000
4	$20.5	$18,561,331	$1,961,000
6	$18.4	$16,603,092	$1,764,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$40.2	$35,099,622	$5,056,000
1	$27.2	$23,032,955	$4,134,000
2	$25.4	$21,384,704	$3,986,000
4	$23.7	$19,968,331	$3,684,000
6	$19.8	$16,857,092	$2,955,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$26.4	$19,941,000	$6,422,000
1	$19.5	$14,000,000	$5,512,000
2	$19.0	$13,642,000	$5,393,000
4	$17.1	$12,160,000	$4,891,000
6	$12.5	$8,851,000	$3,662,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$37.5	$28,611,000	$8,904,000
1	$33.7	$25,489,000	$8,161,000
2	$32.8	$24,800,000	$7,992,000
4	$29.2	$21,960,000	$7,268,000
6	$21.0	$15,490,000	$5,486,000

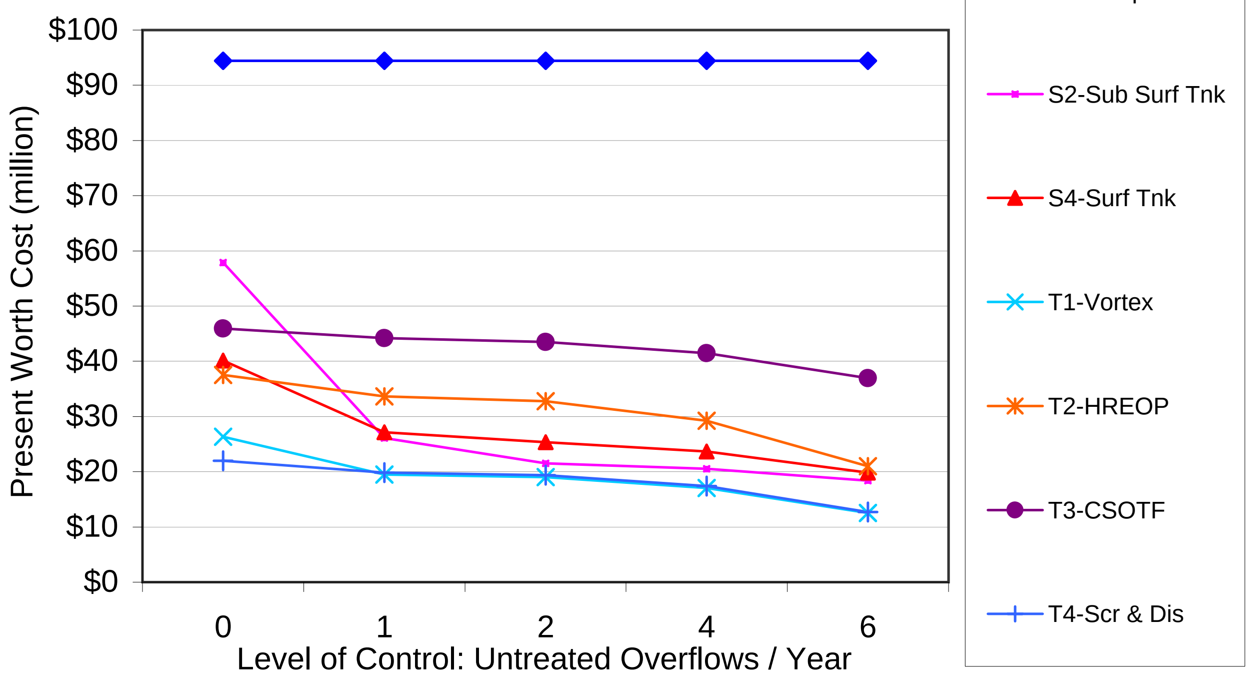
T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$46.0	$39,880,606	$6,074,000
1	$44.2	$38,654,955	$5,535,000
2	$43.5	$38,080,704	$5,415,000
4	$41.5	$36,602,331	$4,891,000
6	$37.0	$33,337,092	$3,631,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$22.0	$16,311,000	$5,644,000
1	$19.8	$14,674,000	$5,161,000
2	$19.4	$14,307,000	$5,051,000
4	$17.4	$12,800,000	$4,582,000
6	$12.7	$9,280,000	$3,435,000

Figure 3 – S-23 to S-24 Alternative Costs



Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	S-23 to S-24
Structures within Region	S-23 and S-24
Model ID	S-23 to S-24.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	91
Peak Volume:	1,253,611 ft^3
	9.38 MG
Total Volume:	4,321,363 ft^3
	32.33 MG
Peak Rate:	96.26 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/3/2005 3:21	8488	1/5/2005 14:30	1253611.14	9377.638	0	22.44	14
1/11/2005 7:36	2361	1/11/2005 11:30	316651.94	2368.715	1	21.36	16
2/14/2005 4:06	2253	2/14/2005 20:00	190960.04	1428.477	2	5.83	35
5/13/2005 22:30	1644	5/13/2005 22:45	174581.42	1305.956	3	83.77	1
8/20/2005 18:15	129	8/20/2005 18:45	174232.91	1303.349	4	96.26	0
3/28/2005 8:47	1624	3/28/2005 19:15	158479.59	1185.507	5	24.53	13
4/1/2005 18:50	2731	4/2/2005 6:30	139955.44	1046.937	6	8.72	30
7/5/2005 16:15	134	7/5/2005 16:45	138433.59	1035.552	7	81.00	2
10/21/2005 18:43	1751	10/22/2005 6:45	137712.17	1030.156	8	71.30	3
10/24/2005 10:50	2884	10/26/2005 7:30	136744.78	1022.919	9	4.08	40
11/29/2005 1:37	755	11/29/2005 7:00	117488.71	878.874	10	15.35	23
1/13/2005 21:36	1457	1/14/2005 2:30	114890.06	859.435	11	10.41	26
7/26/2005 19:43	57	7/26/2005 20:00	103034.62	770.750	12	69.58	4
11/14/2005 21:27	607	11/15/2005 4:00	96801.28	724.122	13	16.18	22
2/20/2005 14:51	1394	2/20/2005 20:30	71362.20	533.825	14	16.99	21
9/29/2005 5:00	143	9/29/2005 5:45	61612.85	460.895	15	44.26	6
4/22/2005 14:51	1006	4/23/2005 4:15	59664.53	446.320	16	17.31	20
5/11/2005 22:30	113	5/11/2005 23:00	58642.98	438.679	17	27.93	10
12/15/2005 8:15	1071	12/15/2005 14:00	50173.97	375.326	18	8.33	31
8/29/2005 9:00	384	8/29/2005 13:35	47087.10	352.235	19	20.59	17
3/23/2005 1:51	798	3/23/2005 2:45	43621.44	326.310	20	4.63	39
2/9/2005 14:20	192	2/9/2005 16:45	43078.57	322.249	21	18.21	19
7/15/2005 17:35	54	7/15/2005 18:00	40357.79	301.896	22	32.34	9
7/17/2005 16:15	85	7/17/2005 16:30	39183.02	293.109	23	44.64	5
5/23/2005 16:15	50	5/23/2005 16:45	36967.29	276.534	24	33.26	8
8/8/2005 8:36	88	8/8/2005 9:15	34322.86	256.752	25	27.11	11
5/28/2005 7:50	167	5/28/2005 9:30	31046.86	232.246	26	10.41	27
9/16/2005 21:15	54	9/16/2005 21:45	30961.30	231.606	27	26.14	12
11/16/2005 4:00	494	11/16/2005 4:15	30148.66	225.527	28	18.25	18
7/21/2005 14:35	84	7/21/2005 15:00	30097.39	225.144	29	22.36	15
10/7/2005 7:07	627	10/7/2005 10:45	28465.43	212.936	30	10.19	28
8/27/2005 15:11	46	8/27/2005 15:30	27254.26	203.876	31	36.24	7
2/16/2005 5:36	735	2/16/2005 8:00	19075.68	142.696	32	3.39	45

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
11/1/2005 14:36	227	11/1/2005 16:30	17012.01	127.258	33	3.97	41
5/20/2005 2:35	479	5/20/2005 6:45	15411.66	115.287	34	2.91	47
3/27/2005 16:16	157	3/27/2005 17:00	14340.54	107.274	35	5.80	36
7/25/2005 13:20	323	7/25/2005 17:00	14118.90	105.616	36	9.26	29
6/3/2005 5:56	235	6/3/2005 9:10	12955.65	96.915	37	5.12	38
9/26/2005 5:35	274	9/26/2005 9:45	12736.69	95.277	38	2.53	54
1/26/2005 3:10	179	1/26/2005 5:00	11543.11	86.348	39	2.69	52
6/14/2005 18:50	64	6/14/2005 19:15	10880.67	81.393	40	11.25	25
1/30/2005 12:29	154	1/30/2005 13:50	10727.73	80.249	41	2.73	48
10/21/2005 1:45	424	10/21/2005 7:30	10090.65	75.483	42	5.34	37
5/7/2005 11:35	144	5/7/2005 13:30	9593.64	71.765	43	6.65	34
11/9/2005 19:30	35	11/9/2005 19:45	9364.08	70.048	44	12.27	24
3/7/2005 21:15	444	3/7/2005 22:15	9255.69	69.237	45	1.14	67
6/8/2005 21:00	56	6/8/2005 21:15	8200.59	61.345	46	8.32	32
4/30/2005 4:16	167	4/30/2005 6:45	8197.83	61.324	47	2.00	57
12/25/2005 10:31	186	12/25/2005 12:45	8116.92	60.719	48	2.71	50
11/8/2005 10:35	304	11/8/2005 15:00	7559.75	56.551	49	3.43	44
4/20/2005 19:20	270	4/20/2005 19:45	7551.49	56.489	50	3.46	43
5/28/2005 17:20	98	5/28/2005 18:30	7475.95	55.924	51	2.47	55
11/24/2005 7:51	258	11/24/2005 8:15	7157.74	53.544	52	1.71	60
8/26/2005 19:50	464	8/26/2005 22:45	7150.71	53.491	53	1.80	59
12/26/2005 1:21	662	12/26/2005 6:00	5725.04	42.826	54	0.78	72
4/26/2005 19:51	332	4/27/2005 1:00	5488.46	41.056	55	2.72	49
4/25/2005 5:52	107	4/25/2005 6:30	4719.83	35.307	56	1.33	64
10/24/2005 2:15	94	10/24/2005 3:00	4275.50	31.983	57	1.53	61
6/6/2005 9:45	34	6/6/2005 10:00	4262.77	31.888	58	7.32	33
10/28/2005 11:56	54	10/28/2005 12:30	4133.47	30.920	59	3.80	42
6/16/2005 11:11	337	6/16/2005 13:15	3599.97	26.930	60	2.33	56
11/23/2005 18:51	213	11/23/2005 20:15	3080.27	23.042	61	1.27	65
7/12/2005 19:45	39	7/12/2005 20:05	3003.30	22.466	62	3.06	46
8/5/2005 10:51	78	8/5/2005 11:30	2745.75	20.540	63	1.98	58
11/9/2005 4:17	286	11/9/2005 4:45	2629.36	19.669	64	1.34	63
3/12/2005 10:50	118	3/12/2005 12:30	2098.44	15.697	65	2.70	51
6/17/2005 0:45	100	6/17/2005 1:30	2097.67	15.692	66	1.39	62
3/20/2005 3:30	334	3/20/2005 7:20	2066.99	15.462	67	0.55	77
3/11/2005 8:06	376	3/11/2005 14:00	1994.23	14.918	68	1.18	66
2/25/2005 12:51	259	2/25/2005 16:00	1760.78	13.171	69	1.07	69
7/16/2005 11:15	93	7/16/2005 11:30	1708.03	12.777	70	1.07	68
4/24/2005 10:51	348	4/24/2005 11:00	1648.04	12.328	71	0.50	78
12/9/2005 3:50	73	12/9/2005 4:30	1414.31	10.580	72	0.66	76
8/16/2005 5:50	166	8/16/2005 8:15	1335.70	9.992	73	0.95	70
9/23/2005 2:55	15	9/23/2005 3:00	1060.03	7.930	74	2.57	53
6/22/2005 5:06	32	6/22/2005 5:30	773.13	5.783	75	0.77	73
11/6/2005 13:45	20	11/6/2005 14:00	614.54	4.597	76	0.81	71
2/26/2005 12:35	23	2/26/2005 12:45	490.27	3.667	77	0.75	74
5/30/2005 19:45	33	5/30/2005 20:00	448.11	3.352	78	0.39	79
12/16/2005 14:31	27	12/16/2005 14:45	423.51	3.168	79	0.71	75
5/19/2005 19:27	25	5/19/2005 19:45	347.91	2.603	80	0.39	81
2/8/2005 5:39	28	2/8/2005 6:00	347.62	2.600	81	0.39	80
6/29/2005 20:35	14	6/29/2005 20:45	211.38	1.581	82	0.37	82
5/24/2005 6:20	343	5/24/2005 6:30	191.82	1.435	83	0.20	84
3/20/2005 16:10	21	3/20/2005 16:15	135.06	1.010	84	0.19	85
11/14/2005 0:05	13	11/14/2005 0:15	105.60	0.790	85	0.20	83
7/12/2005 12:16	17	7/12/2005 12:30	105.00	0.785	86	0.13	87

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
6/28/2005 18:51	13	6/28/2005 19:00	77.53	0.580	87	0.16	86

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
5/27/2005 20:48	14	5/27/2005 21:00	38.99	0.292	88	0.06	90
7/18/2005 18:41	11	7/18/2005 18:45	36.46	0.273	89	0.09	88
3/25/2005 12:09	8	3/25/2005 12:15	24.29	0.182	90	0.07	89

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	S-23 to S-24
Structures within Region	S-23 and S-24
Model ID	S-23 to S-24.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	91	
Peak Volume:	1,253,611	ft^3
	9.38	MG
Total Volume:	4,321,363	ft^3
	32.33	MG
Peak Rate:	96.26	cfs

Figure 1 - S-23 to S-24 CSO Volume

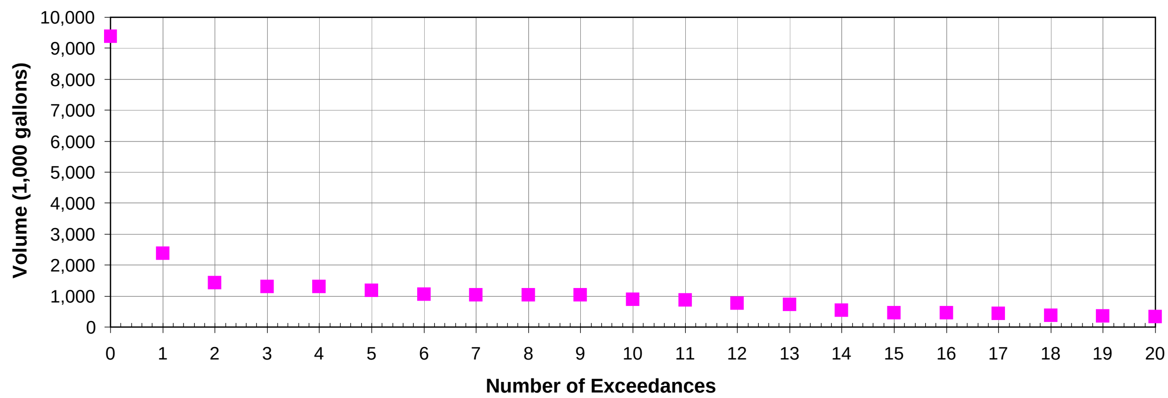
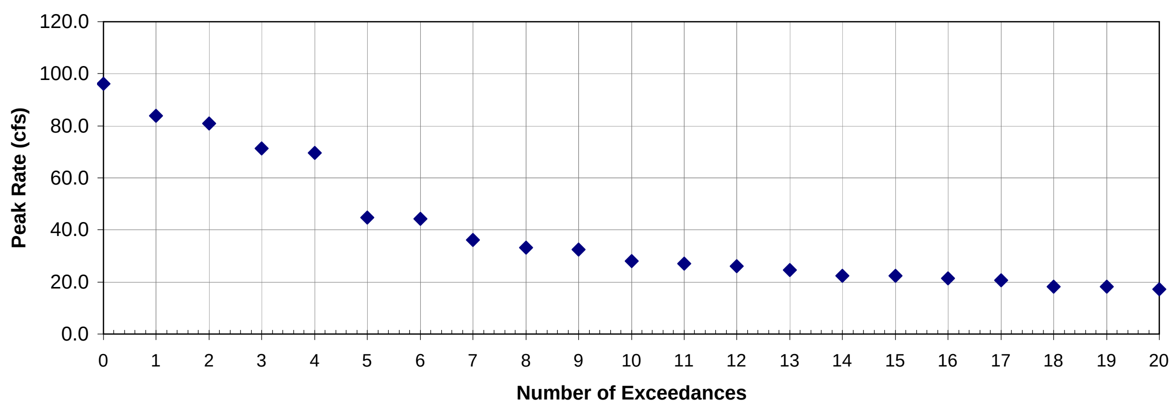


Figure 2 - S-23 to S-24 CSO Peak Flow Rate



D.30.1 S-23 AND S-24 – SAW MILL RUN INTERCEPTOR SEWERSHEDS – NPDES# 061DS23 AND 061DS24

Description of Outfalls

The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. These sewersheds include approximately 12,417 acres of residential, business and commercial users.

These outfalls 061DS23 and 061DS24 are in the Brook, Bausman and Warrington sewershed and Edgebrook sewershed respectively. The S-23 tributary area consists of 177 acres of combined sewers and the S-24 tributary area consists of 311 acres of combined sewers. The outfalls convey overflows from each of the respective ALCOSAN diversion chambers to Saw Mill Run.

Attachment 1, Tributary Area Map, shows the CSO locations and the tributary areas.

Outfalls 061DS23 and 061DS24 typically experience 91 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 9.38 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from both outfalls is approximately 96.26 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

Figure 1 - S-23 to S-24 CSO Volume

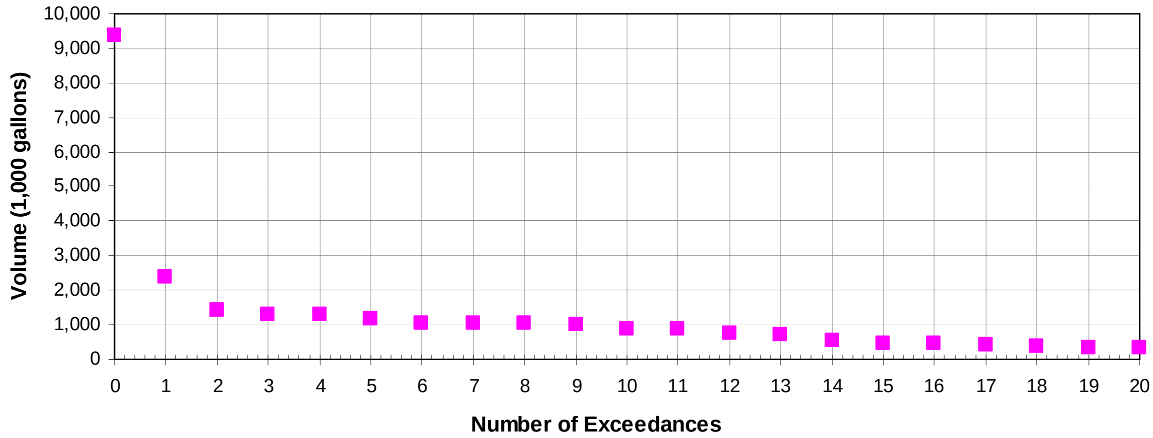
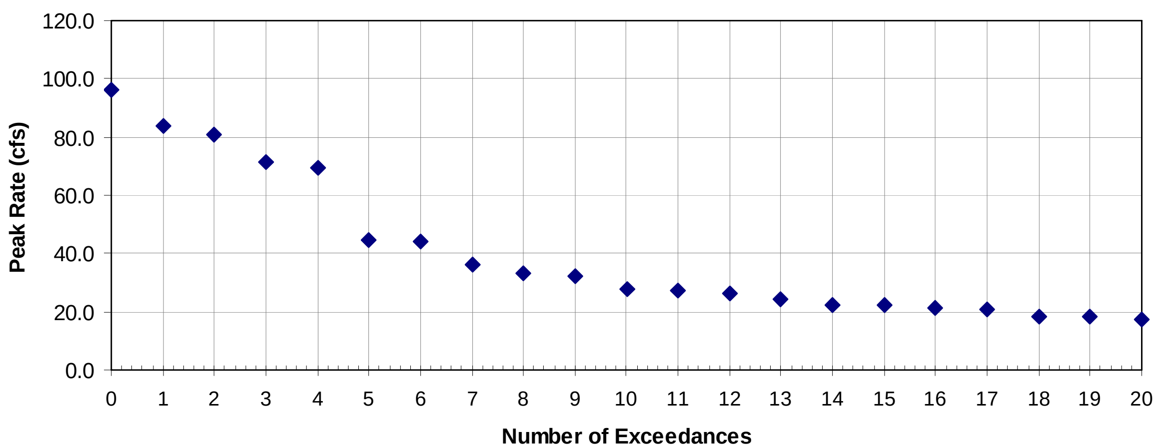


Figure 2 - S-23 to S-24 CSO Peak Flow Rate



A necessary component of all storage and treatment alternatives would be the construction of a consolidation sewer. The sewer is required to convey CSOs from outfall 061DS24 to the vicinity of diversion chamber 061DS23.

There appears to be available space for potential storage or treatment facilities to the northeast of the existing outfalls, adjacent to an existing commercial building. The site is generally bounded by private development to the south and north, Saw Mill Run Boulevard and Saw Mill Run to the west, and steep slopes to the east.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4-S-23 AND S-24: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-S-23 AND S-24: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-S-23 AND S-24: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-S-23 AND S-24: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-S-23 AND S-24: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-S-23 AND S-24: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

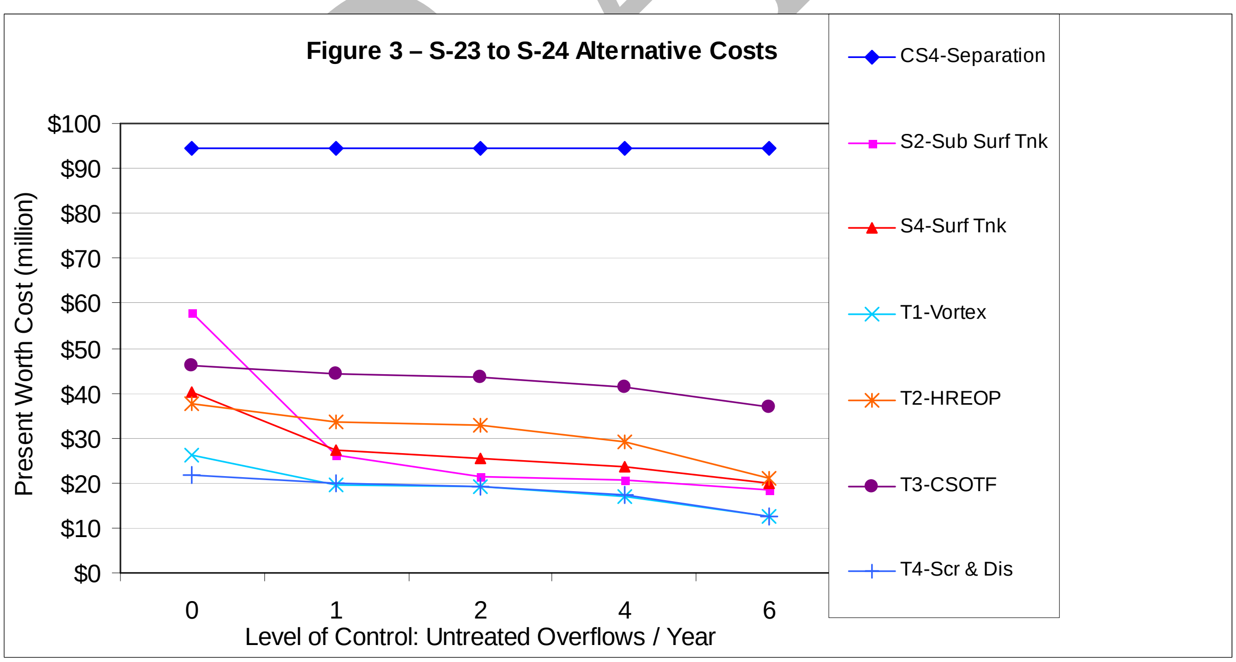
T4-S-23 AND S-24: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – S-23 and S-24 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall “ranking” at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

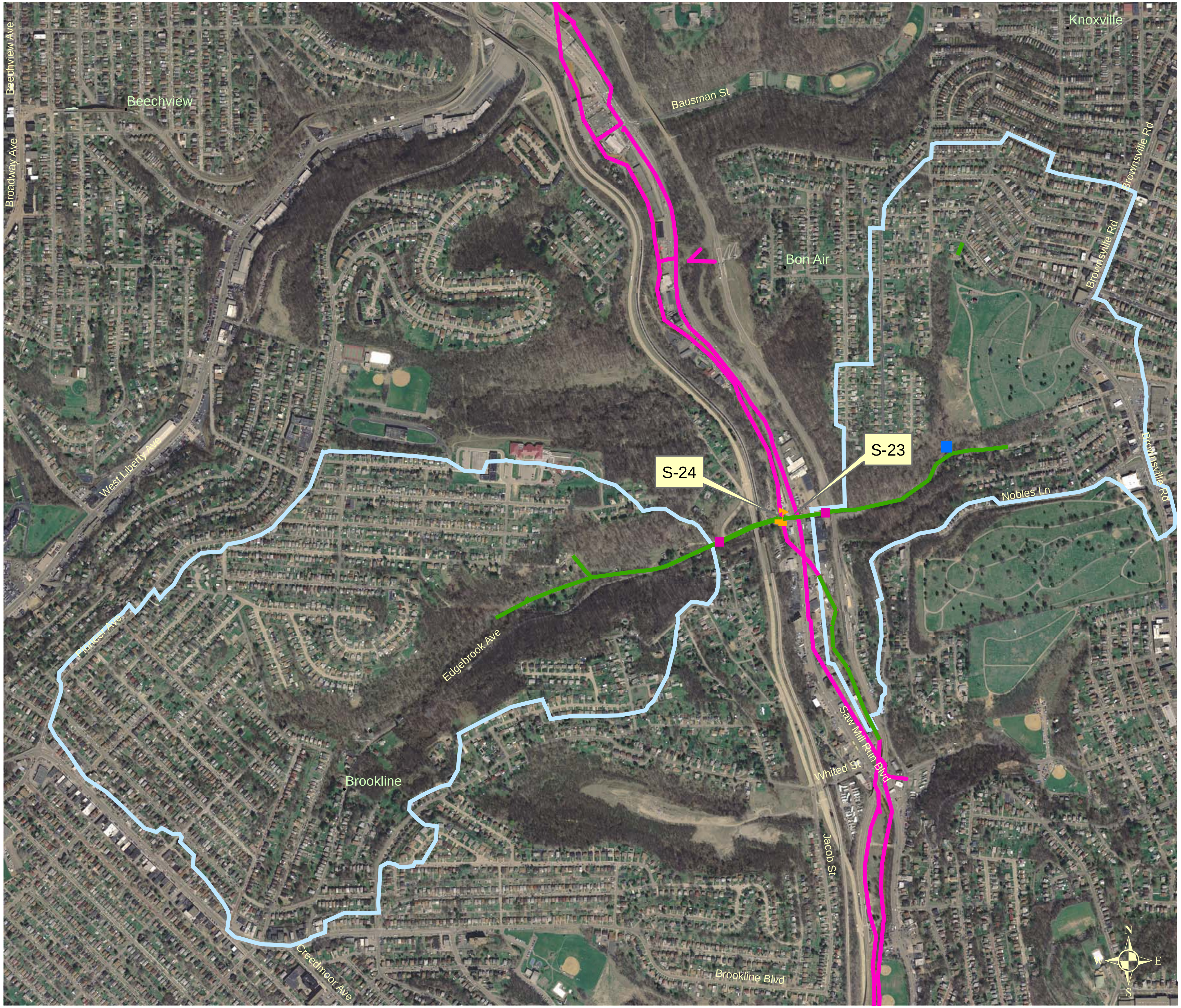
Recommendations

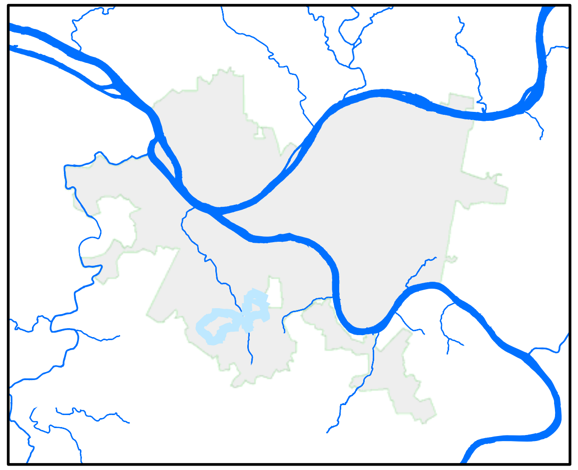
Based upon the above, for control level 0, it is recommended that Alternative S4-S-23 and S-24: Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses. For control levels 1 through 6, it is recommended that Alternative S2-S-23 and S-24: Sub-Surface Storage be carried forward.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

It appears that space is available for a storage or treatment facility for all control levels in the vicinity of diversion chamber 061DS23. An existing commercial parking facility and garage may need acquired for the construction of the storage facility.





Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- PWSA Diversion Structure
- Combined Sewer Outfall

1,000 0 1,000 Feet

Attachment 1 S-23 to S-24 Tributary Area Map Edgebrook Ave & Brook St. Sewershed

CSO Controls Alternatives

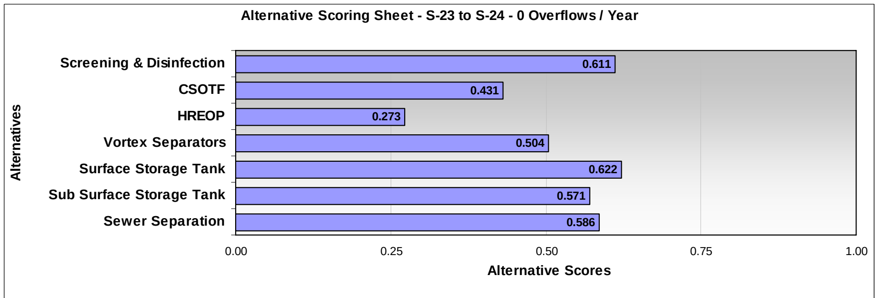
PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

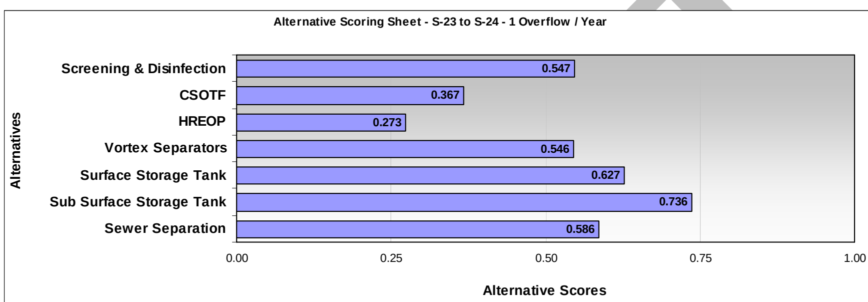
SW-D-0238.pdf

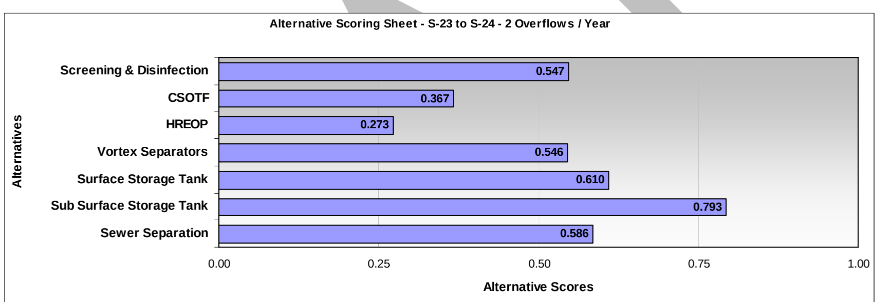
Attachment 2 - CSO Alternatives Development Worksheet

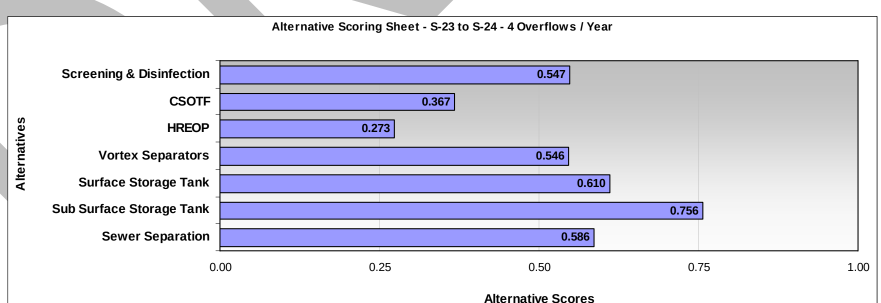
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will not be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

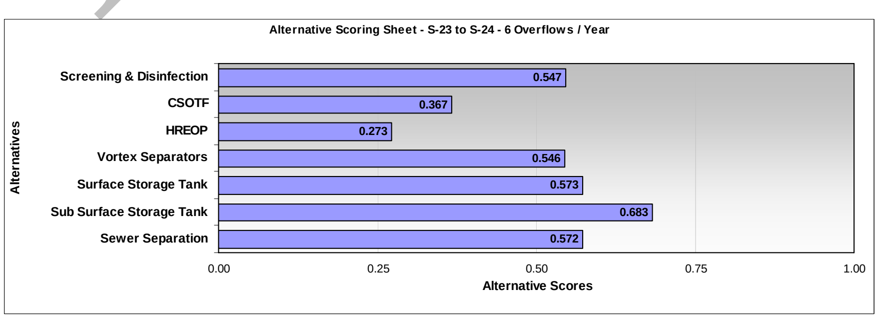
Attachment 3 – Alternative Scoring Sheet

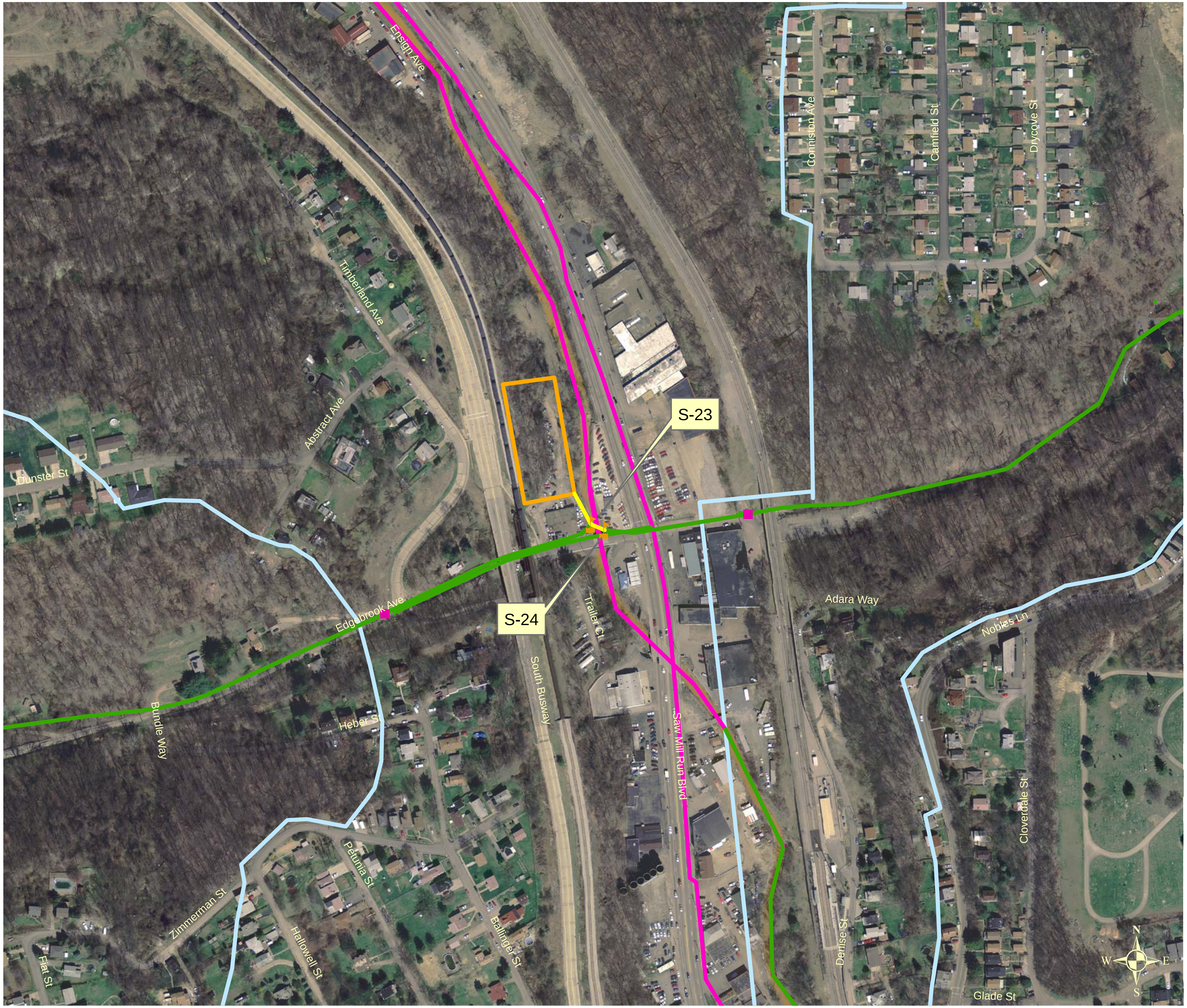


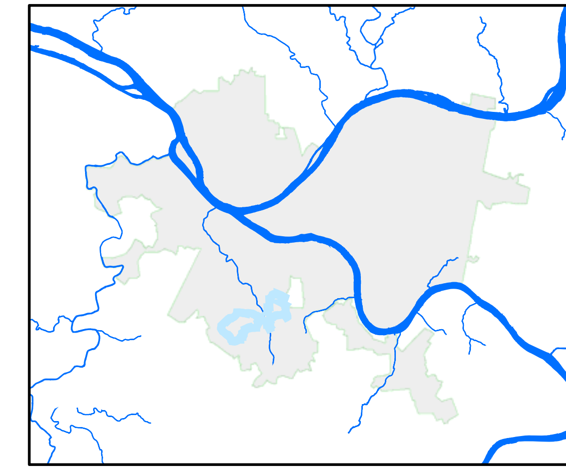












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 240 480 Feet

Attachment 4
S-23 to S-24
Facilities Boundary Map
Edgebrook Ave & Brook St. Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0238.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	3	3	3	3	3
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.					
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.	3	3	3	3	3
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	5	5	5	5	5
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative: CS4-Separation		Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Objective Scoring

Alternative: S2-Sub Surf Tnk		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.	2	2	2	2	2
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3

5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	2
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	4	4	4	4
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	2	2	2	2	2
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T2-HREOP		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	1	1	1	1	1
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T3-CSOTF		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3

5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team

›f Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.570**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.795**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.795**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.779**

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.779**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.779**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.600**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.600**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.584**

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.584**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.620**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.327**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.327**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.327**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.327**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.327**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.222**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.222**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.222**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.222**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.222**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.316**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.316**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.316**

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.316**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.316**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.364**

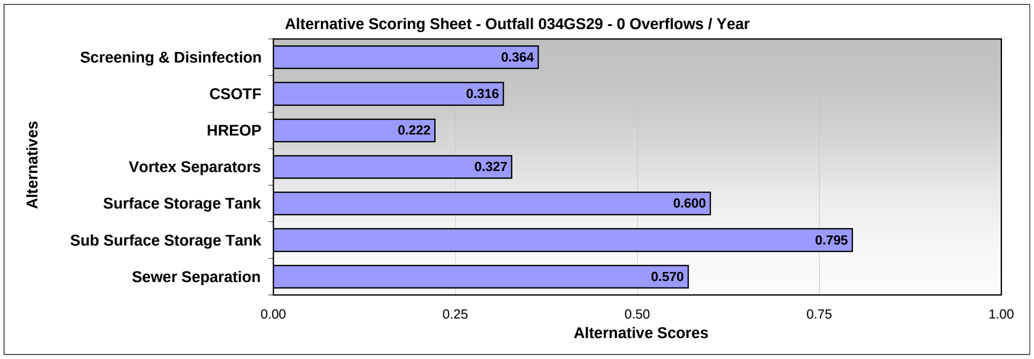
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.364**

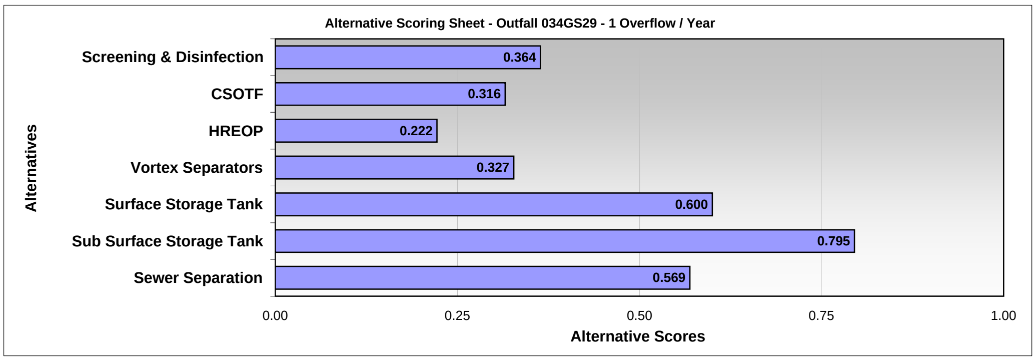
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.364**

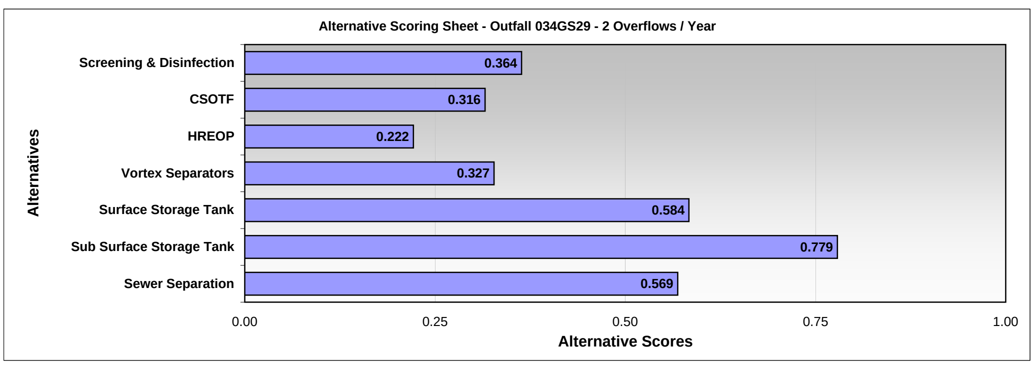
Total Score

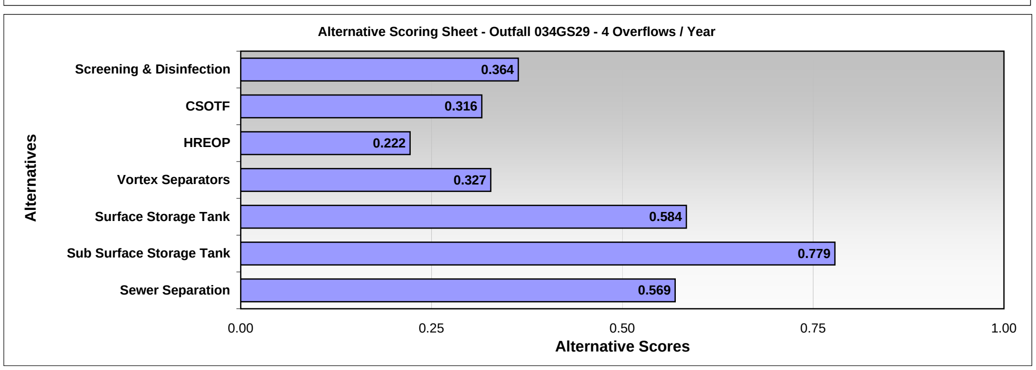
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.364**

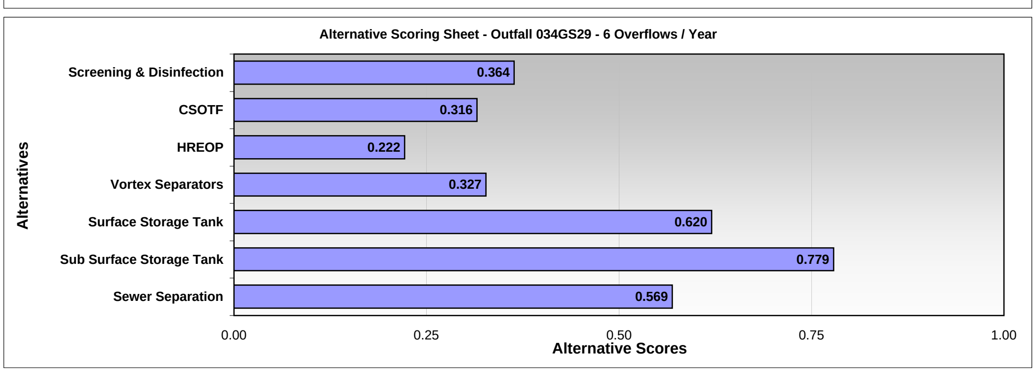
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.364**


Alternative Scoring Sheet - Outfall 034GS29 - 0 Overflows / Year
Alternatives
Screening & Disinfection 0.364
CSOTF 0.316
HREOP 0.222
Vortex Separators 0.327
Surface Storage Tank 0.600
Sub Surface Storage Tank 0.795
Sewer Separation 0.570
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 034GS29 - 1 Overflow / Year
Alternatives
Screening & Disinfection 0.364
CSOTF 0.316
HREOP 0.222
Vortex Separators 0.327
Surface Storage Tank 0.600
Sub Surface Storage Tank 0.795
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 034GS29 - 2 Overflows / Year
Alternatives
Screening & Disinfection 0.364
CSOTF 0.316
HREOP 0.222
Vortex Separators 0.327
Surface Storage Tank 0.584
Sub Surface Storage Tank 0.779
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 034GS29 - 4 Overflows / Year
Alternatives
Screening & Disinfection 0.364
CSOTF 0.316
HREOP 0.222
Vortex Separators 0.327
Surface Storage Tank 0.584
Sub Surface Storage Tank 0.779
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 034GS29 - 6 Overflows / Year
Alternatives
Screening & Disinfection 0.364
CSOTF 0.316
HREOP 0.222
Vortex Separators 0.327
Surface Storage Tank 0.620
Sub Surface Storage Tank 0.779
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	0	
Peak Volume	21,204	CF
	0.16	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	15.02	CFS
	9.71	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		211		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		91,912		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**184,000**		
			TOTAL CAPITAL COST $	**31,873,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	0	
Peak Volume	21,204	CF
	0.16	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	15.02	CFS
	9.71	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29

SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.16	21,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.19	25,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		51		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		34		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.19	26,010	**Sufficient Volume**
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**127,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		9.71	15.02	= Peak Rate
Force Main Diameter (In)		21		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,779,000**	**$ 29,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		15.02		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		38,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		190		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**25,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		9.71		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**862,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		21,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**		
			TOTAL CAPITAL COST $	**3,966,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	0	
Peak Volume	21,204	CF
	0.16	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	15.02	CFS
	9.71	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SUB-SURFACE STORAGE TANK					
0 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.16		21,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.19		25,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		Sufficient Depth	Ref: Tech Parameters, Rev as Req'd
Length (Ft)		51			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		34			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.19		26,010	Sufficient Volume
Tank Area (SF)		2,000			= Length x Width
Construction Cost (Storage Tank)		**1,403,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.16		0.25	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3			Input by Engineer
Force Main Velocity (FPS)		5.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**419,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		15.02			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		38,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,900			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**151,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		9.71			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**862,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			Typ 2, Rev as Req'd
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes / Detention (Min)				No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			No Disinfection
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		21,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**			
				TOTAL CAPITAL COST **$**	**2,993,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	0	
Peak Volume	21,204	CF
	0.16	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	15.02	CFS
	9.71	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
0 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	9.71	15.02	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max	35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	2		
Construction Cost (Swirl / Vortex) $	**1,210,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	10.68	16.52	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	22		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,867,000**	**$ 30,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	15.02		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	58,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	2,900		= ACH x Volume / 60
Construction Cost (Odor Control) $	**211,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	9.71		Ref: CSO Statistics
Construction Cost (Screening) $	**862,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	10.68		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	52	25	
Passes / Detention (Min)	3	**15.74**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**560,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	10,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**20,000**		
		TOTAL CAPITAL COST $	**6,122,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	0	
Peak Volume	21,204	CF
	0.16	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	15.02	CFS
	9.71	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29

SEDIMENTATION BASIN (CSOTF)

0 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		9.71	15.02	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		59	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		30	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.16	21,240	
Construction Cost (CSOTF)	**$**	**16,382,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		9.71	15.02	= Peak Flow x % Req Pump
Force Main Diameter (In)		21		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,779,000**	**$ 29,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		15.02		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**132,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		9.71		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**862,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		9.71		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		50	24	
Passes / Detention (Min)		3	15.98	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**540,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		9,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**		
			TOTAL CAPITAL COST $	**20,844,000**

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RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	0	
Peak Volume	21,204	CF
	0.16	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	15.02	CFS
	9.71	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
0 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		9.71	15.02	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		120		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		16	OK	Input by Engineer
Width (Ft)		9	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**2,725,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		10.68	16.52	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		22		Input by Engineer
Force Main Velocity (FPS)		6.3	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,867,000**	**$ 30,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		15.02		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		150		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**21,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		9.71		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**862,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		10.68		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		52	25	Input by Engineer
Passes / Detention (Min)		3	15.74	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	560,000	$ 434,000	
Construction Cost (Disinfection)	**$**	**994,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		26,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**		
			TOTAL CAPITAL COST $	**7,653,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	0	
Peak Volume	21,204	CF
	0.16	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	15.02	CFS
	9.71	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		9.71		15.02	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**862,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		9.71		15.02	= Peak Flow x % Req Pump
Force Main Diameter (In)		21			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,779,000**	**$**	**29,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		15.02			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000			=CFS x 200
Odor Control Flow Rate (CFM)		150			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**21,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		9.71			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		50		24	
Passes / Detention (Min)		3		**15.98**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	540,000	$	416,000	
Construction Cost (Disinfection)	**$**	**956,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**4,795,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	1	
Peak Volume	18,247	CF
	0.14	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	13.45	CFS
	8.69	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		211		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		91,912		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**184,000**		
			TOTAL CAPITAL COST $	**31,873,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	1	
Peak Volume	18,247	CF
	0.14	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	13.45	CFS
	8.69	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
SURFACE STORAGE TANK				
1 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.14	18,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.16	21,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		47		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		32		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.17	22,560	**Sufficient Volume**
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**108,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		8.69	13.45	= Peak Rate
Force Main Diameter (In)		20		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,675,000**	**$ 28,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		13.45		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		160		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**22,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		8.69		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**815,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		21,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**		
			TOTAL CAPITAL COST $	**3,792,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	1	
Peak Volume	18,247	CF
	0.14	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	13.45	CFS
	8.69	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SUB-SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank Default Value	
Sizing Basis: Peak Volume (MG / CF)		0.14		18,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.16		21,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		47			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		32			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.17		22,560	**Sufficient Volume**
Tank Area (SF)		2,000			= Length x Width
Construction Cost (Storage Tank)		**1,334,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.14		0.21	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3			Input by Engineer
Force Main Velocity (FPS)		4.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**401,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		13.45			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,600			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**132,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		8.69			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**815,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		21,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**			
			TOTAL CAPITAL COST	**$**	**2,840,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	1	
Peak Volume	18,247	CF
	0.14	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	13.45	CFS
	8.69	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
1 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		8.69		13.45	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			Not Applicable - Insufficient Volume
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		9.56		14.79	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		21			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,765,000**	**$**	**29,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		13.45			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		8.69			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**815,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		9.56			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		49		24	
Passes		3		15.90	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**537,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		9,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**			
				TOTAL CAPITAL COST	**$ 4,526,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	1	
Peak Volume	18,247	CF
	0.14	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	13.45	CFS
	8.69	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
SEDIMENTATION BASIN (CSOTF)				
1 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		8.69	13.45	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,500		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		56	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		28	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.14	18,816	
Construction Cost (CSOTF)	**$**	**16,384,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		8.69	13.45	= Peak Flow x % Req Pump
Force Main Diameter (In)		20		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,675,000**	**$ 28,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		13.45		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		28,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,400		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**119,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		8.69		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**815,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		8.69		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		47	22	
Passes		3	**15.38**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**520,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		8,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**16,000**		
			TOTAL CAPITAL COST $	**20,659,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	1	
Peak Volume	18,247	CF
	0.14	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	13.45	CFS
	8.69	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		8.69		13.45	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		110			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		16		OK	Input by Engineer
Width (Ft)		8		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**2,565,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		9.56		14.79	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		21			Input by Engineer
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,765,000**	**$**	**29,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		13.45			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		150			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**21,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		8.69			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**815,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		9.56			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		49		24	Input by Engineer
Passes		3		15.90	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	537,000	$	410,000	
Construction Cost (Disinfection)	**$**	**947,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		26,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
			TOTAL CAPITAL COST	**$**	**7,296,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	1	
Peak Volume	18,247	CF
	0.14	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	13.45	CFS
	8.69	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		8.69		13.45	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**815,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		8.69		13.45	= Peak Flow x % Req Pump
Force Main Diameter (In)		20			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,675,000**	**$**	**28,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		13.45			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,700			=CFS x 200
Odor Control Flow Rate (CFM)		140			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**20,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		8.69			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		47		22	
Passes		3		**15.38**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	520,000	$	385,000	
Construction Cost (Disinfection)	**$**	**905,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST $	**4,591,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	2	
Peak Volume	12,040	CF
	0.09	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	12.90	CFS
	8.34	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		211		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		91,912		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**184,000**		
			TOTAL CAPITAL COST $	**31,873,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	2	
Peak Volume	12,040	CF
	0.09	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	12.90	CFS
	8.34	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.09	12,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.11	14,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		38		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		26		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.11	14,820	**Sufficient Volume**
Tank Area (SF)		1,000		= Length x Width
Construction Cost (Storage Tank)		**68,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		8.34	12.90	= Peak Rate
Force Main Diameter (In)		20		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,636,000**	**$ 28,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		12.90		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		21,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		110		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**16,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		8.34		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**798,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	**3,688,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	2	
Peak Volume	12,040	CF
	0.09	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	12.90	CFS
	8.34	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29

SUB-SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank Default Value	
Sizing Basis: Peak Volume (MG / CF)		0.09		12,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.11		14,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		38			= $(\text{Vol} / \text{SWD} * 1.5)^{1/2}$
Width (Ft)		26			= $(\text{Vol} / \text{SWD} / 1.5)^{1/2}$
Total Volume (MG / CF)		0.11		14,820	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**1,191,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.09		0.14	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2			Input by Engineer
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**361,000**	**$**	**13,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		12.90			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		21,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,050			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**95,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		8.34			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**798,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST $	**2,600,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	2	
Peak Volume	12,040	CF
	0.09	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	12.90	CFS
	8.34	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
2 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		8.34		12.90	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		9.17		14.19	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		21			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,726,000**	**$**	**29,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		12.90			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		8.34			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**798,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		9.17			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		48		23	
Passes		3		**15.56**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**529,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		9,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**			
				TOTAL CAPITAL COST	**$ 4,462,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	2	
Peak Volume	12,040	CF
	0.09	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	12.90	CFS
	8.34	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29

SEDIMENTATION BASIN (CSOTF)

2 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		8.34	12.90	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		54	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		27	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.13	17,496	
Construction Cost (CSOTF)	**$**	**16,384,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		8.34	12.90	= Peak Flow x % Req Pump
Force Main Diameter (In)		20		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,636,000**	**$ 28,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		12.90		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		26,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,300		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**112,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		8.34		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**798,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		8.34		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		46	22	
Passes		3	15.69	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**512,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		8,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**16,000**		
			TOTAL CAPITAL COST $	**20,588,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	2	
Peak Volume	12,040	CF
	0.09	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	12.90	CFS
	8.34	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		8.34		12.90	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		100			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		15		OK	Input by Engineer
Width (Ft)		8		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**2,509,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		9.17		14.19	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		21			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,726,000**	**$**	**29,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		12.90			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		150			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**21,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		8.34			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**798,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		9.17			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		48		23	Input by Engineer
Passes		3		**15.56**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	529,000	$	397,000	
Construction Cost (Disinfection)	**$**	**926,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		26,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST $	**7,163,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	2	
Peak Volume	12,040	CF
	0.09	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	12.90	CFS
	8.34	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		8.34		12.90	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**798,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		8.34		12.90	= Peak Flow x % Req Pump
Force Main Diameter (In)		20			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,636,000**	**$**	**28,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		12.90			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,600			=CFS x 200
Odor Control Flow Rate (CFM)		130			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**19,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		8.34			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		46		22	
Passes		3		**15.69**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	512,000	$	379,000	
Construction Cost (Disinfection)	**$**	**891,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST **$**	**4,520,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	4	
Peak Volume	8,487	CF
	0.06	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	11.72	CFS
	7.57	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		211		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		91,912		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**184,000**		
			TOTAL CAPITAL COST $	**31,873,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	4	
Peak Volume	8,487	CF
	0.06	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	11.72	CFS
	7.57	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29			
SURFACE STORAGE TANK			
4 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.06	8,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.07	9,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	31		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	21		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.07	9,765	**Insufficient Volume**
Tank Area (SF)	1,000		= Length x Width
Construction Cost (Storage Tank)	**47,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	7.57	11.72	= Peak Rate
Force Main Diameter (In)	19		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,548,000**	**$ 27,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	11.72		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	14,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	70		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**11,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	7.57		Ref: CSO Statistics
Construction Cost (Screening) $	**763,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**40,000**		
		TOTAL CAPITAL COST $	**3,538,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	4	
Peak Volume	8,487	CF
	0.06	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	11.72	CFS
	7.57	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SUB-SURFACE STORAGE TANK					
4 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank Default Value	
Sizing Basis: Peak Volume (MG / CF)		0.06		8,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.07		9,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		31			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		21			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.07		9,765	**Insufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**1,110,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.06		0.10	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2			Input by Engineer
Force Main Velocity (FPS)		4.5		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**338,000**	**$**	**13,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		11.72			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		14,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		700			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**69,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		7.57			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**763,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST $	**2,435,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	4	
Peak Volume	8,487	CF
	0.06	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	11.72	CFS
	7.57	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		7.57		11.72	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		8.33		12.89	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		20			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,636,000**	**$**	**28,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		11.72			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		7.57			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**763,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		8.33			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		46		22	
Passes		3		**15.70**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**512,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		8,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**16,000**			
				TOTAL CAPITAL COST	**$ 4,317,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	4	
Peak Volume	8,487	CF
	0.06	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	11.72	CFS
	7.57	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29

SEDIMENTATION BASIN (CSOTF)

4 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	7.57	11.72	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	1,300		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	52	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	26	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.12	16,224	
Construction Cost (CSOTF)	**$ 16,385,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	7.57	11.72	= Peak Flow x % Req Pump
Force Main Diameter (In)	19		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 2,548,000**	**$ 27,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	11.72		Ref: CSO Statistics
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe)	**$ 63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	24,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	1,200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$ 106,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	7.57		Ref: CSO Statistics
Construction Cost (Screening)	**$ 763,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	7.57		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	44	21	
Passes	3	**15.77**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection)	**$ 497,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators)	**$ 39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	8,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 16,000**		
		TOTAL CAPITAL COST $	**20,444,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	4	
Peak Volume	8,487	CF
	0.06	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	11.72	CFS
	7.57	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
4 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		7.57		11.72	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		90			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		14		OK	Input by Engineer
Width (Ft)		7		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**2,389,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		8.33		12.89	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		20			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,636,000**	**$**	**28,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		11.72			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		7.57			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**763,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		8.33			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		46		22	Input by Engineer
Passes		3		**15.70**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	512,000	$	379,000	
Construction Cost (Disinfection)	**$**	**891,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		25,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST $	**6,874,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	4	
Peak Volume	8,487	CF
	0.06	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	11.72	CFS
	7.57	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		7.57		11.72	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**763,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		7.57		11.72	= Peak Flow x % Req Pump
Force Main Diameter (In)		19			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,548,000**	**$**	**27,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		11.72			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,300			=CFS x 200
Odor Control Flow Rate (CFM)		120			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**17,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		7.57			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		44		21	
Passes		3		**15.77**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	497,000	$	362,000	
Construction Cost (Disinfection)	**$**	**859,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**4,362,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	6	
Peak Volume	2,166	CF
	0.02	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	3.79	CFS
	2.45	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		211		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**31,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		91,912		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**184,000**		
			TOTAL CAPITAL COST $	**31,873,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	6	
Peak Volume	2,166	CF
	0.02	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	3.79	CFS
	2.45	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29

SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.02	2,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.02	2,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		15		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		10		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.02	2,250	**Insufficient Volume**
Tank Area (SF)		0		= Length x Width
Construction Cost (Storage Tank)		**11,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		2.45	3.79	= Peak Rate
Force Main Diameter (In)		11		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,789,000**	**$ 20,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.79		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		20		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**4,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		2.45		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**526,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**2,490,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	6	
Peak Volume	2,166	CF
	0.02	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	3.79	CFS
	2.45	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29						
SUB-SURFACE STORAGE TANK						
6 Overflows / Year						
1. Tank Parameters						
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value	
Sizing Basis: Peak Volume (MG / CF)		0.02		2,000	Ref: CSO Statistics	
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters	
Required Storage Volume (MG / CF)		0.02		2,000	= Peak Vol / Available Capacity	
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**	
Length (Ft)		15			= (Vol / SWD * 1.5)$^{1/2}$	
Width (Ft)		10			= (Vol / SWD / 1.5)$^{1/2}$	
Total Volume (MG / CF)		0.02		2,250	**Insufficient Volume**	
Tank Area (SF)		0			= Length x Width	
Construction Cost (Storage Tank)		**964,000**				
2. Dewatering Pump Station / Force Main Parameters						
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters	
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**	
Dewatering Pumping Rate (MGD / CFS)		0.02		0.03	= Peak Vol / DW Time x %Req Pump	
Force Main Diameter (In)		1			Input by Engineer	
Force Main Velocity (FPS)		4.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**	
Force Main Length (Ft)		100			Input by Engineer	
Construction Cost (PS / Force Main)	**$**	**298,000**	**$**	**12,000**		
3. Consolidation and/or Outfall Pipe Parameters						
Peak Flow (CFS)		3.79			Ref: Technical Parameters	
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"	
Length (Ft)		100			Input by Engineer	
Depth (Ft)		20			Input by Engineer	
Construction Cost (Pipe)	**$**	**63,000**				
4. Odor Control Parameters						
Air Changes / Hour (ACH)		3			Ref: Technical Parameters	
Volume of Ventilated Space (CF)		3,000			=Required Storage Vol x 1.5	
Odor Control Flow Rate (CFM)		150			= ACH x Volume / 60	
Construction Cost (Odor Control)	**$**	**21,000**				
5. Screening Parameters						
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**	
Peak Flow, into facility (MGD)		2.45			Ref: CSO Statistics	
Construction Cost (Screening)	**$**	**526,000**				
6. Disinfection Parameters						
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**	
Peak Flow (MGD)		0.00			Ref: Peak flow of PS	
Cl_2 Contact Tank Length / Width (Ft)						
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum	
Construction Cost (Disinfection / CC Tank)	$	-	$	-		
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**	
7. Regulator Parameters						
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer	
Number Regulators		1			Input by Engineer	
Construction Cost (Regulators)	**$**	**39,000**				
8. Land Acquisition Parameters						
Land Required - Tank (SF)		19,000			=(0.291 x Vol (MG) + 0.439) x 43560	
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters	
Land Acquisition Cost	**$**	**38,000**				
				TOTAL CAPITAL COST	**$**	**1,961,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	6	
Peak Volume	2,166	CF
	0.02	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	3.79	CFS
	2.45	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
6 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		2.45	3.79	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.69	4.17	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		11		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,832,000**	**$ 20,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.79		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		2.45		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**526,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		2.69		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		27	13	
Passes		3	**16.85**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**395,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		3,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**6,000**		
			TOTAL CAPITAL COST $	**3,141,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	6	
Peak Volume	2,166	CF
	0.02	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	3.79	CFS
	2.45	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SEDIMENTATION BASIN (CSOTF)					
6 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		2.45		3.79	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		500			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		33		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		16		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.05		6,336	
Construction Cost (CSOTF)	**$**	**16,394,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.45		3.79	= Peak Flow x % Req Pump
Force Main Diameter (In)		11			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,789,000**	**$**	**20,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.79			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		10,000			=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		500			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**53,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		2.45			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**526,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		2.45			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		25		12	
Passes		3		**15.84**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**389,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		6,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**			
			TOTAL CAPITAL COST	**$**	**19,285,000**

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RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	6	
Peak Volume	2,166	CF
	0.02	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	3.79	CFS
	2.45	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		2.45		3.79	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		30			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		9		**OK**	Input by Engineer
Width (Ft)		4		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,584,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.69		4.17	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		11			Input by Engineer
Force Main Velocity (FPS)		6.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,832,000**	**$**	**20,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.79			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		2.45			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**526,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		2.69			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		27		13	Input by Engineer
Passes		3		**16.85**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	395,000	$	232,000	
Construction Cost (Disinfection)	**$**	**627,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		23,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST $	**4,746,000**

RESULTS SUMMARY		
Number of Events / Year	12	
Number of Overflows / Year	6	
Peak Volume	2,166	CF
	0.02	MG
Total Volume	79,970	CF
	0.60	MG
Peak Rate	3.79	CFS
	2.45	MGD

Capital Costs - 034GS29 / Sewershed ACSO 034GS29					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		2.45		3.79	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**526,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		2.45		3.79	= Peak Flow x % Req Pump
Force Main Diameter (In)		11			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,789,000**	**$**	**20,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.79			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		800			=CFS x 200
Odor Control Flow Rate (CFM)		40			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**7,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		2.45			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		25		12	
Passes		3		**15.84**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	389,000	$	218,000	
Construction Cost (Disinfection)	**$**	**607,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST **$**	**3,097,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	9.71	$85,811	20	10.910	$936,192
	Tank O&M	No. Events / Yr	12	$7,690	50	14.484	$111,383
		Const Cost ($)	$127,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,257	20	10.910	$90,087
	Odor Control O&M	Capacity (cfm)	190	$665	20	10.910	$7,255
	Reserve / Replace	10% Gravity / 15% Pump					$13,751
			Total Annual O&M	**$103,000**		**Total PW O&M**	**$1,159,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.16	$5,493	20	10.910	$59,930
	Tank O&M	No. Events / Yr	12	$10,880	50	14.484	$157,586
		Const Cost ($)	$1,403,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,257	20	10.910	$90,087
	Odor Control O&M	Capacity (cfm)	1,900	$6,650	20	10.910	$72,551
	Reserve / Replace	10% Gravity / 15% Pump					$4,465
			Total Annual O&M	**$32,000**		**Total PW O&M**	**$385,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	9.71	$85,811	20	10.910	$936,192
	Sed. Basin O&M	Flow Rate (mgd)	9.71	$1,092	50	14.484	$15,816
	Screening O&M	Flow Rate (mgd)	9.71	$8,257	20	10.910	$90,087
	Disinfection O&M	Flow Rate (mgd)	9.71	$64,210	20	10.910	$700,527
	Odor Control O&M	Capacity (cfm)	1,600.00	$5,600	20	10.910	$61,096
	Reserve / Replace	10% Gravity / 15% Pump					$15,511
			Total Annual O&M	**$165,000**		**Total PW O&M**	**$1,819,000**

Operation and Maintenance Costs

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	10.68	$91,453	20	10.910	$997,745
	HREP O&M	Flow Rate (mgd)	9.71	$88,654	20	10.910	$967,205
	Screening O&M	Flow Rate (mgd)	9.71	$8,257	20	10.910	$90,087
	Disinfection O&M	Flow Rate (mgd)	10.68	$68,049	20	10.910	$742,405
	Odor Control O&M	Capacity (cfm)	150.00	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$23,034
			Total Annual O&M	**$257,000**		**Total PW O&M**	**$2,826,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	10.68	$91,453	20	10.910	$997,745
	Swirl / Vortex O&M	Flow Rate (mgd)	9.71	$1,092	20	10.910	$11,913
	Screening O&M	Flow Rate (mgd)	9.71	$8,257	20	10.910	$90,087
	Disinfection O&M	Flow Rate (mgd)	10.68	$68,049	20	10.910	$742,405
	Odor Control O&M	Capacity (cfm)	2,900.00	$10,150	20	10.910	$110,736
	Reserve / Replace	10% Gravity / 15% Pump					$17,785
			Total Annual O&M	**$180,000**		**Total PW O&M**	**$1,971,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	9.71	$85,811	20	10.910	$936,192
	Screening O&M	Flow Rate (mgd)	9.71	$8,257	20	10.910	$90,087
	Disinfection O&M	Flow Rate (mgd)	9.71	$64,210	20	10.910	$700,527
	Odor Control O&M	Capacity (cfm)	150.00	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$15,209
			Total Annual O&M	**$159,000**		**Total PW O&M**	**$1,748,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	8.69	$79,707	20	10.910	$869,594
	Tank O&M	No. Events / Yr	12	$7,643	50	14.484	$110,695
		Const Cost ($)	$108,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	9	$8,170	20	10.910	$89,132
	Odor Control O&M	Capacity (cfm)	160	$560	20	10.910	$6,110
	Reserve / Replace	10% Gravity / 15% Pump					$13,191
			Total Annual O&M	**$97,000**		**Total PW O&M**	**$1,089,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.14	$4,969	20	10.910	$54,208
	Tank O&M	No. Events / Yr	12	$10,708	50	14.484	$155,087
		Const Cost ($)	$1,334,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	9	$8,170	20	10.910	$89,132
	Odor Control O&M	Capacity (cfm)	1,600	$5,600	20	10.910	$61,096
	Reserve / Replace	10% Gravity / 15% Pump					$4,212
			Total Annual O&M	**$30,000**		**Total PW O&M**	**$364,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	8.69	$79,707	20	10.910	$869,594
	Sed. Basin O&M	Flow Rate (mgd)	8.69	$978	50	14.484	$14,162
	Screening O&M	Flow Rate (mgd)	8.69	$8,170	20	10.910	$89,132
	Disinfection O&M	Flow Rate (mgd)	8.69	$60,031	20	10.910	$654,940
	Odor Control O&M	Capacity (cfm)	1,400.00	$4,900	20	10.910	$53,459
	Reserve / Replace	10% Gravity / 15% Pump					$14,869
			Total Annual O&M	**$154,000**		**Total PW O&M**	**$1,696,000**

Operation and Maintenance Costs

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	9.56	$84,947	20	10.910	$926,767
	HREP O&M	Flow Rate (mgd)	8.69	$83,078	20	10.910	$906,374
	Screening O&M	Flow Rate (mgd)	8.69	$8,170	20	10.910	$89,132
	Disinfection O&M	Flow Rate (mgd)	9.56	$63,620	20	10.910	$694,093
	Odor Control O&M	Capacity (cfm)	150.00	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$21,993
			Total Annual O&M	**$241,000**		**Total PW O&M**	**$2,644,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	9.56	$84,947	20	10.910	$926,767
	Swirl / Vortex O&M	Flow Rate (mgd)	8.69	$978	20	10.910	$10,668
	Screening O&M	Flow Rate (mgd)	8.69	$8,170	20	10.910	$89,132
	Disinfection O&M	Flow Rate (mgd)	9.56	$63,620	20	10.910	$694,093
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$14,959
			Total Annual O&M	**$158,000**		**Total PW O&M**	**$1,736,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	8.69	$79,707	20	10.910	$869,594
	Screening O&M	Flow Rate (mgd)	8.69	$8,170	20	10.910	$89,132
	Disinfection O&M	Flow Rate (mgd)	8.69	$60,031	20	10.910	$654,940
	Odor Control O&M	Capacity (cfm)	140.00	$490	20	10.910	$5,346
	Reserve / Replace	10% Gravity / 15% Pump					$14,600
			Total Annual O&M	**$149,000**		**Total PW O&M**	**$1,634,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	8.34	$77,512	20	10.910	$845,650
	Tank O&M	No. Events / Yr	12	$7,543	50	14.484	$109,247
		Const Cost ($)	$68,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	8	$8,139	20	10.910	$88,798
	Odor Control O&M	Capacity (cfm)	110	$385	20	10.910	$4,200
	Reserve / Replace	10% Gravity / 15% Pump					$12,969
			Total Annual O&M	**$94,000**		**Total PW O&M**	**$1,061,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.09	$3,764	20	10.910	$41,061
	Tank O&M	No. Events / Yr	12	$10,350	50	14.484	$149,910
		Const Cost ($)	$1,191,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	8	$8,139	20	10.910	$88,798
	Odor Control O&M	Capacity (cfm)	1,050	$3,675	20	10.910	$40,094
	Reserve / Replace	10% Gravity / 15% Pump					$3,902
			Total Annual O&M	**$26,000**		**Total PW O&M**	**$324,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	8.34	$77,512	20	10.910	$845,650
	Sed. Basin O&M	Flow Rate (mgd)	8.34	$938	50	14.484	$13,582
	Screening O&M	Flow Rate (mgd)	8.34	$8,139	20	10.910	$88,798
	Disinfection O&M	Flow Rate (mgd)	8.34	$58,522	20	10.910	$638,477
	Odor Control O&M	Capacity (cfm)	1,300.00	$4,550	20	10.910	$49,640
	Reserve / Replace	10% Gravity / 15% Pump					$14,623
			Total Annual O&M	**$150,000**		**Total PW O&M**	**$1,651,000**

Operation and Maintenance Costs

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	9.17	$82,608	20	10.910	$901,250
	HREP O&M	Flow Rate (mgd)	8.34	$81,061	20	10.910	$884,370
	Screening O&M	Flow Rate (mgd)	8.34	$8,139	20	10.910	$88,798
	Disinfection O&M	Flow Rate (mgd)	9.17	$62,021	20	10.910	$676,646
	Odor Control O&M	Capacity (cfm)	150.00	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$21,613
			Total Annual O&M	**$235,000**		**Total PW O&M**	**$2,578,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	9.17	$82,608	20	10.910	$901,250
	Swirl / Vortex O&M	Flow Rate (mgd)	8.34	$938	20	10.910	$10,231
	Screening O&M	Flow Rate (mgd)	8.34	$8,139	20	10.910	$88,798
	Disinfection O&M	Flow Rate (mgd)	9.17	$62,021	20	10.910	$676,646
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$14,732
			Total Annual O&M	**$154,000**		**Total PW O&M**	**$1,692,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	8.34	$77,512	20	10.910	$845,650
	Screening O&M	Flow Rate (mgd)	8.34	$8,139	20	10.910	$88,798
	Disinfection O&M	Flow Rate (mgd)	8.34	$58,522	20	10.910	$638,477
	Odor Control O&M	Capacity (cfm)	130.00	$455	20	10.910	$4,964
	Reserve / Replace	10% Gravity / 15% Pump					$14,370
			Total Annual O&M	**$145,000**		**Total PW O&M**	**$1,592,000**

Operation and Maintenance Costs

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	7.57	$72,705	20	10.910	$793,212
	Tank O&M	No. Events / Yr	12	$7,490	50	14.484	$108,486
		Const Cost ($)	$47,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	8	$8,074	20	10.910	$88,085
	Odor Control O&M	Capacity (cfm)	70	$245	20	10.910	$2,673
	Reserve / Replace	10% Gravity / 15% Pump					$12,501
			Total Annual O&M	**$89,000**		**Total PW O&M**	**$1,005,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.06	$2,980	20	10.910	$32,507
	Tank O&M	No. Events / Yr	12	$10,148	50	14.484	$146,977
		Const Cost ($)	$1,110,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	8	$8,074	20	10.910	$88,085
	Odor Control O&M	Capacity (cfm)	700	$2,450	20	10.910	$26,729
	Reserve / Replace	10% Gravity / 15% Pump					$3,642
			Total Annual O&M	**$24,000**		**Total PW O&M**	**$298,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	7.57	$72,705	20	10.910	$793,212
	Sed. Basin O&M	Flow Rate (mgd)	7.57	$852	50	14.484	$12,341
	Screening O&M	Flow Rate (mgd)	7.57	$8,074	20	10.910	$88,085
	Disinfection O&M	Flow Rate (mgd)	7.57	$55,204	20	10.910	$602,274
	Odor Control O&M	Capacity (cfm)	1,200.00	$4,200	20	10.910	$45,822
	Reserve / Replace	10% Gravity / 15% Pump					$14,111
			Total Annual O&M	**$142,000**		**Total PW O&M**	**$1,556,000**

Operation and Maintenance Costs

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	8.33	$77,486	20	10.910	$845,364
	HREP O&M	Flow Rate (mgd)	7.57	$76,619	20	10.910	$835,913
	Screening O&M	Flow Rate (mgd)	7.57	$8,074	20	10.910	$88,085
	Disinfection O&M	Flow Rate (mgd)	8.33	$58,504	20	10.910	$638,279
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$20,762
			Total Annual O&M	**$222,000**		**Total PW O&M**	**$2,432,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	8.33	$77,486	20	10.910	$845,364
	Swirl / Vortex O&M	Flow Rate (mgd)	7.57	$852	20	10.910	$9,296
	Screening O&M	Flow Rate (mgd)	7.57	$8,074	20	10.910	$88,085
	Disinfection O&M	Flow Rate (mgd)	8.33	$58,504	20	10.910	$638,279
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$14,223
			Total Annual O&M	**$145,000**		**Total PW O&M**	**$1,595,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	7.57	$72,705	20	10.910	$793,212
	Screening O&M	Flow Rate (mgd)	7.57	$8,074	20	10.910	$88,085
	Disinfection O&M	Flow Rate (mgd)	7.57	$55,204	20	10.910	$602,274
	Odor Control O&M	Capacity (cfm)	120.00	$420	20	10.910	$4,582
	Reserve / Replace	10% Gravity / 15% Pump					$13,869
			Total Annual O&M	**$137,000**		**Total PW O&M**	**$1,502,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.45	$34,180	20	10.910	$372,901
	Tank O&M	No. Events / Yr	12	$7,400	50	14.484	$107,183
		Const Cost ($)	$11,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,639	20	10.910	$83,346
	Odor Control O&M	Capacity (cfm)	20	$70	20	10.910	$764
	Reserve / Replace	10% Gravity / 15% Pump					$8,741
			Total Annual O&M	**$50,000**		**Total PW O&M**	**$573,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.02	$1,196	20	10.910	$13,051
	Tank O&M	No. Events / Yr	12	$9,783	50	14.484	$141,690
		Const Cost ($)	$964,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,639	20	10.910	$83,346
	Odor Control O&M	Capacity (cfm)	150	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$2,704
			Total Annual O&M	**$20,000**		**Total PW O&M**	**$247,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	2.45	$34,180	20	10.910	$372,901
	Sed. Basin O&M	Flow Rate (mgd)	2.45	$275	50	14.484	$3,988
	Screening O&M	Flow Rate (mgd)	2.45	$7,639	20	10.910	$83,346
	Disinfection O&M	Flow Rate (mgd)	2.45	$27,738	20	10.910	$302,620
	Odor Control O&M	Capacity (cfm)	500.00	$1,750	20	10.910	$19,092
	Reserve / Replace	10% Gravity / 15% Pump					$9,932
			Total Annual O&M	**$72,000**		**Total PW O&M**	**$792,000**

Operation and Maintenance Costs

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	2.69	$36,427	20	10.910	$397,419
	HREP O&M	Flow Rate (mgd)	2.45	$39,427	20	10.910	$430,147
	Screening O&M	Flow Rate (mgd)	2.45	$7,639	20	10.910	$83,346
	Disinfection O&M	Flow Rate (mgd)	2.69	$29,396	20	10.910	$320,711
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$14,313
			Total Annual O&M	**$114,000**		**Total PW O&M**	**$1,248,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	2.69	$36,427	20	10.910	$397,419
	Swirl / Vortex O&M	Flow Rate (mgd)	2.45	$275	20	10.910	$3,004
	Screening O&M	Flow Rate (mgd)	2.45	$7,639	20	10.910	$83,346
	Disinfection O&M	Flow Rate (mgd)	2.69	$29,396	20	10.910	$320,711
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$9,980
			Total Annual O&M	**$74,000**		**Total PW O&M**	**$814,000**

ACSO 034GS29	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	2.45	$34,180	20	10.910	$372,901
	Screening O&M	Flow Rate (mgd)	2.45	$7,639	20	10.910	$83,346
	Disinfection O&M	Flow Rate (mgd)	2.45	$27,738	20	10.910	$302,620
	Odor Control O&M	Capacity (cfm)	40.00	$140	20	10.910	$1,527
	Reserve / Replace	10% Gravity / 15% Pump					$9,807
			Total Annual O&M	**$70,000**		**Total PW O&M**	**$770,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$31.9	$31,873,000	$0
1	$31.9	$31,873,000	$0
2	$31.9	$31,873,000	$0
4	$31.9	$31,873,000	$0
6	$31.9	$31,873,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$3.4	$2,993,000	$385,000
1	$3.2	$2,840,000	$364,000
2	$2.9	$2,600,000	$324,000
4	$2.7	$2,435,000	$298,000
6	$2.2	$1,961,000	$247,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$5.1	$3,966,000	$1,159,000
1	$4.9	$3,792,000	$1,089,000
2	$4.7	$3,688,000	$1,061,000
4	$4.5	$3,538,000	$1,005,000
6	$3.1	$2,490,000	$573,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$8.1	$6,122,000	$1,971,000
1	$6.3	$4,526,000	$1,736,000
2	$6.2	$4,462,000	$1,692,000
4	$5.9	$4,317,000	$1,595,000
6	$4.0	$3,141,000	$814,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$10.5	$7,653,000	$2,826,000
1	$9.9	$7,296,000	$2,644,000
2	$9.7	$7,163,000	$2,578,000
4	$9.3	$6,874,000	$2,432,000
6	$6.0	$4,746,000	$1,248,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$22.7	$20,844,000	$1,819,000
1	$22.4	$20,659,000	$1,696,000
2	$22.2	$20,588,000	$1,651,000
4	$22.0	$20,444,000	$1,556,000
6	$20.1	$19,285,000	$792,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$6.5	$4,795,000	$1,748,000
1	$6.2	$4,591,000	$1,634,000
2	$6.1	$4,520,000	$1,592,000
4	$5.9	$4,362,000	$1,502,000
6	$3.9	$3,097,000	$770,000

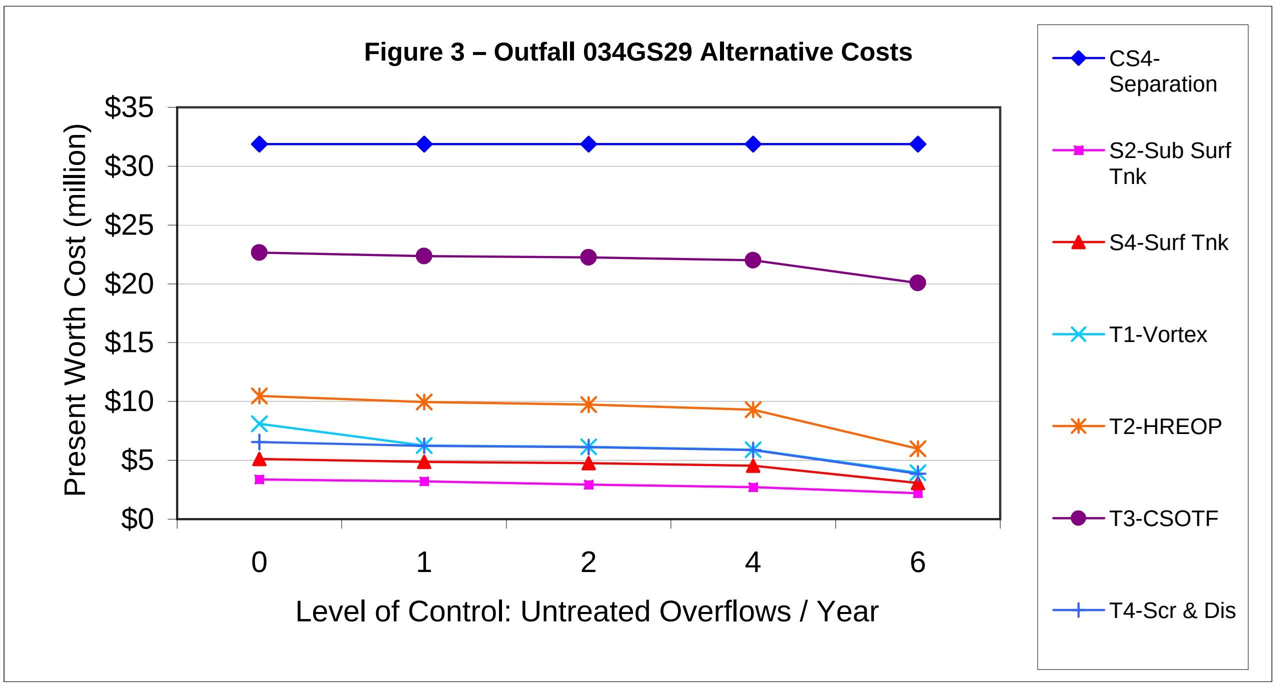


Figure 3 – Outfall 034GS29 Alternative Costs
Present Worth Cost (million)
$35
$30
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 034GS29
Location Name	S-29
Model ID	ADC 034GS29.1
Structure Type	Outfall
PWSA Sewershed	Bausman, Brook and Warrington
Stream of Discharge	Saw Mill Run
NPDES Permit Number	034GS29
Owner	ALCOSAN
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	12
Peak Volume:	21,204 ft^3
	0.16 MG
Total Volume:	79,970 ft^3
	0.60 MG
Peak Rate:	15.02 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
7/5/2005 16:20	50	7/5/2005 16:30	21204.11	158.617	0	15.02	0
8/20/2005 18:20	50	8/20/2005 18:30	18246.67	136.494	1	12.15	3
7/26/2005 19:50	35	7/26/2005 20:00	12039.93	90.065	2	11.72	4
8/29/2005 13:35	20	8/29/2005 13:45	9574.55	71.622	3	13.45	1
5/13/2005 22:35	20	5/13/2005 22:45	8487.18	63.488	4	12.90	2
7/15/2005 17:45	25	7/15/2005 18:00	3176.01	23.758	5	3.90	5
11/9/2005 19:35	20	11/9/2005 19:45	2165.50	16.199	6	3.79	6
9/29/2005 5:35	20	9/29/2005 5:45	2021.03	15.118	7	3.26	7
5/23/2005 16:25	15	5/23/2005 16:30	1236.44	9.249	8	2.16	8
10/22/2005 6:35	20	10/22/2005 6:45	1179.58	8.824	9	1.99	9
8/27/2005 15:25	15	8/27/2005 15:30	495.53	3.707	10	1.20	10
4/23/2005 3:55	14	4/23/2005 4:00	143.86	1.076	11	0.27	11

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 034GS29
Location Name	S-29
Model ID	ADC 034GS29.1
Structure Type	Outfall
PWSA Sewershed	Bausman, Brook and Warrington
Stream of Discharge	Saw Mill Run
NPDES Permit Number	034GS29
Owner	ALCOSAN

Results Summary

Number of Events:	12
Peak Volume:	21,204 ft^3
	0.16 MG
Total Volume:	79,970 ft^3
	0.60 MG
Peak Rate:	15.02 cfs

Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Figure 1 - Outfall 034GS29 CSO Volume

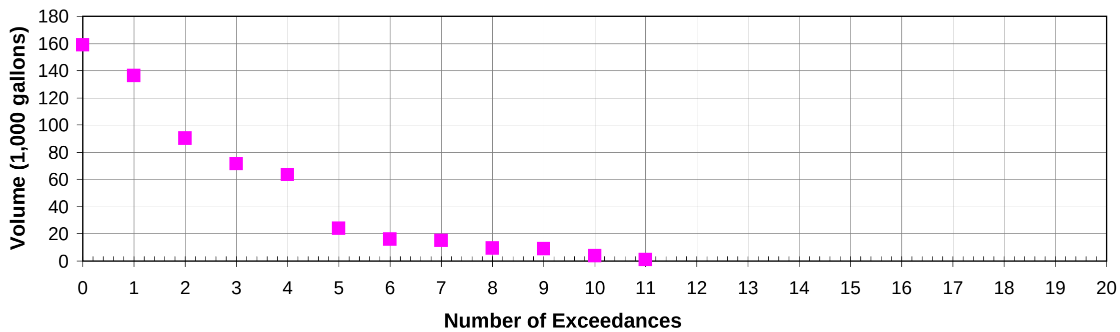
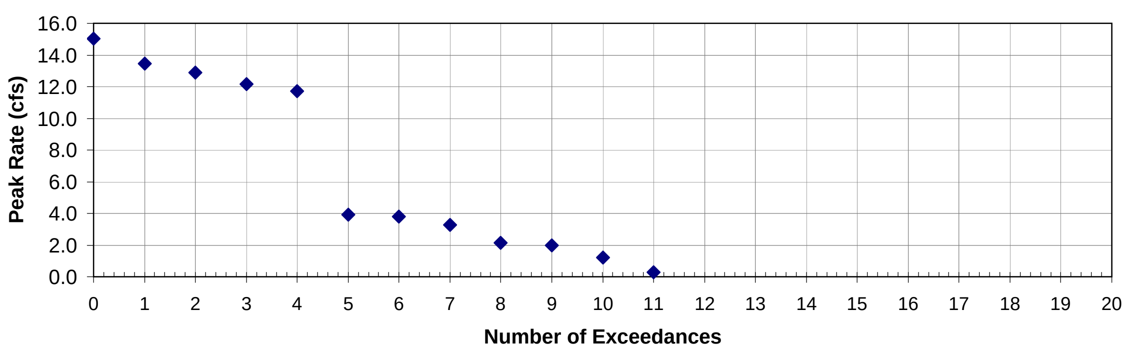


Figure 2 - Outfall 034GS29 CSO Peak Flow Rate



D.30.2 S-29 – SAW MILL RUN SEWERSHED – NPDES# 034GS29

Description of Outfall

Outfall 034GS29 conveys overflows from the ALCOSAN diversion chamber S-29 to Saw Mill Run. The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. The outfall is located along Saw Mill Run adjacent to Saw Mill Run Boulevard near Timberland Avenue in the City of Pittsburgh. The Saw Mill Run Interceptor sewersheds include approximately 4,734 acres of residential, business and commercial users. The 034GS29 Sewershed (S-29) consists of 211 acres, or approximately 4.5% of the total service area. The Saw Mill Run Interceptor Sewersheds are comprised of approximately 1,587 manholes and 353,993 linear feet (67.0 miles) of combined, sanitary, and storm sewer up to 72 inches in diameter.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 034GS29 typically experiences 12 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 034GS29 is approximately 0.16 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 034GS29 is approximately 15.02 CFS. *Figure 1 – Outfall 034GS29 CSO Volume* and *Figure 2 – Outfall 034GS29 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 12 largest CSO events during the typical year baseline conditions simulation.

Figure 1 - Outfall 034GS29 CSO Volume

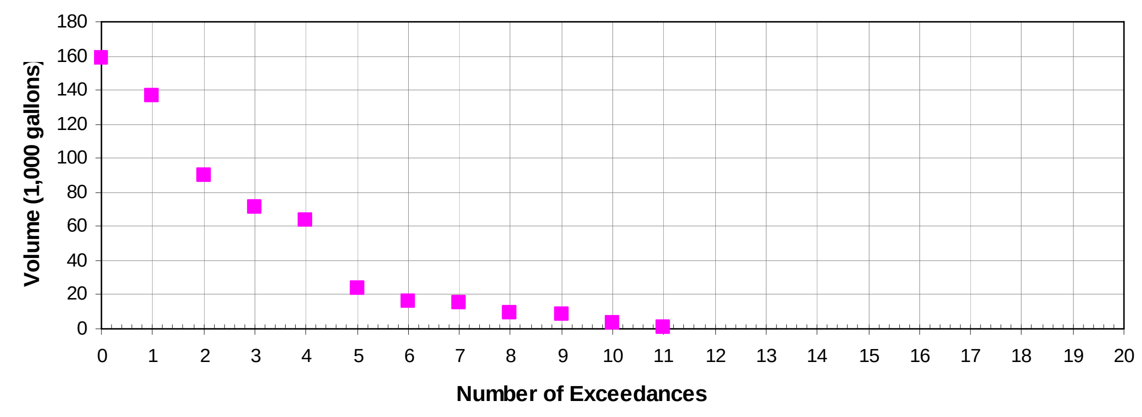
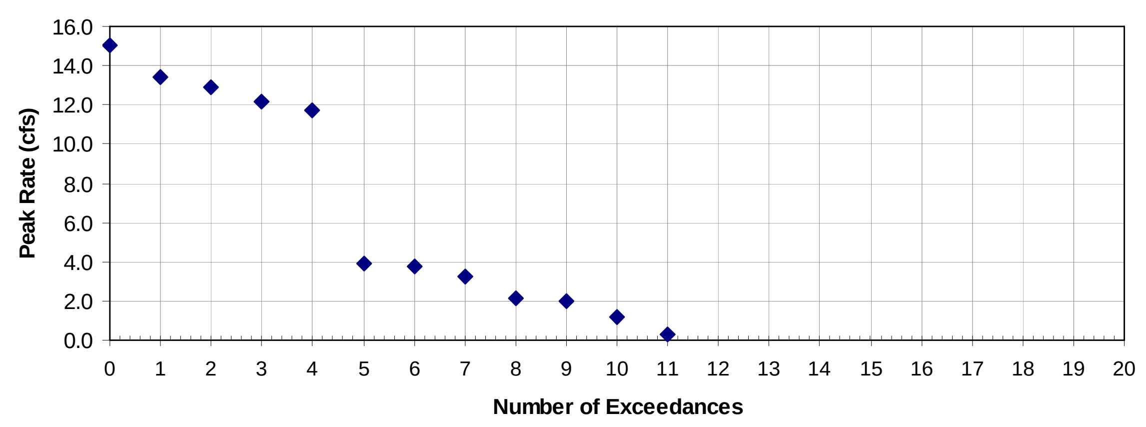


Figure 2 - Outfall 034GS29 CSO Peak Flow Rate



There appears to be a limited amount of available space for potential storage or treatment facilities in the vicinity of outfall 034GS29, north of Timberland Avenue near an existing parking facility. The site is generally bounded by railroad tracks to the west and private development to the north, south and east.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 034GS29. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-034GS29: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-034GS29: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-034GS29: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-034GS29: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-034GS29: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-034GS29: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

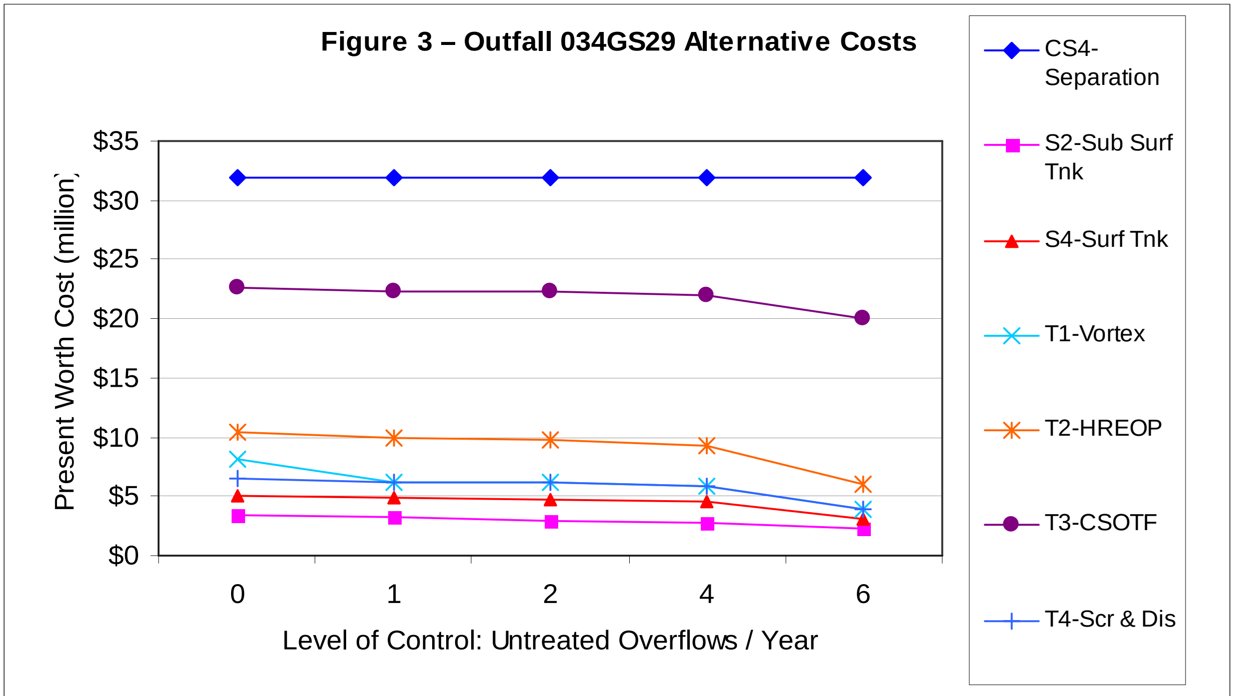
T4-034GS29: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 034GS29 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

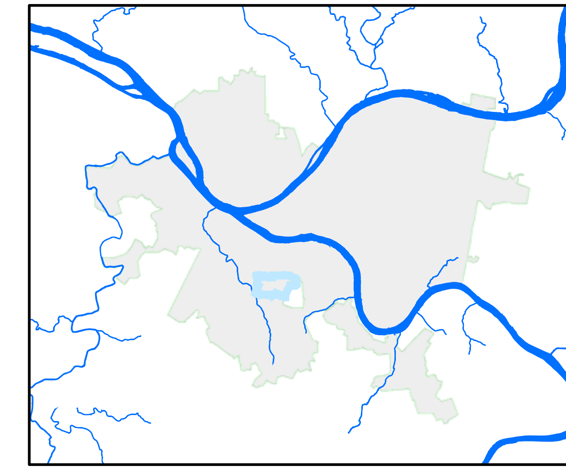
Recommendations

Based upon the above, it is recommended that Alternative S2-034GS29: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

It appears that space is available for the construction of a sub-surface storage facility for all control levels.



Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

500 0 500 Feet

Attachment 1
S-29
Tributary Area Map
Brook St.
Sewershed

CSO Controls Alternatives

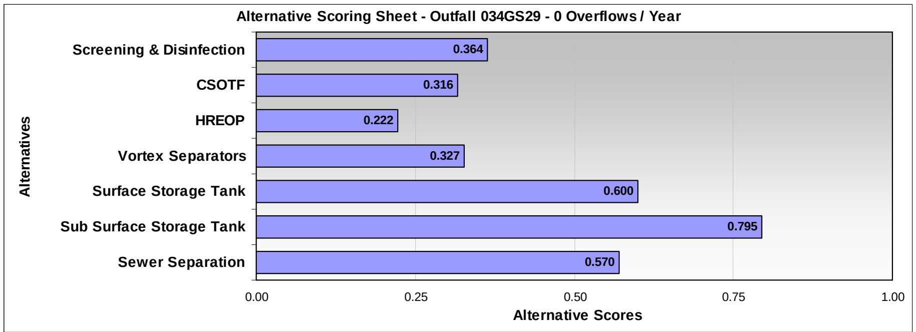
PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

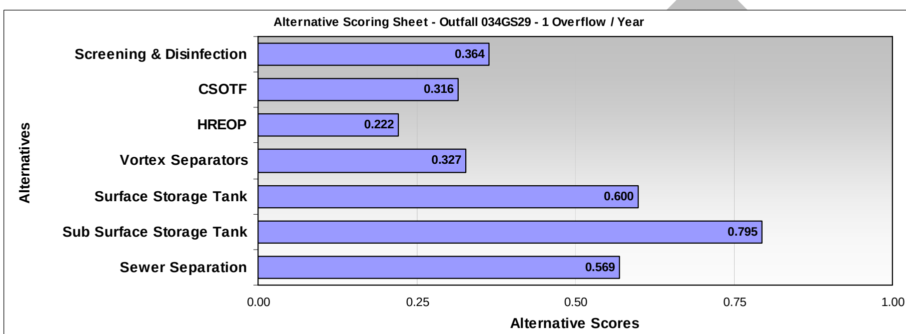
SW-D-0240.pdf

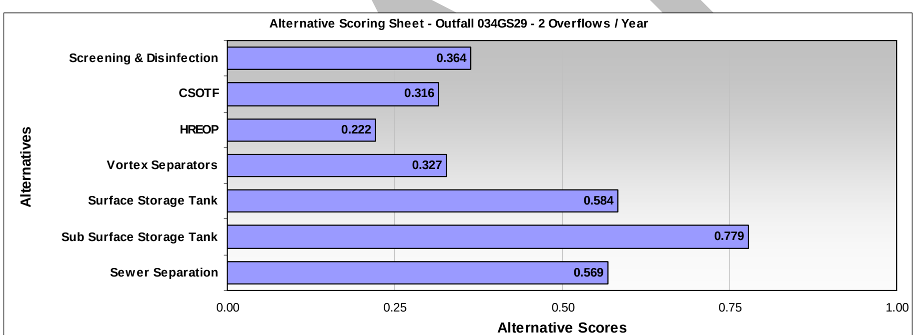
Attachment 2 - CSO Alternatives Development Worksheet

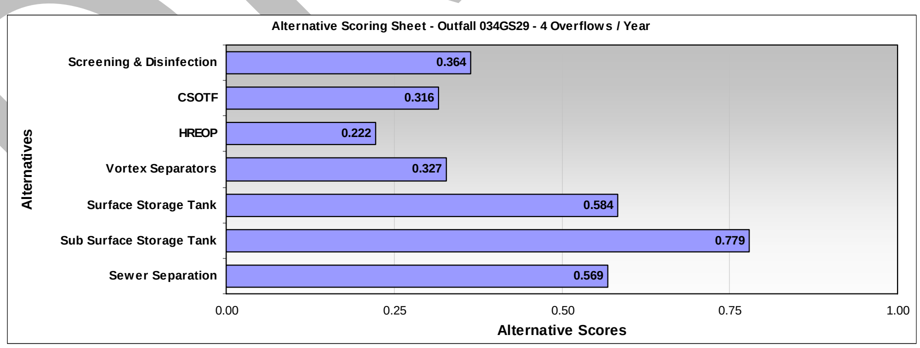
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not provide adequate CSO control.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only.
Sewer separation	Y	Sewer separation within the 211 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will be not evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

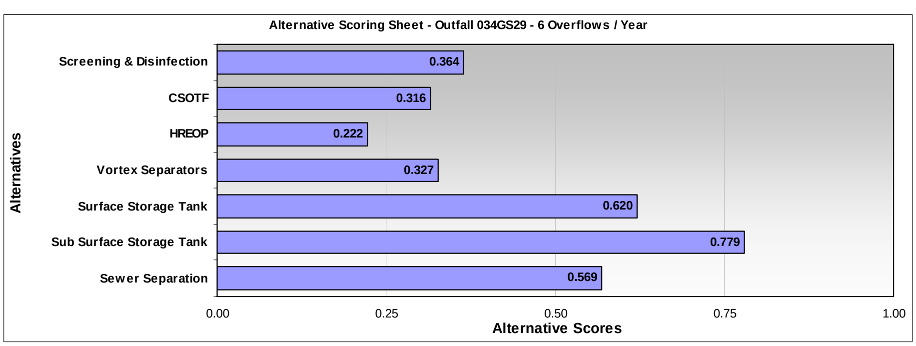
Attachment 3 – Alternative Scoring Sheet

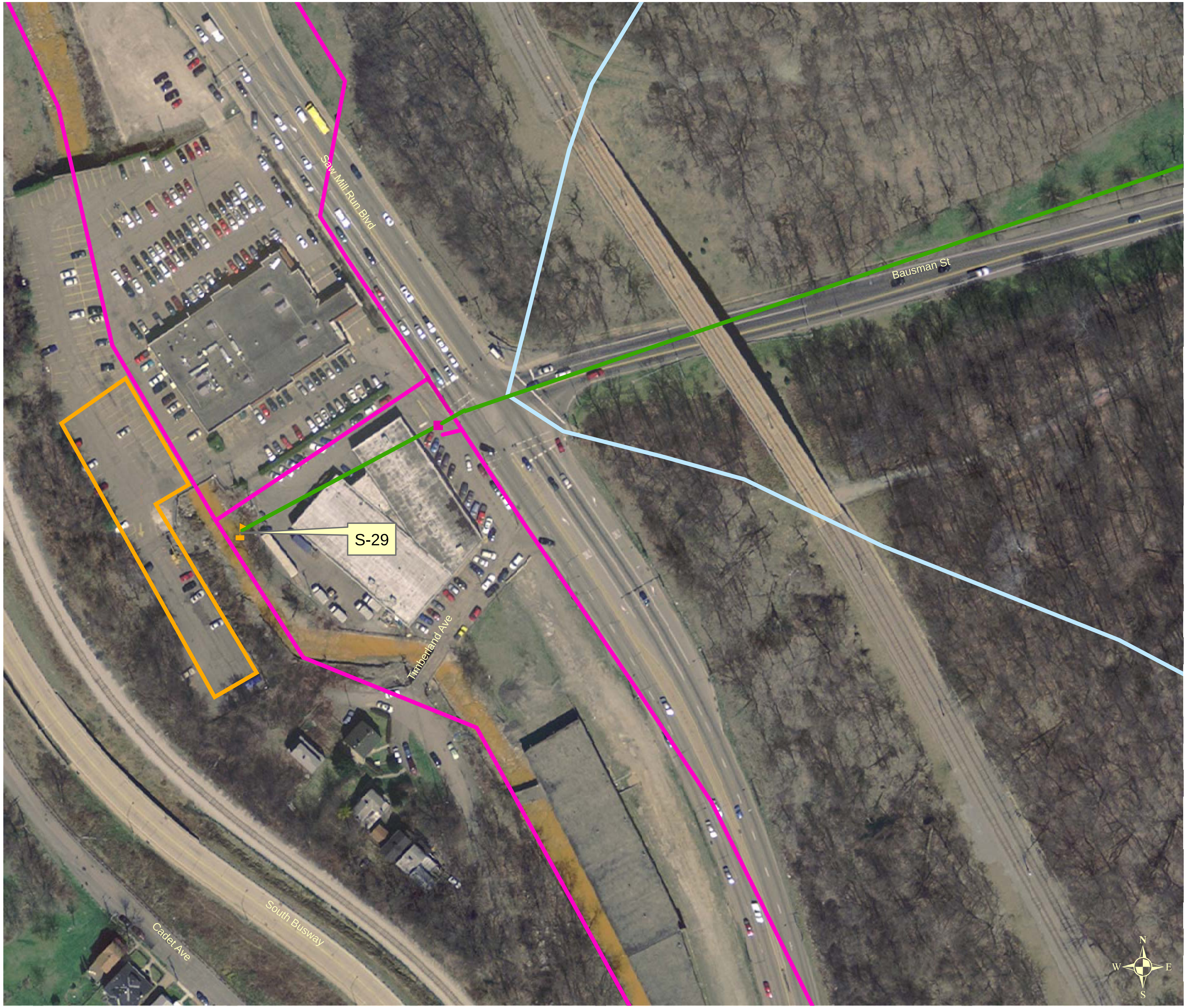


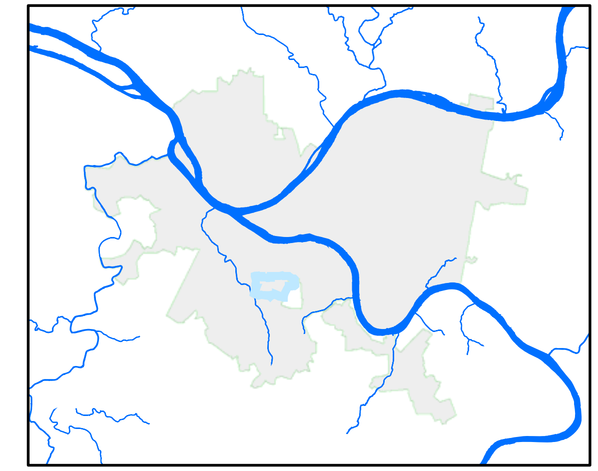












Area Overview

Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

Attachment 4
S-29
Facilities Boundary Map
Brook St. Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0240.pdf

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	3	3	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: CS4-Separation		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: CS4-Separation		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: CS4-Separation		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	2	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	2	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	2	1	1	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T2-HREOP		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T3-CSOTF		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	2	1	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	2	2	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team
›f Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.717**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.643**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.643**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.542**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.707**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.622**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.737**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.720**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.720**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.720**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.450**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.528**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.496**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.496**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.528**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.402**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Total Score

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.597**

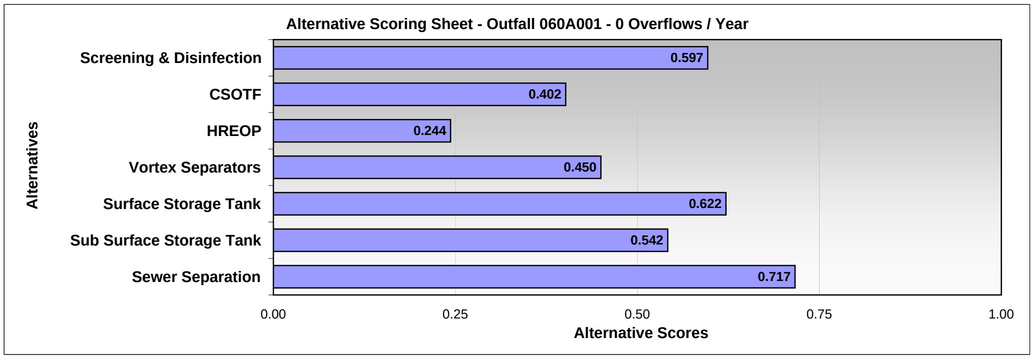
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

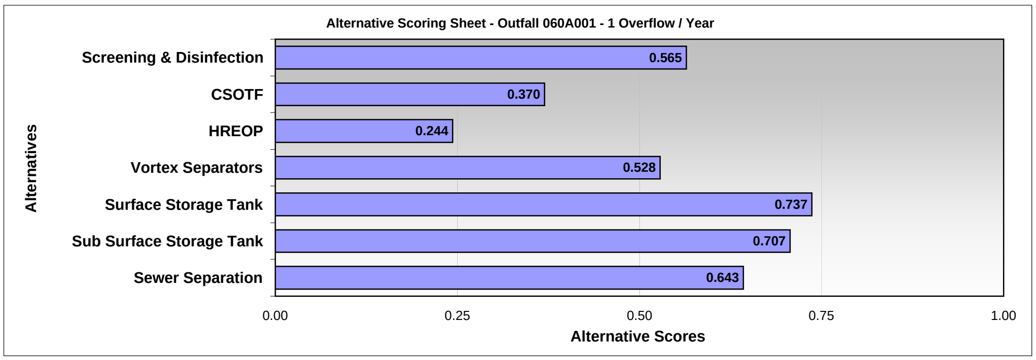
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

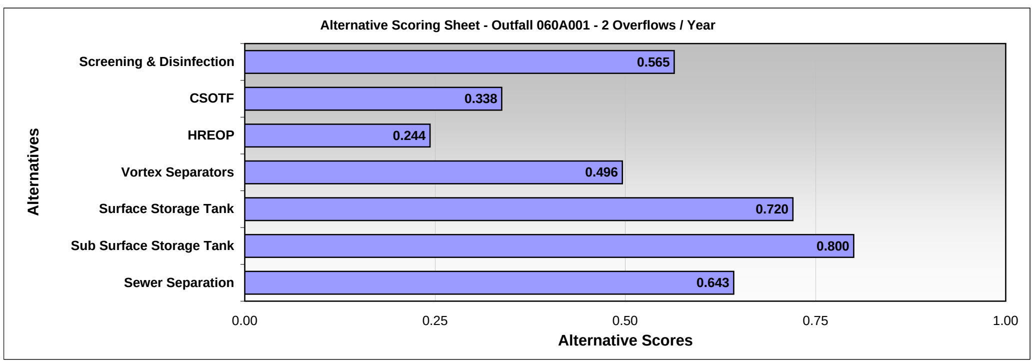
Total Score

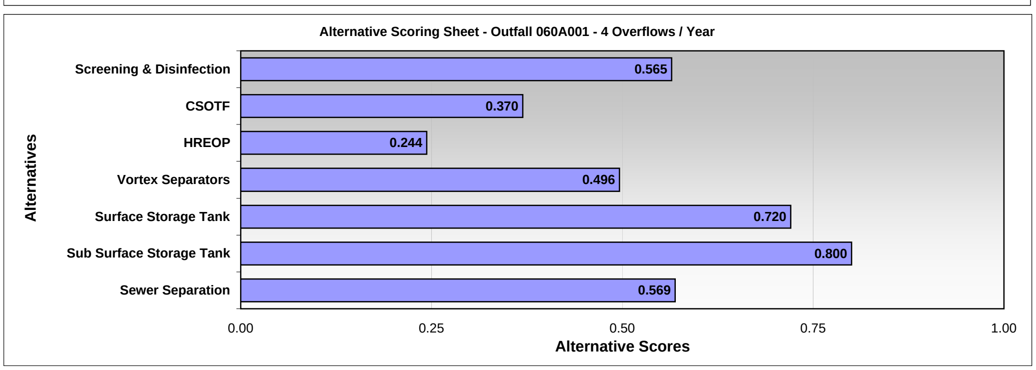
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

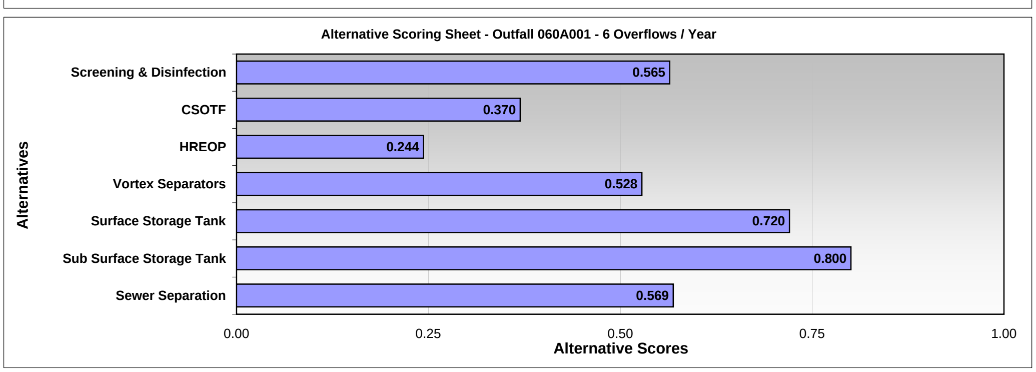
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**


Alternative Scoring Sheet - Outfall 060A001 - 0 Overflows / Year
Alternatives
Screening & Disinfection
0.597
CSOTF
0.402
HREOP
0.244
Vortex Separators
0.450
Surface Storage Tank
0.622
Sub Surface Storage Tank
0.542
Sewer Separation
0.717
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 060A001 - 1 Overflow / Year
Alternatives
Screening & Disinfection
0.565
CSOTF
0.370
HREOP
0.244
Vortex Separators
0.528
Surface Storage Tank
0.737
Sub Surface Storage Tank
0.707
Sewer Separation
0.643
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 060A001 - 2 Overflows / Year
Alternatives
Screening & Disinfection
0.565
CSOTF
0.338
HREOP
0.244
Vortex Separators
0.496
Surface Storage Tank
0.720
Sub Surface Storage Tank
0.800
Sewer Separation
0.643
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 060A001 - 4 Overflows / Year
Alternatives
Screening & Disinfection
0.565
CSOTF
0.370
HREOP
0.244
Vortex Separators
0.496
Surface Storage Tank
0.720
Sub Surface Storage Tank
0.800
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 060A001 - 6 Overflows / Year
Alternatives
Screening & Disinfection
0.565
CSOTF
0.370
HREOP
0.244
Vortex Separators
0.528
Surface Storage Tank
0.720
Sub Surface Storage Tank
0.800
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	0	
Peak Volume	1,035,510	CF
	7.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	53.72	CFS
	34.72	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		88		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**13,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		38,333		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**77,000**		
			TOTAL CAPITAL COST $	**13,316,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	0	
Peak Volume	1,035,510	CF
	7.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	53.72	CFS
	34.72	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001				
SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		7.75	1,036,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		9.11	1,219,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		350		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		234		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		9.19	1,228,500	**Sufficient Volume**
Tank Area (SF)		82,000		= Length x Width
Construction Cost (Storage Tank)		**8,780,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		34.72	53.72	= Peak Rate
Force Main Diameter (In)		41		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,887,000**	**$ 49,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		53.72		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,829,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		9,150		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**519,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		34.72		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,020,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		135,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**270,000**		
			TOTAL CAPITAL COST $	**17,689,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	0	
Peak Volume	1,035,510	CF
	7.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	53.72	CFS
	34.72	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

SUB-SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		7.75	1,036,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		9.11	1,219,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		350		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		234		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		9.19	1,228,500	**Sufficient Volume**
Tank Area (SF)		82,000		= Length x Width
Construction Cost (Storage Tank)		**24,768,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		7.75	11.99	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		19		Input by Engineer
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,569,000**	**$ 27,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		53.72		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,829,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		91,450		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**3,152,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		34.72		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,020,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		135,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**270,000**		
			TOTAL CAPITAL COST $	**32,970,000**

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RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	0	
Peak Volume	1,035,510	CF
	7.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	53.72	CFS
	34.72	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
0 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	34.72	53.72	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max	35	Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate	4		
Construction Cost (Swirl / Vortex) $	**2,637,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)	38.19	59.09	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	42		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**6,311,000**	**$ 51,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	53.72		Ref: Technical Parameters
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**125,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	115,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	5,750		= ACH x Volume / 60
Construction Cost (Odor Control) $	**361,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	34.72		Ref: CSO Statistics
Construction Cost (Screening) $	**2,020,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow (MGD)	38.19		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	97	47	
Passes / Detention (Min)	3	15.43	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**1,082,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	36,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**72,000**		
		TOTAL CAPITAL COST $	**12,958,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	0	
Peak Volume	1,035,510	CF
	7.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	53.72	CFS
	34.72	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001				
SEDIMENTATION BASIN (CSOTF)				
0 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		34.72	53.72	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		5,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		109	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		54	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.53	70,632	
Construction Cost (CSOTF)	$	**16,373,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		34.72	53.72	= Peak Flow x % Req Pump
Force Main Diameter (In)		41		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	$	**5,887,000**	$ **49,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		53.72		Ref: CSO Statistics
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	$	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		106,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		5,300		= ACH x Volume / 60
Construction Cost (Odor Control)	$	**338,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		34.72		Ref: CSO Statistics
Construction Cost (Screening)	$	**2,020,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		34.72		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		93	44	
Passes / Detention (Min)		3	15.23	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	$	**1,020,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	$	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		19,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	$	**38,000**		
			TOTAL CAPITAL COST $	**25,889,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	0	
Peak Volume	1,035,510	CF
	7.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	53.72	CFS
	34.72	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

HIGH RATE END OF PIPE TREATMENT (HREOP)

0 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		34.72		53.72	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		410			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		30		OK	Input by Engineer
Width (Ft)		15		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**6,738,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		38.19		59.09	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		42			Input by Engineer
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,311,000**	**$**	**51,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		53.72			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		11,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**57,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		34.72			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,020,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		38.19			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		97		47	Input by Engineer
Passes / Detention (Min)		3		**15.43**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,082,000	$	963,000	
Construction Cost (Disinfection)	**$**	**2,045,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		38,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**76,000**			
				TOTAL CAPITAL COST $	**17,462,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	0	
Peak Volume	1,035,510	CF
	7.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	53.72	CFS
	34.72	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001				
SCREENING AND DISINFECTION				
0 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		34.72	53.72	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,020,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		34.72	53.72	= Peak Flow x % Req Pump
Force Main Diameter (In)		41		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,887,000**	**$ 49,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		53.72		Ref: CSO Statistics
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		10,700		=CFS x 200
Odor Control Flow Rate (CFM)		540		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**56,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		34.72		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		93	44	
Passes / Detention (Min)		3	**15.23**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,020,000	$ 896,000	
Construction Cost (Disinfection)	**$**	**1,916,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		26,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**		
			TOTAL CAPITAL COST $	**10,144,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	1	
Peak Volume	274,693	CF
	2.05	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	37.04	CFS
	23.94	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		88		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**13,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		38,333		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**77,000**		
			TOTAL CAPITAL COST $	**13,316,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	1	
Peak Volume	274,693	CF
	2.05	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	37.04	CFS
	23.94	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001			
SURFACE STORAGE TANK			
1 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	2.05	275,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	2.42	324,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	181		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	121		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	2.46	328,515	**Sufficient Volume**
Tank Area (SF)	22,000		= Length x Width
Construction Cost (Storage Tank)	**2,067,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	23.94	37.04	= Peak Rate
Force Main Diameter (In)	34		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**4,572,000**	**$ 42,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	37.04		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	486,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	2,430		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**184,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	23.94		Ref: CSO Statistics
Construction Cost (Screening) $	**1,521,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	50,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**100,000**		
		TOTAL CAPITAL COST $	**8,609,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	1	
Peak Volume	274,693	CF
	2.05	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	37.04	CFS
	23.94	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001					
SUB-SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.05		275,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.42		324,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		181			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		121			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.46		328,515	**Sufficient Volume**
Tank Area (SF)		22,000			= Length x Width
Construction Cost (Storage Tank)		**7,242,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.05		3.18	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		10			Input by Engineer
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,719,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		37.04			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		486,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		24,300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,116,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		23.94			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,521,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		50,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**100,000**			
			TOTAL CAPITAL COST	**$**	**11,840,000**

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RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	1	
Peak Volume	274,693	CF
	2.05	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	37.04	CFS
	23.94	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
1 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		23.94	37.04	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		26.33	40.74	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		35		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,864,000**	**$ 43,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		37.04		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		23.94		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,521,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		26.33		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		81	39	
Passes		3	**15.51**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**866,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		25,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST	**$ 7,727,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	1	
Peak Volume	274,693	CF
	2.05	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	37.04	CFS
	23.94	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001			
SEDIMENTATION BASIN (CSOTF)			
1 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	23.94	37.04	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	4,000		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	90	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	45	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.36	48,600	
Construction Cost (CSOTF) $	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	23.94	37.04	= Peak Flow x % Req Pump
Force Main Diameter (In)	34		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**4,572,000**	**$ 42,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	37.04		Ref: CSO Statistics
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	73,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	3,650		= ACH x Volume / 60
Construction Cost (Odor Control) $	**252,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	23.94		Ref: CSO Statistics
Construction Cost (Screening) $	**1,521,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	23.94		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	77	37	
Passes	3	**15.39**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**821,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	15,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**30,000**		
		TOTAL CAPITAL COST $	**23,732,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	1	
Peak Volume	274,693	CF
	2.05	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	37.04	CFS
	23.94	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		23.94		37.04	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		290			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		25		OK	Input by Engineer
Width (Ft)		13		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**4,992,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		26.33		40.74	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		35			Input by Engineer
Force Main Velocity (FPS)		6.1		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,864,000**	**$**	**43,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		37.04			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		23.94			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,521,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		26.33			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		81		39	Input by Engineer
Passes		3		15.51	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	866,000	$	750,000	
Construction Cost (Disinfection)	**$**	**1,616,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		33,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**			
			TOTAL CAPITAL COST	**$**	**13,270,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	1	
Peak Volume	274,693	CF
	2.05	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	37.04	CFS
	23.94	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		23.94		37.04	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,521,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		23.94		37.04	= Peak Flow x % Req Pump
Force Main Diameter (In)		34			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,572,000**	**$**	**42,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		37.04			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,400			=CFS x 200
Odor Control Flow Rate (CFM)		370			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**42,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		23.94			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		77		37	
Passes		3		**15.39**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	821,000	$	700,000	
Construction Cost (Disinfection)	**$**	**1,521,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		25,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST $	**7,871,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	2	
Peak Volume	186,481	CF
	1.39	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	36.25	CFS
	23.43	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		88		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**13,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		38,333		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**77,000**		
			TOTAL CAPITAL COST $	**13,316,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	2	
Peak Volume	186,481	CF
	1.39	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	36.25	CFS
	23.43	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001					
SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.39		186,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.64		219,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		149			= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		100			= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		1.67		223,500	**Sufficient Volume**
Tank Area (SF)		15,000			= Length x Width
Construction Cost (Storage Tank)		**1,355,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		23.43		36.25	= Peak Rate
Force Main Diameter (In)		33			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,510,000**	**$**	**41,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		36.25			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		329,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,650			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**136,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		23.43			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,497,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		40,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**80,000**			
			TOTAL CAPITAL COST	**$**	**7,742,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	2	
Peak Volume	186,481	CF
	1.39	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	36.25	CFS
	23.43	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

SUB-SURFACE STORAGE TANK

2 Overflows / Year

Parameter	Value		Reference
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	1.39	186,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	1.64	219,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	149		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)	100		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)	1.67	223,500	**Sufficient Volume**
Tank Area (SF)	15,000		= Length x Width
Construction Cost (Storage Tank)	**5,210,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.39	2.16	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	8		Input by Engineer
Force Main Velocity (FPS)	6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,470,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	36.25		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	329,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	16,450		= ACH x Volume / 60
Construction Cost (Odor Control) $	**822,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	23.43		Ref: CSO Statistics
Construction Cost (Screening) $	**1,497,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	40,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**80,000**		
		TOTAL CAPITAL COST $	**9,220,000**

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RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	2	
Peak Volume	186,481	CF
	1.39	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	36.25	CFS
	23.43	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
2 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	23.43	36.25	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	-		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	25.77	39.87	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	35		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**4,795,000**	**$ 43,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	36.25		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	-		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	23.43		Ref: CSO Statistics
Construction Cost (Screening) $	**1,497,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	25.77		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	80	38	
Passes	3	**15.25**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**856,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	24,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**48,000**		
		TOTAL CAPITAL COST $	**7,622,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	2	
Peak Volume	186,481	CF
	1.39	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	36.25	CFS
	23.43	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001			
SEDIMENTATION BASIN (CSOTF)			
2 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	23.43	36.25	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	4,000		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	90	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)	45	Area OK	= Area Req'd / Length
Max Length : Width Ratio	3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)	0.36	48,600	
Construction Cost (CSOTF) $	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)	23.43	36.25	= Peak Flow x % Req Pump
Force Main Diameter (In)	33		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**4,510,000**	**$ 41,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	36.25		Ref: CSO Statistics
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	73,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	3,650		= ACH x Volume / 60
Construction Cost (Odor Control) $	**252,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	23.43		Ref: CSO Statistics
Construction Cost (Screening) $	**1,497,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow (MGD)	23.43		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	76	37	
Passes	3	15.52	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**811,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	14,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**28,000**		
		TOTAL CAPITAL COST $	**23,633,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	2	
Peak Volume	186,481	CF
	1.39	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	36.25	CFS
	23.43	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

HIGH RATE END OF PIPE TREATMENT (HREOP)

2 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		23.43	36.25	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		280		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		25	OK	Input by Engineer
Width (Ft)		12	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**4,911,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		25.77	39.87	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		35		Input by Engineer
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,795,000**	**$ 43,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		36.25		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**40,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		23.43		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,497,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		25.77		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		80	38	Input by Engineer
Passes		3	**15.25**	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	856,000	$ 732,000	
Construction Cost (Disinfection)	**$**	**1,588,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		33,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**		
			TOTAL CAPITAL COST $	**13,063,000**

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RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	2	
Peak Volume	186,481	CF
	1.39	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	36.25	CFS
	23.43	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

SCREENING AND DISINFECTION

2 Overflows / Year

1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		23.43	36.25	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,497,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		23.43	36.25	= Peak Flow x % Req Pump
Force Main Diameter (In)		33		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,510,000**	**$ 41,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		36.25		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,200		=CFS x 200
Odor Control Flow Rate (CFM)		360		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**41,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		23.43		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		76	37	
Passes		3	**15.52**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	811,000	$ 693,000	
Construction Cost (Disinfection)	**$**	**1,504,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		25,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**7,766,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	4	
Peak Volume	131,282	CF
	0.98	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	27.69	CFS
	17.89	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

SEWER SEPARATION

4 Overflows / Year

1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		88		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**13,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		38,333		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**77,000**		
			TOTAL CAPITAL COST $	**13,316,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	4	
Peak Volume	131,282	CF
	0.98	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	27.69	CFS
	17.89	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

SURFACE STORAGE TANK

4 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.98	131,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.16	154,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		125		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		84		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.18	157,500	**Sufficient Volume**
Tank Area (SF)		11,000		= Length x Width
Construction Cost (Storage Tank)		**924,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		17.89	27.69	= Peak Rate
Force Main Diameter (In)		29		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,834,000**	**$ 37,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		27.69		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		231,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,160		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**103,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		17.89		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,241,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		34,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**		
			TOTAL CAPITAL COST $	**6,330,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	4	
Peak Volume	131,282	CF
	0.98	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	27.69	CFS
	17.89	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001				
SUB-SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.98	131,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.16	154,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		125		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		84		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.18	157,500	**Sufficient Volume**
Tank Area (SF)		11,000		= Length x Width
Construction Cost (Storage Tank)		**3,938,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.98	1.52	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		7		Input by Engineer
Force Main Velocity (FPS)		5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,119,000**	**$ 17,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		27.69		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		231,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,550		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**623,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		17.89		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,241,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		34,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**		
			TOTAL CAPITAL COST $	**7,129,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	4	
Peak Volume	131,282	CF
	0.98	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	27.69	CFS
	17.89	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
4 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		17.89	27.69	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		19.68	30.45	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		31		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,053,000**	**$ 39,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		27.69		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		17.89		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,241,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		19.68		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		70	34	
Passes		3	**15.63**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**739,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		19,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST	**$ 6,493,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	4	
Peak Volume	131,282	CF
	0.98	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	27.69	CFS
	17.89	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001			
SEDIMENTATION BASIN (CSOTF)			
4 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	17.89	27.69	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	3,000		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	78	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	39	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.27	36,504	
Construction Cost (CSOTF) $	**16,374,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	17.89	27.69	= Peak Flow x % Req Pump
Force Main Diameter (In)	29		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**3,834,000**	**$ 37,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	27.69		Ref: CSO Statistics
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	55,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	2,750		= ACH x Volume / 60
Construction Cost (Odor Control) $	**202,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	17.89		Ref: CSO Statistics
Construction Cost (Screening) $	**1,241,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	17.89		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	67	32	
Passes	3	**15.49**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**704,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	12,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**24,000**		
		TOTAL CAPITAL COST $	**22,539,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	4	
Peak Volume	131,282	CF
	0.98	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	27.69	CFS
	17.89	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
4 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		17.89		27.69	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		220			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		22		OK	Input by Engineer
Width (Ft)		11		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**4,025,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		19.68		30.45	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		31			Input by Engineer
Force Main Velocity (FPS)		5.8		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,053,000**	**$**	**39,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		27.69			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		17.89			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,241,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		19.68			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		70		34	Input by Engineer
Passes		3		15.63	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	739,000	$	623,000	
Construction Cost (Disinfection)	**$**	**1,362,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		30,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
				TOTAL CAPITAL COST $	**10,939,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	4	
Peak Volume	131,282	CF
	0.98	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	27.69	CFS
	17.89	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		17.89		27.69	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,241,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		17.89		27.69	= Peak Flow x % Req Pump
Force Main Diameter (In)		29			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,834,000**	**$**	**37,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		27.69			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		5,500			=CFS x 200
Odor Control Flow Rate (CFM)		280			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**34,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		17.89			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		67		32	
Passes		3		**15.49**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	704,000	$	585,000	
Construction Cost (Disinfection)	**$**	**1,289,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
				TOTAL CAPITAL COST $	**6,606,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	6	
Peak Volume	99,849	CF
	0.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	18.80	CFS
	12.15	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001					
SEWER SEPARATION					
6 Overflows / Year					
1. Sewer Separation Parameters					
Drainage Area - Suburban Areas (Acres)		88		**Typ 0, Rev as Req'd**	
% Separation - Suburban Areas		100%		Complete Separation	
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer	
% Separation - Urban Areas		100%		Complete Separation	
Construction Cost (Sewer Separation)	**$**	**13,200,000**			
2. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only	
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**	
Construction Cost (Regulators)	**$**	**39,000**			
3. Land Acquisition Parameters					
Land Acquisition - Sewer Separation (SF)		38,333		1% Drainage Area	
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters	
Land Acquisition Cost	**$**	**77,000**			
			TOTAL CAPITAL COST	**$**	**13,316,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	6	
Peak Volume	99,849	CF
	0.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	18.80	CFS
	12.15	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.75	100,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.88	118,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		110		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		73		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.90	120,450	**Sufficient Volume**
Tank Area (SF)		8,000		= Length x Width
Construction Cost (Storage Tank)		**686,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		12.15	18.80	= Peak Rate
Force Main Diameter (In)		24		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,982,000**	**$ 32,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		18.80		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		177,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		890		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**84,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		12.15		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**975,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		30,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST $	**4,921,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	6	
Peak Volume	99,849	CF
	0.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	18.80	CFS
	12.15	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

SUB-SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.75	100,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.88	118,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	Sufficient Depth	Ref: Tech Parameters, Rev as Req'd
Length (Ft)		110		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		73		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.90	120,450	Sufficient Volume
Tank Area (SF)		8,000		= Length x Width
Construction Cost (Storage Tank)		**3,214,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.75	1.16	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		6		Input by Engineer
Force Main Velocity (FPS)		5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**919,000**	**$ 16,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		18.80		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		177,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,850		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**505,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		12.15		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**975,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		Typ 2, Rev as Req'd
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		No Disinfection
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		30,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST $	**5,791,000**

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RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	6	
Peak Volume	99,849	CF
	0.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	18.80	CFS
	12.15	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
6 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	12.15	18.80	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	13.36	20.68	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	25		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**3,282,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	18.80		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	12.15		Ref: CSO Statistics
Construction Cost (Screening) $	**975,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	13.36		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	58	28	
Passes	3	**15.71**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**614,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	13,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**26,000**		
		TOTAL CAPITAL COST $	**5,292,000**

Capital Costs

RESULTS SUMMARY			
Number of Events / Year	90		
Number of Overflows / Year	6		
Peak Volume	99,849	CF	
	0.75	MG	
Total Volume	3,391,957	CF	
	25.37	MG	
Peak Rate	18.80	CFS	
	12.15	MGD	

Capital Costs - 060A001 / Sewershed CSO 060A001			
SEDIMENTATION BASIN (CSOTF)			
6 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	12.15	18.80	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	2,100		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	66	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	33	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.20	26,136	
Construction Cost (CSOTF) $	**16,379,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	12.15	18.80	= Peak Flow x % Req Pump
Force Main Diameter (In)	24		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,982,000**	**$ 32,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	18.80		Ref: CSO Statistics
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	39,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	1,950		= ACH x Volume / 60
Construction Cost (Odor Control) $	**154,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	12.15		Ref: CSO Statistics
Construction Cost (Screening) $	**975,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	12.15		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	55	27	
Passes	3	**15.80**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**590,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	10,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**20,000**		
		TOTAL CAPITAL COST $	**21,234,000**

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RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	6	
Peak Volume	99,849	CF
	0.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	18.80	CFS
	12.15	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001

HIGH RATE END OF PIPE TREATMENT (HREOP)

6 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		12.15	18.80	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		150		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		18	OK	Input by Engineer
Width (Ft)		9	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**3,111,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		13.36	20.68	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		25		Input by Engineer
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,282,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		18.80		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		12.15		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**975,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		13.36		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		58	28	Input by Engineer
Passes		3	15.71	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	614,000	$ 493,000	
Construction Cost (Disinfection)	**$**	**1,107,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		27,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**		
			TOTAL CAPITAL COST $	**8,690,000**

RESULTS SUMMARY		
Number of Events / Year	90	
Number of Overflows / Year	6	
Peak Volume	99,849	CF
	0.75	MG
Total Volume	3,391,957	CF
	25.37	MG
Peak Rate	18.80	CFS
	12.15	MGD

Capital Costs - 060A001 / Sewershed CSO 060A001					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		12.15		18.80	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**975,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		12.15		18.80	= Peak Flow x % Req Pump
Force Main Diameter (In)		24			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,982,000**	**$**	**32,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		18.80			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,800			=CFS x 200
Odor Control Flow Rate (CFM)		190			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**25,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		12.15			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		55		27	
Passes		3		**15.80**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	590,000	$	467,000	
Construction Cost (Disinfection)	**$**	**1,057,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
				TOTAL CAPITAL COST $	**5,221,000**

Operation and Maintenance Costs

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	34.72	$201,060	20	10.910	$2,193,556
	Tank O&M	No. Events / Yr	90	$77,246	50	14.484	$1,118,800
		Const Cost ($)	$8,780,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	35	$10,533	20	10.910	$114,919
	Odor Control O&M	Capacity (cfm)	9,150	$32,025	20	10.910	$349,391
	Reserve / Replace	10% Gravity / 15% Pump					$30,925
			Total Annual O&M	**$321,000**		**Total PW O&M**	**$3,808,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	7.75	$73,802	20	10.910	$805,173
	Tank O&M	No. Events / Yr	90	$117,216	50	14.484	$1,697,709
		Const Cost ($)	$24,768,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	35	$10,533	20	10.910	$114,919
	Odor Control O&M	Capacity (cfm)	91,450	$320,075	20	10.910	$3,491,999
	Reserve / Replace	10% Gravity / 15% Pump					$24,549
			Total Annual O&M	**$522,000**		**Total PW O&M**	**$6,134,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	34.72	$201,060	20	10.910	$2,193,556
	Sed. Basin O&M	Flow Rate (mgd)	34.72	$3,906	50	14.484	$56,568
	Screening O&M	Flow Rate (mgd)	34.72	$10,533	20	10.910	$114,919
	Disinfection O&M	Flow Rate (mgd)	34.72	$139,568	20	10.910	$1,522,678
	Odor Control O&M	Capacity (cfm)	5,300.00	$18,550	20	10.910	$202,379
	Reserve / Replace	10% Gravity / 15% Pump					$33,207
			Total Annual O&M	**$374,000**		**Total PW O&M**	**$4,123,000**

Operation and Maintenance Costs

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	38.19	$214,280	20	10.910	$2,337,777
	HREP O&M	Flow Rate (mgd)	34.72	$187,586	20	10.910	$2,046,555
	Screening O&M	Flow Rate (mgd)	34.72	$10,533	20	10.910	$114,919
	Disinfection O&M	Flow Rate (mgd)	38.19	$147,912	20	10.910	$1,613,706
	Odor Control O&M	Capacity (cfm)	550.00	$1,925	20	10.910	$21,002
	Reserve / Replace	10% Gravity / 15% Pump					$52,669
			Total Annual O&M	**$563,000**		**Total PW O&M**	**$6,187,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	38.19	$214,280	20	10.910	$2,337,777
	Swirl / Vortex O&M	Flow Rate (mgd)	34.72	$3,906	20	10.910	$42,611
	Screening O&M	Flow Rate (mgd)	34.72	$10,533	20	10.910	$114,919
	Disinfection O&M	Flow Rate (mgd)	38.19	$147,912	20	10.910	$1,613,706
	Odor Control O&M	Capacity (cfm)	5,750.00	$20,125	20	10.910	$219,563
	Reserve / Replace	10% Gravity / 15% Pump					$38,755
			Total Annual O&M	**$397,000**		**Total PW O&M**	**$4,367,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	34.72	$201,060	20	10.910	$2,193,556
	Screening O&M	Flow Rate (mgd)	34.72	$10,533	20	10.910	$114,919
	Disinfection O&M	Flow Rate (mgd)	34.72	$139,568	20	10.910	$1,522,678
	Odor Control O&M	Capacity (cfm)	540.00	$1,890	20	10.910	$20,620
	Reserve / Replace	10% Gravity / 15% Pump					$32,440
			Total Annual O&M	**$354,000**		**Total PW O&M**	**$3,884,000**

Operation and Maintenance Costs

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	23.94	$156,828	20	10.910	$1,710,984
	Tank O&M	No. Events / Yr	90	$60,464	50	14.484	$875,729
		Const Cost ($)	$2,067,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	24	$9,524	20	10.910	$103,908
	Odor Control O&M	Capacity (cfm)	2,430	$8,505	20	10.910	$92,789
	Reserve / Replace	10% Gravity / 15% Pump					$23,291
			Total Annual O&M	**$236,000**		**Total PW O&M**	**$2,807,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.05	$30,411	20	10.910	$331,786
	Tank O&M	No. Events / Yr	90	$73,401	50	14.484	$1,063,110
		Const Cost ($)	$7,242,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	24	$9,524	20	10.910	$103,908
	Odor Control O&M	Capacity (cfm)	24,300	$85,050	20	10.910	$927,890
	Reserve / Replace	10% Gravity / 15% Pump					$14,186
			Total Annual O&M	**$199,000**		**Total PW O&M**	**$2,441,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	23.94	$156,828	20	10.910	$1,710,984
	Sed. Basin O&M	Flow Rate (mgd)	23.94	$2,693	50	14.484	$39,000
	Screening O&M	Flow Rate (mgd)	23.94	$9,524	20	10.910	$103,908
	Disinfection O&M	Flow Rate (mgd)	23.94	$111,275	20	10.910	$1,213,998
	Odor Control O&M	Capacity (cfm)	3,650.00	$12,775	20	10.910	$139,374
	Reserve / Replace	10% Gravity / 15% Pump					$25,709
			Total Annual O&M	**$294,000**		**Total PW O&M**	**$3,233,000**

Operation and Maintenance Costs

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	26.33	$167,139	20	10.910	$1,823,477
	HREP O&M	Flow Rate (mgd)	23.94	$150,737	20	10.910	$1,644,527
	Screening O&M	Flow Rate (mgd)	23.94	$9,524	20	10.910	$103,908
	Disinfection O&M	Flow Rate (mgd)	26.33	$117,927	20	10.910	$1,286,573
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$40,038
			Total Annual O&M	**$447,000**		**Total PW O&M**	**$4,914,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	26.33	$167,139	20	10.910	$1,823,477
	Swirl / Vortex O&M	Flow Rate (mgd)	23.94	$2,693	20	10.910	$29,377
	Screening O&M	Flow Rate (mgd)	23.94	$9,524	20	10.910	$103,908
	Disinfection O&M	Flow Rate (mgd)	26.33	$117,927	20	10.910	$1,286,573
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$26,338
			Total Annual O&M	**$298,000**		**Total PW O&M**	**$3,270,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	23.94	$156,828	20	10.910	$1,710,984
	Screening O&M	Flow Rate (mgd)	23.94	$9,524	20	10.910	$103,908
	Disinfection O&M	Flow Rate (mgd)	23.94	$111,275	20	10.910	$1,213,998
	Odor Control O&M	Capacity (cfm)	370.00	$1,295	20	10.910	$14,128
	Reserve / Replace	10% Gravity / 15% Pump					$25,138
			Total Annual O&M	**$279,000**		**Total PW O&M**	**$3,068,000**

Operation and Maintenance Costs

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	23.43	$154,592	20	10.910	$1,686,586
	Tank O&M	No. Events / Yr	90	$58,684	50	14.484	$849,948
		Const Cost ($)	$1,355,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	23	$9,478	20	10.910	$103,400
	Odor Control O&M	Capacity (cfm)	1,650	$5,775	20	10.910	$63,005
	Reserve / Replace	10% Gravity / 15% Pump					$22,843
			Total Annual O&M	**$229,000**		**Total PW O&M**	**$2,726,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.39	$23,478	20	10.910	$256,139
	Tank O&M	No. Events / Yr	90	$68,321	50	14.484	$989,533
		Const Cost ($)	$5,210,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	23	$9,478	20	10.910	$103,400
	Odor Control O&M	Capacity (cfm)	16,450	$57,575	20	10.910	$628,140
	Reserve / Replace	10% Gravity / 15% Pump					$12,305
			Total Annual O&M	**$159,000**		**Total PW O&M**	**$1,990,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	23.43	$154,592	20	10.910	$1,686,586
	Sed. Basin O&M	Flow Rate (mgd)	23.43	$2,635	50	14.484	$38,171
	Screening O&M	Flow Rate (mgd)	23.43	$9,478	20	10.910	$103,400
	Disinfection O&M	Flow Rate (mgd)	23.43	$109,827	20	10.910	$1,198,203
	Odor Control O&M	Capacity (cfm)	3,650.00	$12,775	20	10.910	$139,374
	Reserve / Replace	10% Gravity / 15% Pump					$25,364
			Total Annual O&M	**$290,000**		**Total PW O&M**	**$3,191,000**

Operation and Maintenance Costs

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	25.77	$164,756	20	10.910	$1,797,475
	HREP O&M	Flow Rate (mgd)	23.43	$148,843	20	10.910	$1,623,868
	Screening O&M	Flow Rate (mgd)	23.43	$9,478	20	10.910	$103,400
	Disinfection O&M	Flow Rate (mgd)	25.77	$116,392	20	10.910	$1,269,834
	Odor Control O&M	Capacity (cfm)	350.00	$1,225	20	10.910	$13,365
	Reserve / Replace	10% Gravity / 15% Pump					$39,430
			Total Annual O&M	**$441,000**		**Total PW O&M**	**$4,847,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	25.77	$164,756	20	10.910	$1,797,475
	Swirl / Vortex O&M	Flow Rate (mgd)	23.43	$2,635	20	10.910	$28,753
	Screening O&M	Flow Rate (mgd)	23.43	$9,478	20	10.910	$103,400
	Disinfection O&M	Flow Rate (mgd)	25.77	$116,392	20	10.910	$1,269,834
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$25,964
			Total Annual O&M	**$294,000**		**Total PW O&M**	**$3,225,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	23.43	$154,592	20	10.910	$1,686,586
	Screening O&M	Flow Rate (mgd)	23.43	$9,478	20	10.910	$103,400
	Disinfection O&M	Flow Rate (mgd)	23.43	$109,827	20	10.910	$1,198,203
	Odor Control O&M	Capacity (cfm)	360.00	$1,260	20	10.910	$13,747
	Reserve / Replace	10% Gravity / 15% Pump					$24,790
			Total Annual O&M	**$276,000**		**Total PW O&M**	**$3,027,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	17.89	$129,120	20	10.910	$1,408,696
	Tank O&M	No. Events / Yr	90	$57,606	50	14.484	$834,342
		Const Cost ($)	$924,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	18	$8,977	20	10.910	$97,940
	Odor Control O&M	Capacity (cfm)	1,160	$4,060	20	10.910	$44,294
	Reserve / Replace	10% Gravity / 15% Pump					$19,298
			Total Annual O&M	**$200,000**		**Total PW O&M**	**$2,405,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.98	$18,570	20	10.910	$202,599
	Tank O&M	No. Events / Yr	90	$65,141	50	14.484	$943,476
		Const Cost ($)	$3,938,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	18	$8,977	20	10.910	$97,940
	Odor Control O&M	Capacity (cfm)	11,550	$40,425	20	10.910	$441,034
	Reserve / Replace	10% Gravity / 15% Pump					$9,636
			Total Annual O&M	**$134,000**		**Total PW O&M**	**$1,695,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	17.89	$129,120	20	10.910	$1,408,696
	Sed. Basin O&M	Flow Rate (mgd)	17.89	$2,013	50	14.484	$29,154
	Screening O&M	Flow Rate (mgd)	17.89	$8,977	20	10.910	$97,940
	Disinfection O&M	Flow Rate (mgd)	17.89	$93,199	20	10.910	$1,016,793
	Odor Control O&M	Capacity (cfm)	2,750.00	$9,625	20	10.910	$105,008
	Reserve / Replace	10% Gravity / 15% Pump					$21,483
			Total Annual O&M	**$243,000**		**Total PW O&M**	**$2,679,000**

Operation and Maintenance Costs

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	19.68	$137,610	20	10.910	$1,501,315
	HREP O&M	Flow Rate (mgd)	17.89	$127,028	20	10.910	$1,385,869
	Screening O&M	Flow Rate (mgd)	17.89	$8,977	20	10.910	$97,940
	Disinfection O&M	Flow Rate (mgd)	19.68	$98,770	20	10.910	$1,077,579
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$32,968
			Total Annual O&M	**$374,000**		**Total PW O&M**	**$4,107,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	19.68	$137,610	20	10.910	$1,501,315
	Swirl / Vortex O&M	Flow Rate (mgd)	17.89	$2,013	20	10.910	$21,960
	Screening O&M	Flow Rate (mgd)	17.89	$8,977	20	10.910	$97,940
	Disinfection O&M	Flow Rate (mgd)	19.68	$98,770	20	10.910	$1,077,579
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$21,922
			Total Annual O&M	**$248,000**		**Total PW O&M**	**$2,721,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	17.89	$129,120	20	10.910	$1,408,696
	Screening O&M	Flow Rate (mgd)	17.89	$8,977	20	10.910	$97,940
	Disinfection O&M	Flow Rate (mgd)	17.89	$93,199	20	10.910	$1,016,793
	Odor Control O&M	Capacity (cfm)	280.00	$980	20	10.910	$10,692
	Reserve / Replace	10% Gravity / 15% Pump					$21,026
			Total Annual O&M	**$233,000**		**Total PW O&M**	**$2,555,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	12.15	$99,697	20	10.910	$1,087,687
	Tank O&M	No. Events / Yr	90	$57,011	50	14.484	$825,724
		Const Cost ($)	$686,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	12	$8,470	20	10.910	$92,403
	Odor Control O&M	Capacity (cfm)	890	$3,115	20	10.910	$33,984
	Reserve / Replace	10% Gravity / 15% Pump					$15,047
			Total Annual O&M	**$169,000**		**Total PW O&M**	**$2,055,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.75	$15,467	20	10.910	$168,743
	Tank O&M	No. Events / Yr	90	$63,331	50	14.484	$917,260
		Const Cost ($)	$3,214,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	12	$8,470	20	10.910	$92,403
	Odor Control O&M	Capacity (cfm)	8,850	$30,975	20	10.910	$337,935
	Reserve / Replace	10% Gravity / 15% Pump					$7,775
			Total Annual O&M	**$119,000**		**Total PW O&M**	**$1,524,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	12.15	$99,697	20	10.910	$1,087,687
	Sed. Basin O&M	Flow Rate (mgd)	12.15	$1,367	50	14.484	$19,796
	Screening O&M	Flow Rate (mgd)	12.15	$8,470	20	10.910	$92,403
	Disinfection O&M	Flow Rate (mgd)	12.15	$73,621	20	10.910	$803,195
	Odor Control O&M	Capacity (cfm)	1,950.00	$6,825	20	10.910	$74,460
	Reserve / Replace	10% Gravity / 15% Pump					$16,842
			Total Annual O&M	**$190,000**		**Total PW O&M**	**$2,094,000**

Operation and Maintenance Costs

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	13.36	$106,252	20	10.910	$1,159,200
	HREP O&M	Flow Rate (mgd)	12.15	$101,166	20	10.910	$1,103,717
	Screening O&M	Flow Rate (mgd)	12.15	$8,470	20	10.910	$92,403
	Disinfection O&M	Flow Rate (mgd)	13.36	$78,022	20	10.910	$851,212
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$26,245
			Total Annual O&M	**$295,000**		**Total PW O&M**	**$3,240,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	13.36	$106,252	20	10.910	$1,159,200
	Swirl / Vortex O&M	Flow Rate (mgd)	12.15	$1,367	20	10.910	$14,912
	Screening O&M	Flow Rate (mgd)	12.15	$8,470	20	10.910	$92,403
	Disinfection O&M	Flow Rate (mgd)	13.36	$78,022	20	10.910	$851,212
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$17,713
			Total Annual O&M	**$195,000**		**Total PW O&M**	**$2,135,000**

CSO 060A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	12.15	$99,697	20	10.910	$1,087,687
	Screening O&M	Flow Rate (mgd)	12.15	$8,470	20	10.910	$92,403
	Disinfection O&M	Flow Rate (mgd)	12.15	$73,621	20	10.910	$803,195
	Odor Control O&M	Capacity (cfm)	190.00	$665	20	10.910	$7,255
	Reserve / Replace	10% Gravity / 15% Pump					$16,491
			Total Annual O&M	**$183,000**		**Total PW O&M**	**$2,007,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$13.3	$13,316,000	$0
1	$13.3	$13,316,000	$0
2	$13.3	$13,316,000	$0
4	$13.3	$13,316,000	$0
6	$13.3	$13,316,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$39.1	$32,970,000	$6,134,000
1	$14.3	$11,840,000	$2,441,000
2	$11.2	$9,220,000	$1,990,000
4	$8.8	$7,129,000	$1,695,000
6	$7.3	$5,791,000	$1,524,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$21.5	$17,689,000	$3,808,000
1	$11.4	$8,609,000	$2,807,000
2	$10.5	$7,742,000	$2,726,000
4	$8.7	$6,330,000	$2,405,000
6	$7.0	$4,921,000	$2,055,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$17.3	$12,958,000	$4,367,000
1	$11.0	$7,727,000	$3,270,000
2	$10.8	$7,622,000	$3,225,000
4	$9.2	$6,493,000	$2,721,000
6	$7.4	$5,292,000	$2,135,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$23.6	$17,462,000	$6,187,000
1	$18.2	$13,270,000	$4,914,000
2	$17.9	$13,063,000	$4,847,000
4	$15.0	$10,939,000	$4,107,000
6	$11.9	$8,690,000	$3,240,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$30.0	$25,889,000	$4,123,000
1	$27.0	$23,732,000	$3,233,000
2	$26.8	$23,633,000	$3,191,000
4	$25.2	$22,539,000	$2,679,000
6	$23.3	$21,234,000	$2,094,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$14.0	$10,144,000	$3,884,000
1	$10.9	$7,871,000	$3,068,000
2	$10.8	$7,766,000	$3,027,000
4	$9.2	$6,606,000	$2,555,000
6	$7.2	$5,221,000	$2,007,000

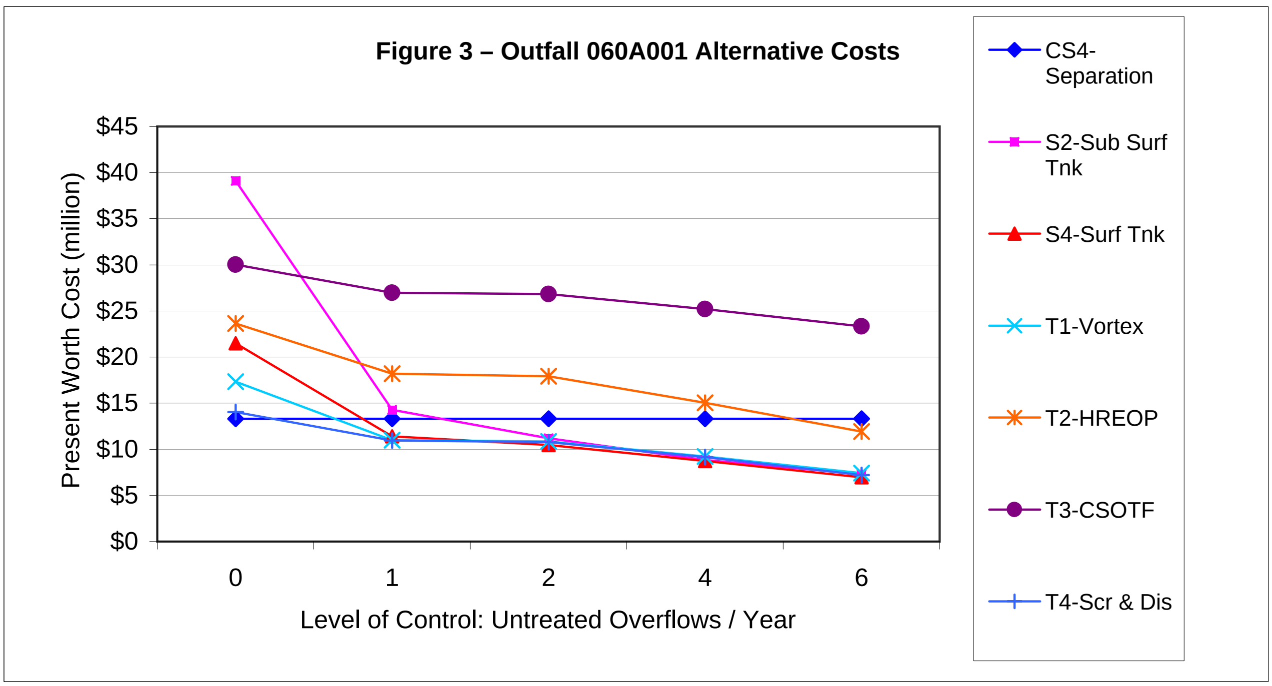


Figure 3 – Outfall 060A001 Alternative Costs
Present Worth Cost (million)
$45
$40
$35
$30
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	CSO 060A001
Location Name	Brook Street
Model ID	DC 060A001-W.X
Structure Type	Outfall
PWSA Sewershed	Bausman, Brook and Warrington
Stream of Discharge	Saw Mill Run
NPDES Permit Number	060A001
Owner	PWSA
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	90
Peak Volume:	1,035,510 ft^3
	7.75 MG
Total Volume:	3,391,957 ft^3
	25.37 MG
Peak Rate:	53.72 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/3/2005 3:21	8488	1/5/2005 14:30	1035510.09	7746.133	0	12.36	14
1/11/2005 7:36	2361	1/11/2005 11:30	274692.50	2054.837	1	12.29	15
2/14/2005 4:06	2253	2/14/2005 22:00	186481.15	1394.972	2	5.31	35
10/24/2005 10:50	2884	10/26/2005 7:30	136747.03	1022.936	3	4.08	40
4/1/2005 18:50	2731	4/2/2005 6:30	131281.58	982.052	4	5.86	33
3/28/2005 8:47	1624	3/28/2005 19:15	102094.96	763.721	5	11.14	19
1/13/2005 21:36	1457	1/14/2005 2:30	99849.00	746.920	6	6.70	30
10/21/2005 18:43	1751	10/22/2005 6:45	97218.21	727.241	7	36.25	2
11/29/2005 1:37	755	11/29/2005 7:15	96903.64	724.888	8	9.44	21
8/20/2005 18:15	129	8/20/2005 18:45	96663.11	723.088	9	53.72	0
5/13/2005 22:30	1644	5/13/2005 22:45	85148.33	636.952	10	24.21	5
11/14/2005 21:27	607	11/15/2005 4:00	84232.79	630.103	11	12.28	16
7/5/2005 16:15	134	7/5/2005 17:00	76585.32	572.897	12	27.69	4
7/26/2005 19:43	57	7/26/2005 20:00	57572.00	430.667	13	37.04	1
2/20/2005 14:51	1394	2/20/2005 20:30	56502.23	422.665	14	7.81	25
12/15/2005 8:15	1071	12/15/2005 14:00	48468.32	362.567	15	6.32	31
9/29/2005 5:00	143	9/29/2005 5:45	47633.58	356.323	16	29.28	3
3/23/2005 1:51	798	3/23/2005 2:45	43621.44	326.310	17	4.63	39
4/22/2005 14:51	1006	4/23/2005 4:15	41580.77	311.045	18	7.89	24
5/11/2005 22:30	113	5/11/2005 23:00	39294.54	293.943	19	17.20	7
8/29/2005 9:00	384	8/29/2005 13:45	31893.86	238.582	20	14.51	11
11/16/2005 4:00	494	11/16/2005 4:15	27638.62	206.751	21	13.77	13
2/9/2005 14:20	192	2/9/2005 16:45	26782.21	200.344	22	7.65	27
5/28/2005 7:50	167	5/28/2005 9:30	26160.68	195.695	23	7.69	26
10/7/2005 7:07	627	10/7/2005 10:45	25801.75	193.010	24	7.31	29
5/23/2005 16:15	50	5/23/2005 16:30	22039.06	164.863	25	14.84	10
7/17/2005 16:15	85	7/17/2005 16:30	21627.42	161.784	26	16.86	8
2/16/2005 5:36	735	2/16/2005 8:00	19075.68	142.696	27	3.39	45
7/21/2005 14:45	74	7/21/2005 15:00	18141.40	135.707	28	15.99	9
11/1/2005 14:36	227	11/1/2005 16:30	17012.08	127.259	29	3.97	41
9/16/2005 21:15	54	9/16/2005 21:30	15755.19	117.857	30	10.49	20
8/27/2005 15:11	46	8/27/2005 15:30	15491.52	115.884	31	18.80	6
5/20/2005 2:35	479	5/20/2005 6:45	15411.71	115.287	32	2.91	46

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
8/8/2005 8:36	88	8/8/2005 9:15	14661.98	109.679	33	11.32	18
3/27/2005 16:16	157	3/27/2005 17:00	13988.01	104.637	34	5.16	36
9/26/2005 5:35	274	9/26/2005 9:45	12736.69	95.277	35	2.53	52
6/3/2005 5:56	235	6/3/2005 9:15	12566.84	94.006	36	5.03	37
7/25/2005 13:20	323	7/25/2005 13:45	12227.10	91.465	37	8.91	22
7/15/2005 17:35	54	7/15/2005 18:00	11870.63	88.798	38	14.06	12
1/26/2005 3:10	179	1/26/2005 5:00	11543.11	86.348	39	2.69	51
1/30/2005 12:29	154	1/30/2005 13:50	10727.73	80.249	40	2.73	47
10/21/2005 1:45	424	10/21/2005 7:30	9870.23	73.834	41	4.85	38
11/9/2005 19:30	35	11/9/2005 19:45	9365.39	70.058	42	12.27	17
3/7/2005 21:15	444	3/7/2005 22:15	9255.69	69.237	43	1.14	66
5/7/2005 11:35	144	5/7/2005 13:30	9185.04	68.709	44	5.57	34
6/8/2005 21:00	56	6/8/2005 21:15	8200.50	61.344	45	8.32	23
4/30/2005 4:16	167	4/30/2005 6:45	8197.84	61.324	46	2.00	55
12/25/2005 10:31	186	12/25/2005 12:45	8116.94	60.719	47	2.71	49
6/14/2005 18:50	64	6/14/2005 19:15	7998.99	59.836	48	5.88	32
11/8/2005 10:35	304	11/8/2005 15:00	7559.77	56.551	49	3.43	44
4/20/2005 19:20	270	4/20/2005 19:45	7551.51	56.489	50	3.46	43
5/28/2005 17:20	98	5/28/2005 18:30	7475.94	55.924	51	2.47	53
11/24/2005 7:51	258	11/24/2005 8:15	7157.78	53.544	52	1.71	58
8/26/2005 19:50	464	8/26/2005 22:45	7149.76	53.484	53	1.80	57
12/26/2005 1:21	662	12/26/2005 6:00	5724.92	42.825	54	0.78	71
4/26/2005 19:51	332	4/27/2005 1:00	5488.46	41.056	55	2.72	48
4/25/2005 5:52	107	4/25/2005 6:30	4719.83	35.307	56	1.33	63
10/24/2005 2:15	94	10/24/2005 3:00	4275.50	31.983	57	1.53	60
6/6/2005 9:45	34	6/6/2005 10:00	4262.77	31.888	58	7.32	28
10/28/2005 11:56	54	10/28/2005 12:30	4133.45	30.920	59	3.80	42
6/16/2005 11:11	337	6/16/2005 13:15	3599.97	26.930	60	2.33	54
11/23/2005 18:51	213	11/23/2005 20:15	3080.26	23.042	61	1.27	64
8/5/2005 10:51	78	8/5/2005 11:30	2745.75	20.540	62	1.98	56
11/9/2005 4:18	285	11/9/2005 4:45	2631.52	19.685	63	1.34	62
7/12/2005 19:45	39	7/12/2005 20:00	2480.41	18.555	64	1.59	59
3/12/2005 10:50	118	3/12/2005 12:30	2098.44	15.697	65	2.70	50
6/17/2005 0:45	100	6/17/2005 1:30	2097.46	15.690	66	1.39	61
3/20/2005 3:30	334	3/20/2005 7:20	2066.99	15.462	67	0.55	76
3/11/2005 8:06	376	3/11/2005 14:00	1994.23	14.918	68	1.18	65
2/25/2005 12:51	259	2/25/2005 16:00	1760.78	13.171	69	1.07	68
7/16/2005 11:15	93	7/16/2005 11:30	1708.02	12.777	70	1.07	67
4/24/2005 10:51	348	4/24/2005 11:00	1648.04	12.328	71	0.50	77
12/9/2005 3:50	73	12/9/2005 4:30	1414.31	10.580	72	0.66	75
8/16/2005 5:50	166	8/16/2005 8:15	1335.74	9.992	73	0.95	69
6/22/2005 5:06	32	6/22/2005 5:30	772.99	5.782	74	0.77	72
11/6/2005 13:45	20	11/6/2005 14:00	614.54	4.597	75	0.81	70
2/26/2005 12:35	23	2/26/2005 12:45	490.27	3.667	76	0.75	73
5/30/2005 19:45	33	5/30/2005 20:00	448.12	3.352	77	0.39	78
12/16/2005 14:31	27	12/16/2005 14:45	423.54	3.168	78	0.71	74
5/19/2005 19:27	25	5/19/2005 19:45	347.91	2.603	79	0.39	80
2/8/2005 5:39	28	2/8/2005 6:00	347.62	2.600	80	0.39	79
6/29/2005 20:35	14	6/29/2005 20:45	211.38	1.581	81	0.37	81
5/24/2005 6:20	343	5/24/2005 6:30	191.83	1.435	82	0.20	83
3/20/2005 16:10	21	3/20/2005 16:15	135.06	1.010	83	0.19	84
11/14/2005 0:05	13	11/14/2005 0:15	105.58	0.790	84	0.20	82
7/12/2005 12:16	17	7/12/2005 12:30	105.01	0.786	85	0.13	86
6/28/2005 18:51	13	6/28/2005 19:00	77.53	0.580	86	0.16	85

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
5/27/2005 20:48	14	5/27/2005 21:00	38.99	0.292	87	0.06	89

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
7/18/2005 18:41	11	7/18/2005 18:45	36.45	0.273	88	0.09	87
3/25/2005 12:09	8	3/25/2005 12:15	24.29	0.182	89	0.07	88

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	CSO 060A001	**Results Summary**	
Location Name	Brook Street	Number of Events:	90
Model ID	DC 060A001-W.X	Peak Volume:	1,035,510 ft^3
Structure Type	Outfall		7.75 MG
PWSA Sewershed	Bausman, Brook and Warrington	Total Volume:	3,391,957 ft^3
Stream of Discharge	Saw Mill Run		25.37 MG
NPDES Permit Number	060A001	Peak Rate:	53.72 cfs
Owner	PWSA		

Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Figure 1 - Outfall 060A001 CSO Volume

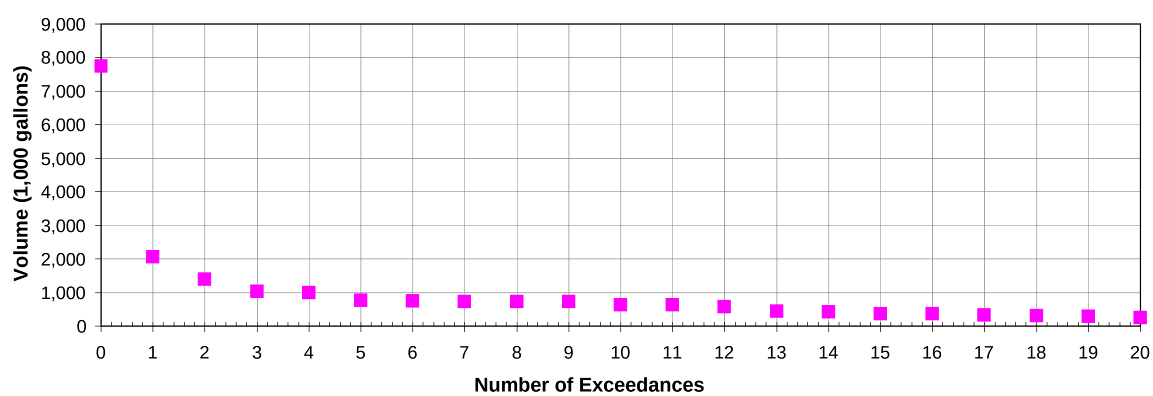
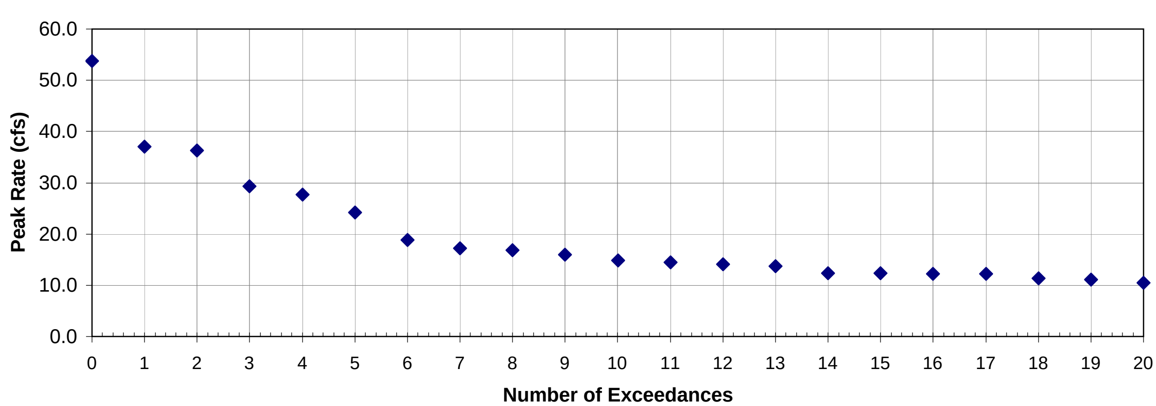


Figure 2 - Outfall 060A001 CSO Peak Flow Rate



D.30.3 CSO060A001 – BAUSMAN, BROOK, WARRINGTON SEWERSHED – NPDES# 060A001

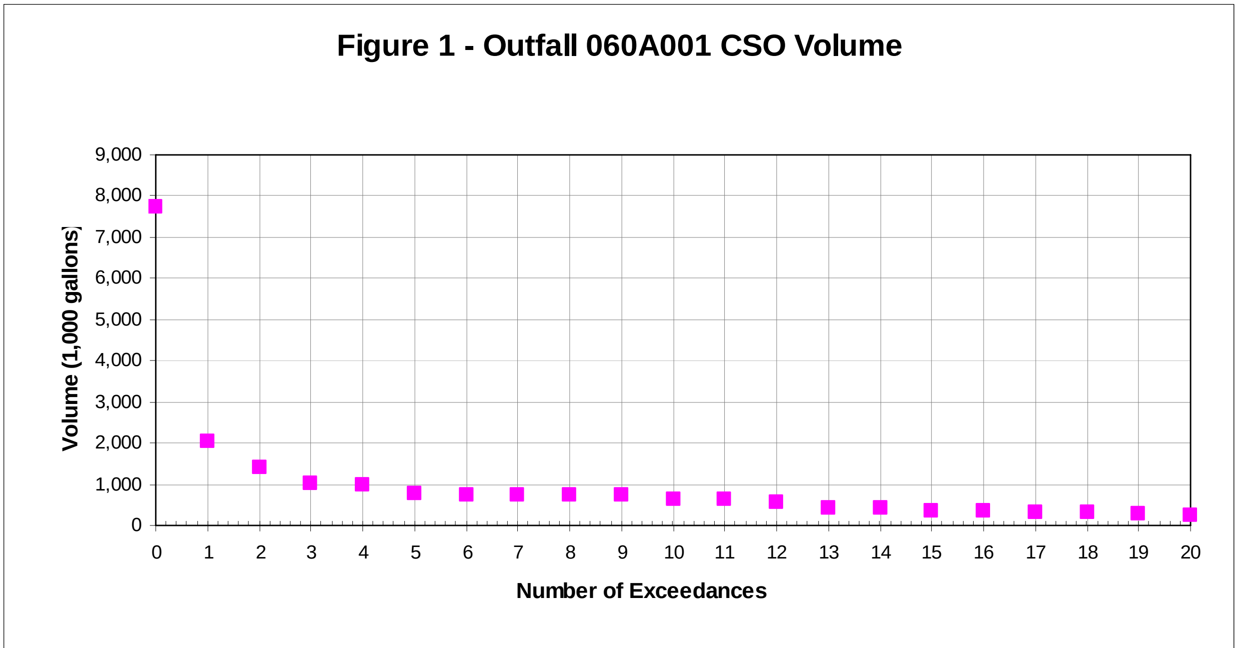
Description of Outfall

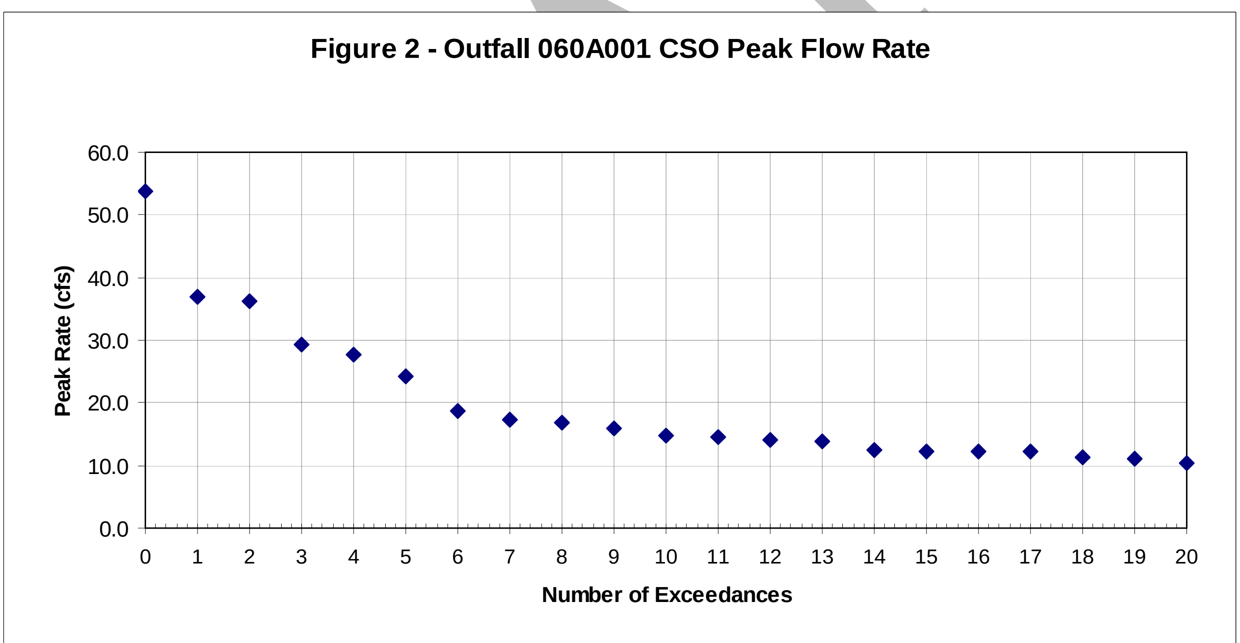
Outfall 060A001 conveys overflows from the PWSA diversion chamber 060A001 to a tributary of Saw Mill Run. The outfall is located along Brook Street in the City of Pittsburgh. The Bausman, Brook, and Warrington Street Sewersheds are located in portions of Allentown, Beltzhoover, Bon Air, Carrick, Knoxville, and Mount Washington sections in the City of Pittsburgh. The Bausman and Brook Street Sewersheds also include portions of Mount Oliver Borough. These sewersheds include approximately 871 acres of residential, business and commercial users. The Bausman, Brook and Warrington Sewersheds are comprised of approximately 751 manholes and 219,457 linear feet (41.6 miles) of mostly combined sewer up to 72 inches in diameter. The 060A001 sewershed consists of 88 acres, or approximately 10% of the total service area.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 060A001 typically experiences 90 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 060A001 is approximately 7.75 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 060A001 is approximately 53.72 CFS. *Figure 1 – Outfall 060A001 CSO Volume* and *Figure 2 – Outfall 060A001 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

Figure 1 - Outfall 060A001 CSO Volume





Space appears to be limited for storage or treatment facilities adjacent to the outfall. Space appears to be available approximately 700 feet north of the outfall in an open field. The site is generally bounded by Drycove Street to the west, Brook Street and steep slopes to the south and private development to the north and east.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 006A001. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-060A001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-060A001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-060A001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-060A001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-060A001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-060A001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

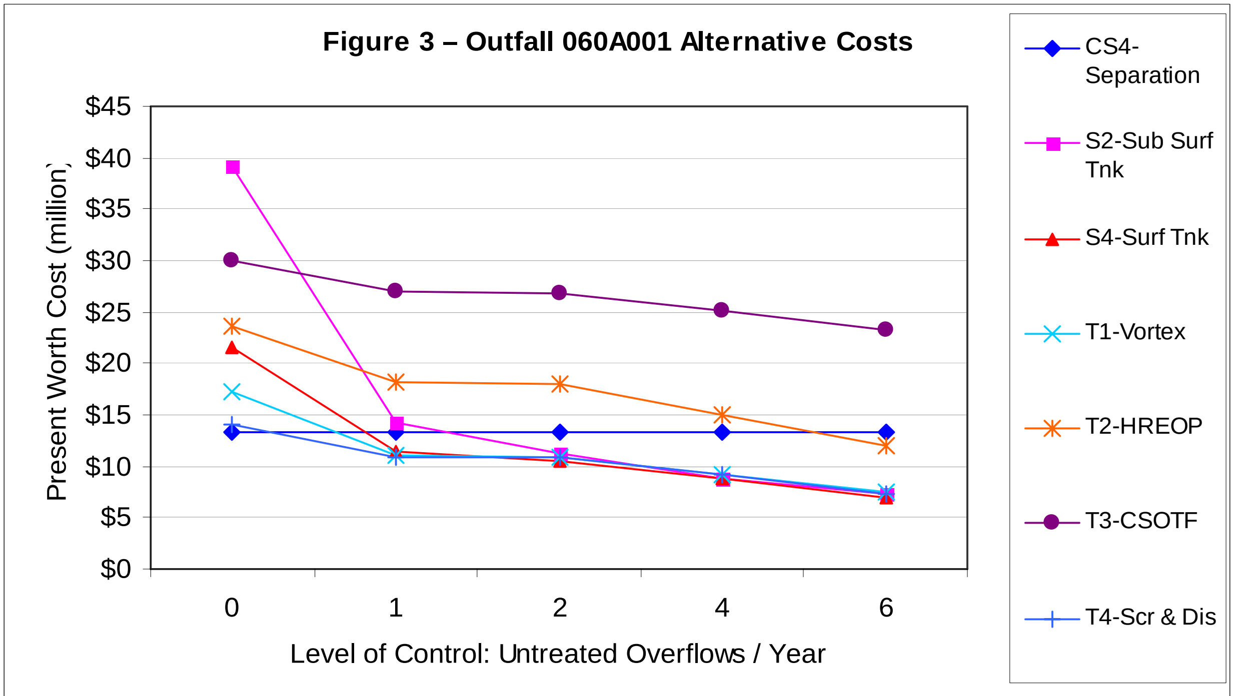
T4-060A001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 060A001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

Recommendations

Based upon the above, for control level 0, it is recommended that Alternative CS2-060A001: Separation be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control level 1, it is recommended that Alternative S4-060A001: Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control levels 2 through 6, it is recommended that Alternative S2-

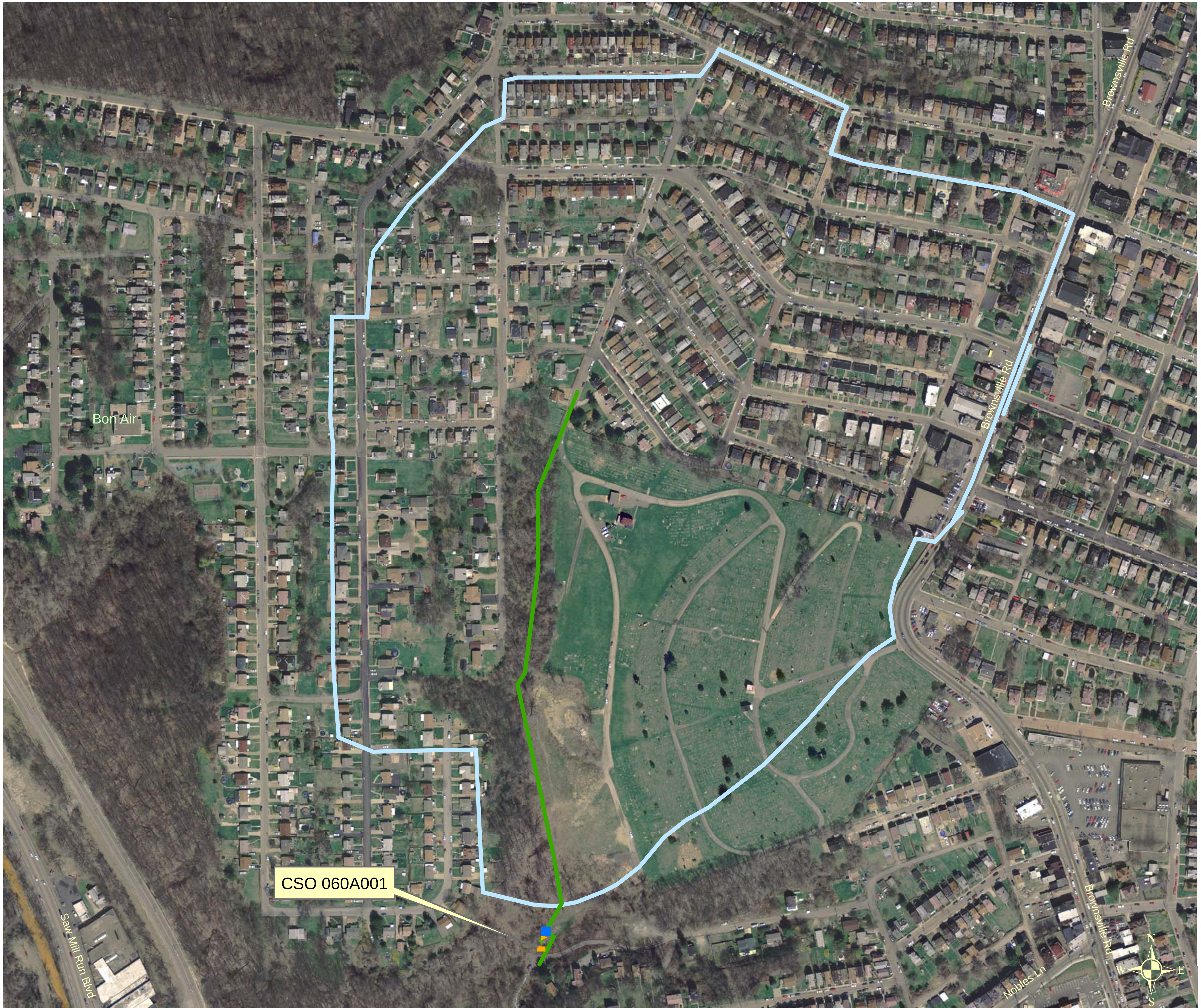
060A001: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

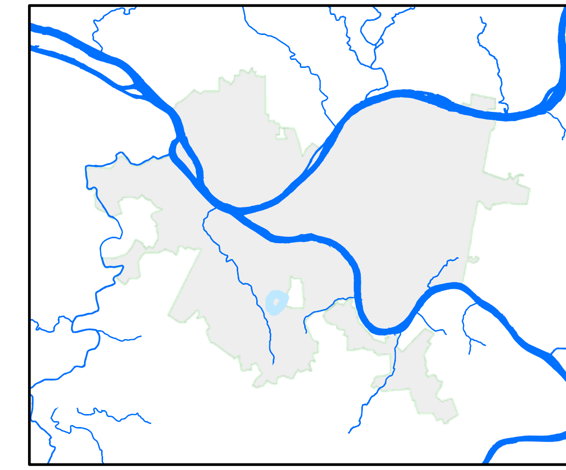
Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Although separation reduces hydraulic loading, additional pollutants may be introduced to the receiving stream. Stormwater flows that would have originally ended up in the trunk sewer will now discharge directly to local waterways. Discharge constituents include surface pollutants such as oil, grease and road grit, as well as general trash and road debris. Another issue to consider with separation is the available regulator capacity at the PWSA diversion chamber. Sufficient capacity must exist in order to convey the sanitary flow to the interceptor. Failure to provide sufficient capacity may result in a sanitary sewer overflow (SSO) condition.

For control levels 1 through 6, storage facilities were the highest rank alternatives. It appears that space is available at the location described above to construct said facilities.





Area Overview

Legend

- Sewershed Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

300 0 300
Feet

Attachment 1
CSO 060A001
Tributary Area Map
Brook St.
Sewershed

CSO Controls Alternatives

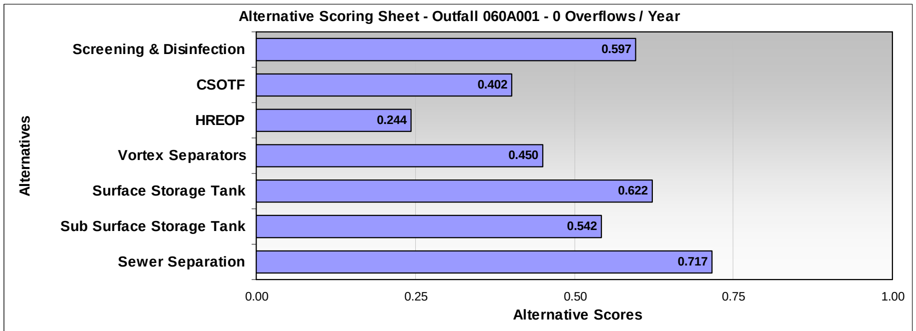
PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

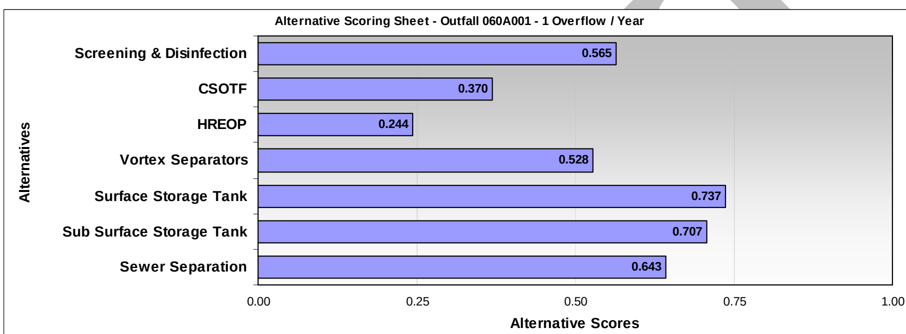
SW-D-0242.pdf

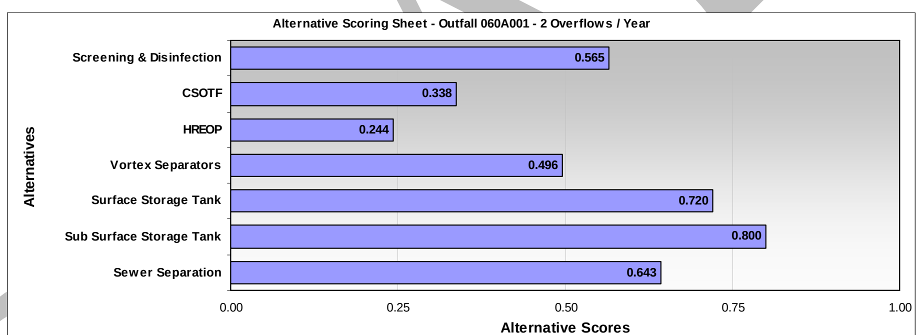
Attachment 2 - CSO Alternatives Development Worksheet

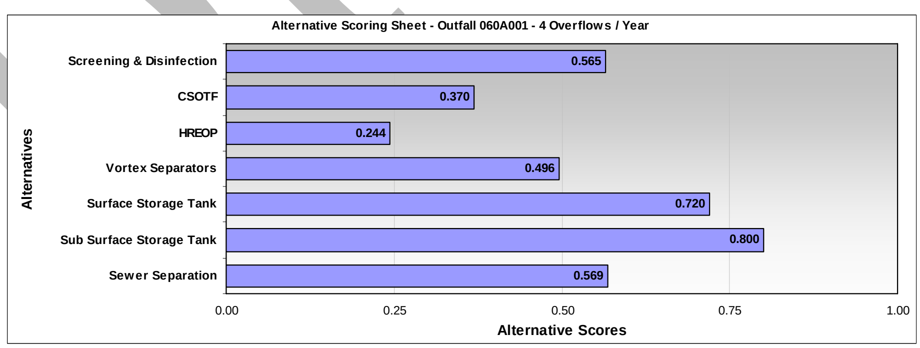
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	A relief sewer will not be evaluated.
Sewer separation	Y	Sewer separation within the 88 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

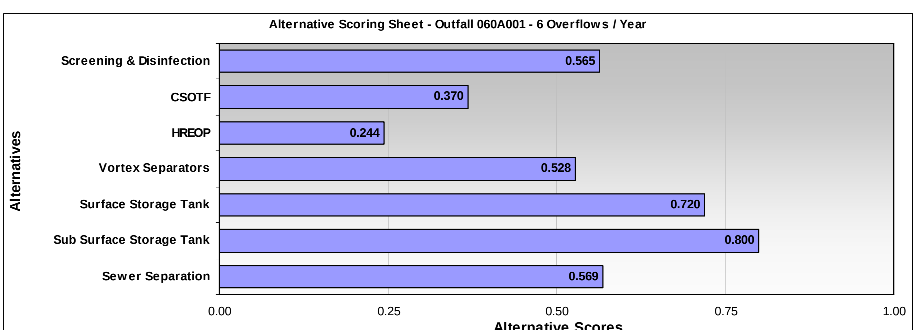
Attachment 3 – Alternative Scoring Sheet

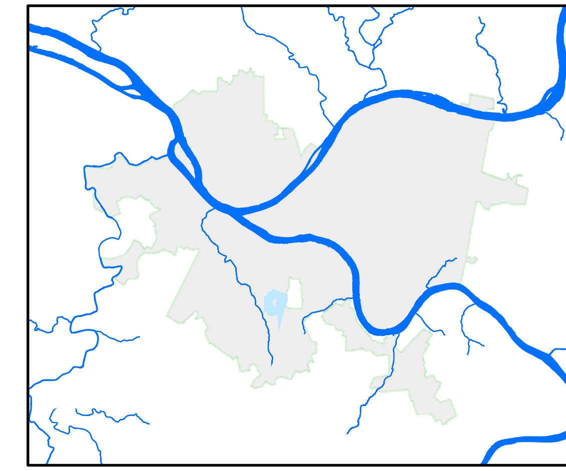












Area Overview

Legend

- Sewershed Boundary
- Facilities Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

100 0 100
Feet

Attachment 4
CSO 060A001
Facilities Boundary Map
Brook St.
Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0242.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: CS4-Separation		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: CS4-Separation		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: CS4-Separation		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative: CS4-Separation		Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	5	5	5	4
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	2	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	4	4	4	4
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	3	5	4	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T2-HREOP		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	1	1	1	1	1
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	4	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	2	2	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team

ɔf Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.570**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.574**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.764**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.659**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.769**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.752**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.752**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.752**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.455**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.496**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.459**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.496**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.496**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.597**

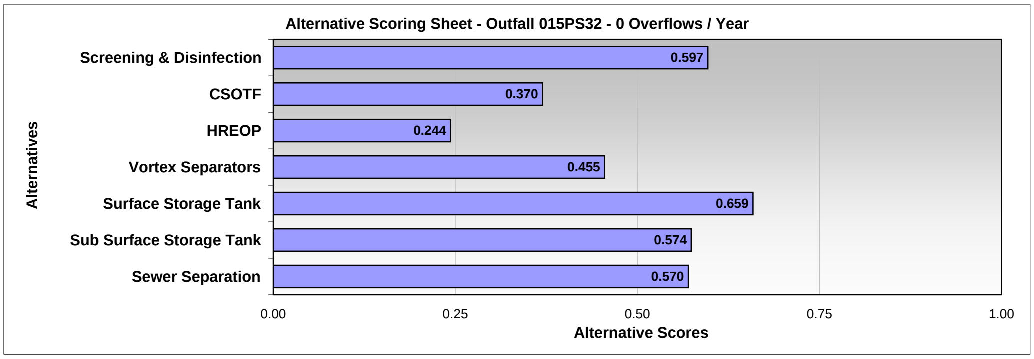
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

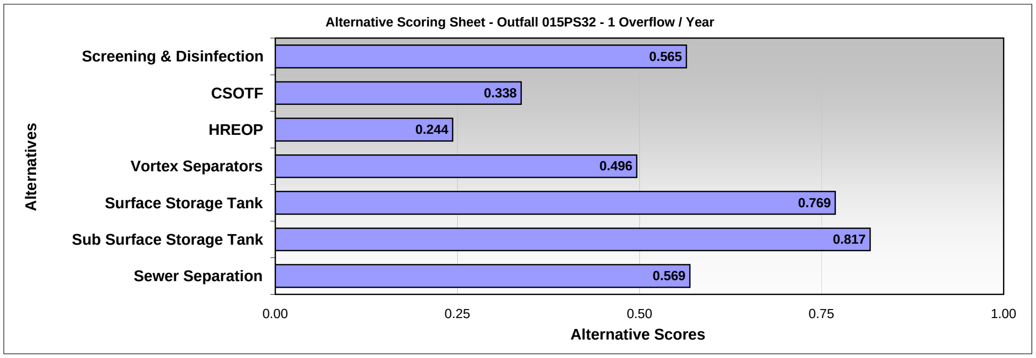
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.528**

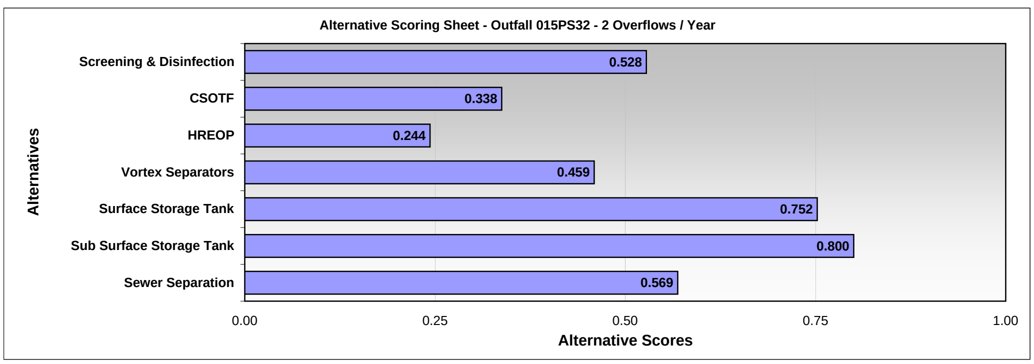
Total Score

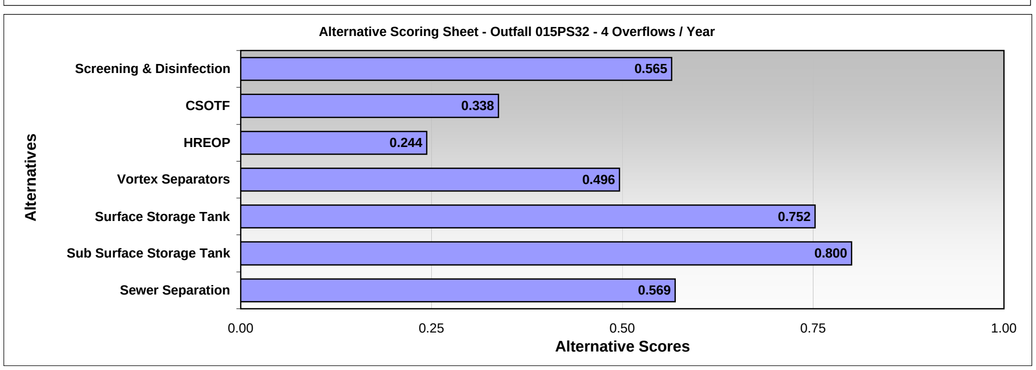
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

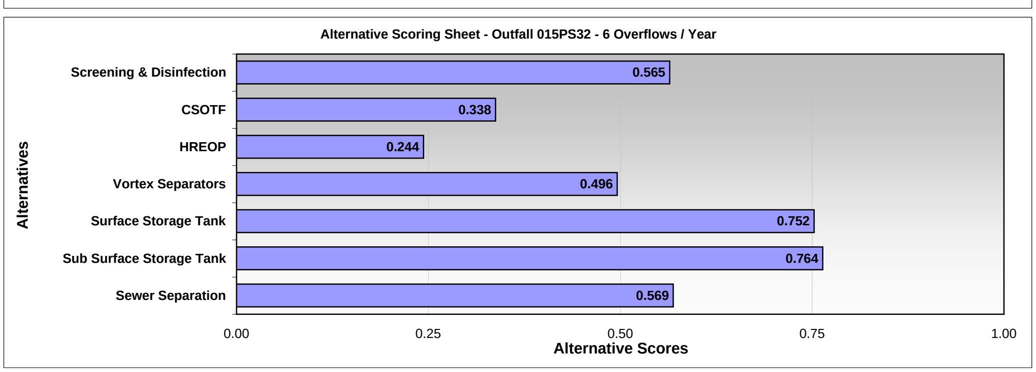
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**


Alternative Scoring Sheet - Outfall 015PS32 - 0 Overflows / Year
Alternatives
Screening & Disinfection 0.597
CSOTF 0.370
HREOP 0.244
Vortex Separators 0.455
Surface Storage Tank 0.659
Sub Surface Storage Tank 0.574
Sewer Separation 0.570
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015PS32 - 1 Overflow / Year
Alternatives
Screening & Disinfection 0.565
CSOTF 0.338
HREOP 0.244
Vortex Separators 0.496
Surface Storage Tank 0.769
Sub Surface Storage Tank 0.817
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015PS32 - 2 Overflows / Year
Alternatives
Screening & Disinfection 0.528
CSOTF 0.338
HREOP 0.244
Vortex Separators 0.459
Surface Storage Tank 0.752
Sub Surface Storage Tank 0.800
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015PS32 - 4 Overflows / Year
Alternatives
Screening & Disinfection 0.565
CSOTF 0.338
HREOP 0.244
Vortex Separators 0.496
Surface Storage Tank 0.752
Sub Surface Storage Tank 0.800
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015PS32 - 6 Overflows / Year
Alternatives
Screening & Disinfection 0.565
CSOTF 0.338
HREOP 0.244
Vortex Separators 0.496
Surface Storage Tank 0.752
Sub Surface Storage Tank 0.764
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	0	
Peak Volume	1,392,766	CF
	10.42	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	114.19	CFS
	73.80	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)				**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		376		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**75,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		163,786		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**328,000**		
			TOTAL CAPITAL COST $	**75,567,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	0	
Peak Volume	1,392,766	CF
	10.42	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	114.19	CFS
	73.80	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SURFACE STORAGE TANK					
0 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		10.42		1,393,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		12.26		1,639,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		406			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		271			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		12.34		1,650,390	**Sufficient Volume**
Tank Area (SF)		110,000			= Length x Width
Construction Cost (Storage Tank)		**12,128,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		73.80		114.19	= Peak Rate
Force Main Diameter (In)		59			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,655,000**	**$**	**71,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		114.19			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**160,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,459,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		12,300			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**654,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		73.80			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,829,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes / Detention (Min)				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		174,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**348,000**			
			TOTAL CAPITAL COST	**$**	**27,884,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	0	
Peak Volume	1,392,766	CF
	10.42	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	114.19	CFS
	73.80	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SUB-SURFACE STORAGE TANK					
0 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		10.42		1,393,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		12.26		1,639,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		406			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		271			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		12.34		1,650,390	**Sufficient Volume**
Tank Area (SF)		110,000			= Length x Width
Construction Cost (Storage Tank)		**32,998,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		10.42		16.12	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		22			Input by Engineer
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,845,000**	**$**	**30,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		114.19			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**160,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,459,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		122,950			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**3,975,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		73.80			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,829,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes / Detention (Min)				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		174,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**348,000**			
			TOTAL CAPITAL COST	**$**	**44,224,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	0	
Peak Volume	1,392,766	CF
	10.42	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	114.19	CFS
	73.80	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
0 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		73.80	114.19	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		8		
Construction Cost (Swirl / Vortex)	**$**	**4,181,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		81.18	125.61	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		62		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,556,000**	**$ 74,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		114.19		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**160,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		231,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		11,550		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**623,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		73.80		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,829,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		81.18		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		141	68	
Passes / Detention (Min)		5	**15.27**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,745,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		77,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**154,000**		
			TOTAL CAPITAL COST $	**22,621,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	0	
Peak Volume	1,392,766	CF
	10.42	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	114.19	CFS
	73.80	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SEDIMENTATION BASIN (CSOTF)				
0 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		73.80	114.19	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		12,400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		158	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		79	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		1.12	149,784	
Construction Cost (CSOTF)	**$**	**16,465,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		73.80	114.19	= Peak Flow x % Req Pump
Force Main Diameter (In)		59		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,655,000**	**$ 71,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		114.19		Ref: CSO Statistics
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**160,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		225,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,250		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**610,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		73.80		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,829,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		73.80		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		135	64	
Passes / Detention (Min)		5	15.13	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,644,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		35,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**		
			TOTAL CAPITAL COST $	**33,543,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	0	
Peak Volume	1,392,766	CF
	10.42	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	114.19	CFS
	73.80	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
0 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		73.80	114.19	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		870		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		43	OK	Input by Engineer
Width (Ft)		21	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**13,259,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		81.18	125.61	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		62		Input by Engineer
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,556,000**	**$ 74,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		114.19		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**160,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		22,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,100		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**99,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		73.80		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,829,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		81.18		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		141	68	Input by Engineer
Passes / Detention (Min)		5	**15.27**	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,745,000	$ 1,862,000	
Construction Cost (Disinfection)	**$**	**3,607,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		56,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**112,000**		
			TOTAL CAPITAL COST $	**32,735,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	0	
Peak Volume	1,392,766	CF
	10.42	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	114.19	CFS
	73.80	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32

SCREENING AND DISINFECTION

0 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		73.80		114.19	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,829,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		73.80		114.19	= Peak Flow x % Req Pump
Force Main Diameter (In)		59			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,655,000**	**$**	**71,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		114.19			Ref: CSO Statistics
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**160,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		22,800			=CFS x 200
Odor Control Flow Rate (CFM)		1,140			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**101,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		73.80			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		135		64	
Passes / Detention (Min)		5		**15.13**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,644,000	$	1,730,000	
Construction Cost (Disinfection)	**$**	**3,374,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		30,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
				TOTAL CAPITAL COST	**$ 18,289,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	1	
Peak Volume	446,202	CF
	3.34	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	86.73	CFS
	56.05	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		376		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**75,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		163,786		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**328,000**		
			TOTAL CAPITAL COST $	**75,567,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	1	
Peak Volume	446,202	CF
	3.34	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	86.73	CFS
	56.05	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.34		446,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.93		525,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		230			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		154			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.97		531,300	**Sufficient Volume**
Tank Area (SF)		35,000			= Length x Width
Construction Cost (Storage Tank)		**3,507,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		56.05		86.73	= Peak Rate
Force Main Diameter (In)		51			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,490,000**	**$**	**61,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		86.73			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		788,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,940			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**268,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		56.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,008,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		69,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**138,000**			
			TOTAL CAPITAL COST	**$**	**15,636,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	1	
Peak Volume	446,202	CF
	3.34	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	86.73	CFS
	56.05	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SUB-SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.34		446,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.93		525,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		230			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		154			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.97		531,300	**Sufficient Volume**
Tank Area (SF)		35,000			= Length x Width
Construction Cost (Storage Tank)		**11,193,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.34		5.16	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		13			Input by Engineer
Force Main Velocity (FPS)		5.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,942,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		86.73			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		788,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		39,400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,629,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		56.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,008,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		69,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**138,000**			
				TOTAL CAPITAL COST $	**18,096,000**

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RESULTS SUMMARY			
Number of Events / Year		64	
Number of Overflows / Year		1	
Peak Volume		446,202	CF
		3.34	MG
Total Volume		5,994,417	CF
		44.84	MG
Peak Rate		86.73	CFS
		56.05	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
1 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		56.05		86.73	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		61.66		95.41	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		54			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,174,000**	**$**	**64,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		86.73			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		56.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,008,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		61.66			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		123		59	
Passes		5		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,467,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		58,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**116,000**			
				TOTAL CAPITAL COST	**$ 14,253,000**

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RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	1	
Peak Volume	446,202	CF
	3.34	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	86.73	CFS
	56.05	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32

SEDIMENTATION BASIN (CSOTF)

1 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		56.05	86.73	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		9,400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		138	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		69	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.85	114,264	
Construction Cost (CSOTF)	**$**	**16,408,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		56.05	86.73	= Peak Flow x % Req Pump
Force Main Diameter (In)		51		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,490,000**	**$ 61,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		86.73		Ref: CSO Statistics
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		171,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,550		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**492,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		56.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,008,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		56.05		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		118	56	
Passes		5	**15.24**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,380,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		28,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**		
			TOTAL CAPITAL COST $	**30,059,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	1	
Peak Volume	446,202	CF
	3.34	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	86.73	CFS
	56.05	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32

HIGH RATE END OF PIPE TREATMENT (HREOP)

1 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		56.05		86.73	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		660			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		37		**OK**	Input by Engineer
Width (Ft)		19		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**10,260,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		61.66		95.41	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		54			Input by Engineer
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,174,000**	**$**	**64,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		86.73			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		17,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		850			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**81,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		56.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,008,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		61.66			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		123		59	Input by Engineer
Passes		5		**15.21**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,467,000	$	1,525,000	
Construction Cost (Disinfection)	**$**	**2,992,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		48,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**96,000**			
				TOTAL CAPITAL COST	**$ 25,839,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	1	
Peak Volume	446,202	CF
	3.34	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	86.73	CFS
	56.05	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		56.05		86.73	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,008,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		56.05		86.73	= Peak Flow x % Req Pump
Force Main Diameter (In)		51			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,490,000**	**$**	**61,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		86.73			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		17,300			=CFS x 200
Odor Control Flow Rate (CFM)		870			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**82,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		56.05			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		118		56	
Passes		5		**15.24**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,380,000	$	1,431,000	
Construction Cost (Disinfection)	**$**	**2,811,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		28,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**			
			TOTAL CAPITAL COST	**$**	**14,672,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	2	
Peak Volume	304,622	CF
	2.28	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	85.60	CFS
	55.32	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		376		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**75,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		163,786		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**328,000**		
			TOTAL CAPITAL COST $	**75,567,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	2	
Peak Volume	304,622	CF
	2.28	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	85.60	CFS
	55.32	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.28		305,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.68		359,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		190			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		127			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.71		361,950	**Sufficient Volume**
Tank Area (SF)		24,000			= Length x Width
Construction Cost (Storage Tank)		**2,314,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		55.32		85.60	= Peak Rate
Force Main Diameter (In)		51			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,400,000**	**$**	**61,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		85.60			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		539,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,700			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**199,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		55.32			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,974,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		53,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**106,000**			
				TOTAL CAPITAL COST $	**14,218,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	2	
Peak Volume	304,622	CF
	2.28	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	85.60	CFS
	55.32	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SUB-SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.28		305,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.68		359,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		190			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		127			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.71		361,950	**Sufficient Volume**
Tank Area (SF)		24,000			= Length x Width
Construction Cost (Storage Tank)		**7,931,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.28		3.53	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		10			Input by Engineer
Force Main Velocity (FPS)		6.5		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,759,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		85.60			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		539,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		26,950			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,210,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		55.32			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,974,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		53,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**106,000**			
			TOTAL CAPITAL COST	**$**	**14,163,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	2	
Peak Volume	304,622	CF
	2.28	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	85.60	CFS
	55.32	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
2 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		55.32	85.60	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		60.85	94.16	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		54		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,075,000**	**$ 64,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		85.60		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		55.32		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,974,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		60.85		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		122	59	
Passes		5	**15.29**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,454,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		57,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**114,000**		
			TOTAL CAPITAL COST	**$ 14,105,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	2	
Peak Volume	304,622	CF
	2.28	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	85.60	CFS
	55.32	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32

SEDIMENTATION BASIN (CSOTF)

2 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		55.32	85.60	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		9,300		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		137	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		69	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.85	113,436	
Construction Cost (CSOTF)	**$**	**16,407,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		55.32	85.60	= Peak Flow x % Req Pump
Force Main Diameter (In)		51		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,400,000**	**$ 61,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		85.60		Ref: CSO Statistics
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		170,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**490,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		55.32		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,974,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		55.32		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		117	56	
Passes		5	**15.31**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,368,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		27,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**		
			TOTAL CAPITAL COST $	**29,918,000**

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RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	2	
Peak Volume	304,622	CF
	2.28	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	85.60	CFS
	55.32	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		55.32		85.60	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		660			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		37		OK	Input by Engineer
Width (Ft)		19		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**10,137,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		60.85		94.16	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		54			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,075,000**	**$**	**64,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		85.60			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		17,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		850			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**81,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		55.32			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,974,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		60.85			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		122		59	Input by Engineer
Passes		5		**15.29**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,454,000	$	1,515,000	
Construction Cost (Disinfection)	**$**	**2,969,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		47,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**94,000**			
				TOTAL CAPITAL COST $	**25,558,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	2	
Peak Volume	304,622	CF
	2.28	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	85.60	CFS
	55.32	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		55.32		85.60	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,974,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		55.32		85.60	= Peak Flow x % Req Pump
Force Main Diameter (In)		51			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,400,000**	**$**	**61,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		85.60			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		17,100			=CFS x 200
Odor Control Flow Rate (CFM)		860			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**81,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		55.32			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		117		56	
Passes		5		**15.31**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,368,000	$	1,421,000	
Construction Cost (Disinfection)	**$**	**2,789,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		28,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**			
				TOTAL CAPITAL COST **$**	**14,525,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	4	
Peak Volume	289,789	CF
	2.17	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	70.17	CFS
	45.35	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		376		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**75,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		163,786		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**328,000**		
			TOTAL CAPITAL COST $	**75,567,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	4	
Peak Volume	289,789	CF
	2.17	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	70.17	CFS
	45.35	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32

SURFACE STORAGE TANK

4 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.17	290,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.55	341,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		186		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		124		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.59	345,960	**Sufficient Volume**
Tank Area (SF)		23,000		= Length x Width
Construction Cost (Storage Tank)		**2,191,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		45.35	70.17	= Peak Rate
Force Main Diameter (In)		46		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,184,000**	**$ 55,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		70.17		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		512,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,560		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**191,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		45.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,512,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		51,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**102,000**		
			TOTAL CAPITAL COST $	**12,399,000**

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RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	4	
Peak Volume	289,789	CF
	2.17	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	70.17	CFS
	45.35	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32			
SUB-SURFACE STORAGE TANK			
4 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	2.17	290,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	2.55	341,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	186		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	124		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	2.59	345,960	**Sufficient Volume**
Tank Area (SF)	23,000		= Length x Width
Construction Cost (Storage Tank)	**7,590,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	2.17	3.35	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	10		Input by Engineer
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,739,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	70.17		Ref: Technical Parameters
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**125,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	512,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	25,600		= ACH x Volume / 60
Construction Cost (Odor Control) $	**1,162,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	45.35		Ref: CSO Statistics
Construction Cost (Screening) $	**2,512,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	51,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**102,000**		
		TOTAL CAPITAL COST $	**13,288,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	4	
Peak Volume	289,789	CF
	2.17	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	70.17	CFS
	45.35	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
4 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		45.35	70.17	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		49.88	77.19	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		49		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,737,000**	**$ 58,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		70.17		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		45.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,512,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		49.88		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		111	53	
Passes		5	**15.24**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,280,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		47,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**94,000**		
			TOTAL CAPITAL COST	**$ 12,105,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	4	
Peak Volume	289,789	CF
	2.17	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	70.17	CFS
	45.35	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		45.35	70.17	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		7,600		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		124	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		62	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.69	92,256	
Construction Cost (CSOTF)	**$**	**16,385,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		45.35	70.17	= Peak Flow x % Req Pump
Force Main Diameter (In)		46		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,184,000**	**$ 55,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		70.17		Ref: CSO Statistics
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		138,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		6,900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**416,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		45.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,512,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		45.35		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		106	51	
Passes		5	**15.41**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,205,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		23,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST $	**27,967,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	4	
Peak Volume	289,789	CF
	2.17	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	70.17	CFS
	45.35	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
4 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		45.35	70.17	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		540		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		34	**OK**	Input by Engineer
Width (Ft)		17	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**8,481,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		49.88	77.19	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		49		Input by Engineer
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,737,000**	**$ 58,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		70.17		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		14,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		700		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**69,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		45.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,512,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		49.88		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		111	53	Input by Engineer
Passes		5	**15.24**	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,280,000	$ 1,320,000	
Construction Cost (Disinfection)	**$**	**2,600,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		43,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**86,000**		
			TOTAL CAPITAL COST $	**21,707,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	4	
Peak Volume	289,789	CF
	2.17	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	70.17	CFS
	45.35	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		45.35		70.17	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,512,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		45.35		70.17	= Peak Flow x % Req Pump
Force Main Diameter (In)		46			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,184,000**	**$**	**55,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		70.17			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		14,000			=CFS x 200
Odor Control Flow Rate (CFM)		700			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**69,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		45.35			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		106		51	
Passes		5		**15.41**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,205,000	$	1,245,000	
Construction Cost (Disinfection)	**$**	**2,450,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		27,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**			
				TOTAL CAPITAL COST $	**12,488,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	6	
Peak Volume	254,465	CF
	1.90	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	44.83	CFS
	28.97	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		376		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**75,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		163,786		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**328,000**		
			TOTAL CAPITAL COST $	**75,567,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	6	
Peak Volume	254,465	CF
	1.90	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	44.83	CFS
	28.97	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SURFACE STORAGE TANK					
6 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.90		254,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.24		299,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		174			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		116			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.26		302,760	**Sufficient Volume**
Tank Area (SF)		20,000			= Length x Width
Construction Cost (Storage Tank)		**1,902,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		28.97		44.83	= Peak Rate
Force Main Diameter (In)		37			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,186,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.83			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		449,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,250			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**173,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		28.97			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,754,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		48,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**96,000**			
				TOTAL CAPITAL COST $	**9,279,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	6	
Peak Volume	254,465	CF
	1.90	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	44.83	CFS
	28.97	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SUB-SURFACE STORAGE TANK				
6 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.90	254,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.24	299,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		174		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		116		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.26	302,760	**Sufficient Volume**
Tank Area (SF)		20,000		= Length x Width
Construction Cost (Storage Tank)		**6,776,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.90	2.95	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		9		Input by Engineer
Force Main Velocity (FPS)		6.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,692,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		44.83		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		449,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		22,450		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,048,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.97		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,754,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		48,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**96,000**		
			TOTAL CAPITAL COST $	**11,508,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	6	
Peak Volume	254,465	CF
	1.90	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	44.83	CFS
	28.97	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
6 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		28.97	44.83	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		31.87	49.32	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		39		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,540,000**	**$ 47,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		44.83		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.97		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,754,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		31.87		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		89	43	
Passes		3	**15.52**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**969,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		30,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST	**$ 8,753,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	6	
Peak Volume	254,465	CF
	1.90	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	44.83	CFS
	28.97	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32				
SEDIMENTATION BASIN (CSOTF)				
6 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		28.97	44.83	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		4,900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		100	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		50	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.45	60,000	
Construction Cost (CSOTF)	**$**	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		28.97	44.83	= Peak Flow x % Req Pump
Force Main Diameter (In)		37		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,186,000**	**$ 45,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		44.83		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		90,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**298,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		28.97		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,754,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		28.97		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		85	41	
Passes		3	15.55	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**915,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		17,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**34,000**		
			TOTAL CAPITAL COST $	**24,726,000**

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RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	6	
Peak Volume	254,465	CF
	1.90	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	44.83	CFS
	28.97	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		28.97		44.83	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		350			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		27		OK	Input by Engineer
Width (Ft)		14		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**5,805,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		31.87		49.32	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		39			Input by Engineer
Force Main Velocity (FPS)		5.9		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,540,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.83			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		28.97			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,754,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		31.87			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		89		43	Input by Engineer
Passes		3		15.52	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	969,000	$	853,000	
Construction Cost (Disinfection)	**$**	**1,822,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		35,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**			
			TOTAL CAPITAL COST	**$**	**15,210,000**

RESULTS SUMMARY		
Number of Events / Year	64	
Number of Overflows / Year	6	
Peak Volume	254,465	CF
	1.90	MG
Total Volume	5,994,417	CF
	44.84	MG
Peak Rate	44.83	CFS
	28.97	MGD

Capital Costs - 015PS32 / Sewershed ACSO 015PS32					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		28.97		44.83	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,754,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		28.97		44.83	= Peak Flow x % Req Pump
Force Main Diameter (In)		37			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,186,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.83			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000			=CFS x 200
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		28.97			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		85		41	
Passes		3		**15.55**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	915,000	$	801,000	
Construction Cost (Disinfection)	**$**	**1,716,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		26,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
			TOTAL CAPITAL COST	**$**	**8,925,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	73.80	$332,767	20	10.910	$3,630,470
	Tank O&M	No. Events / Yr	64	$69,642	50	14.484	$1,008,661
		Const Cost ($)	$12,128,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	74	$14,547	20	10.910	$158,710
	Odor Control O&M	Capacity (cfm)	12,300	$43,050	20	10.910	$469,673
	Reserve / Replace	10% Gravity / 15% Pump					$55,666
			Total Annual O&M	**$461,000**		**Total PW O&M**	**$5,323,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	10.42	$89,964	20	10.910	$981,498
	Tank O&M	No. Events / Yr	64	$121,817	50	14.484	$1,764,342
		Const Cost ($)	$32,998,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	74	$14,547	20	10.910	$158,710
	Odor Control O&M	Capacity (cfm)	122,950	$430,325	20	10.910	$4,694,820
	Reserve / Replace	10% Gravity / 15% Pump					$32,834
			Total Annual O&M	**$657,000**		**Total PW O&M**	**$7,632,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	73.80	$332,767	20	10.910	$3,630,470
	Sed. Basin O&M	Flow Rate (mgd)	73.80	$8,303	50	14.484	$120,251
	Screening O&M	Flow Rate (mgd)	73.80	$14,547	20	10.910	$158,710
	Disinfection O&M	Flow Rate (mgd)	73.80	$220,958	20	10.910	$2,410,636
	Odor Control O&M	Capacity (cfm)	11,250.00	$39,375	20	10.910	$429,579
	Reserve / Replace	10% Gravity / 15% Pump					$60,018
			Total Annual O&M	**$616,000**		**Total PW O&M**	**$6,810,000**

Operation and Maintenance Costs

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	81.18	$354,646	20	10.910	$3,869,166
	HREP O&M	Flow Rate (mgd)	73.80	$292,290	20	10.910	$3,188,865
	Screening O&M	Flow Rate (mgd)	73.80	$14,547	20	10.910	$158,710
	Disinfection O&M	Flow Rate (mgd)	81.18	$234,167	20	10.910	$2,554,748
	Odor Control O&M	Capacity (cfm)	1,100.00	$3,850	20	10.910	$42,003
	Reserve / Replace	10% Gravity / 15% Pump					$98,644
			Total Annual O&M	**$900,000**		**Total PW O&M**	**$9,912,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	81.18	$354,646	20	10.910	$3,869,166
	Swirl / Vortex O&M	Flow Rate (mgd)	73.80	$8,303	20	10.910	$90,581
	Screening O&M	Flow Rate (mgd)	73.80	$14,547	20	10.910	$158,710
	Disinfection O&M	Flow Rate (mgd)	81.18	$234,167	20	10.910	$2,554,748
	Odor Control O&M	Capacity (cfm)	11,550.00	$40,425	20	10.910	$441,034
	Reserve / Replace	10% Gravity / 15% Pump					$69,690
			Total Annual O&M	**$653,000**		**Total PW O&M**	**$7,184,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	73.80	$332,767	20	10.910	$3,630,470
	Screening O&M	Flow Rate (mgd)	73.80	$14,547	20	10.910	$158,710
	Disinfection O&M	Flow Rate (mgd)	73.80	$220,958	20	10.910	$2,410,636
	Odor Control O&M	Capacity (cfm)	1,140.00	$3,990	20	10.910	$43,531
	Reserve / Replace	10% Gravity / 15% Pump					$58,634
			Total Annual O&M	**$573,000**		**Total PW O&M**	**$6,302,000**

Operation and Maintenance Costs

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	56.05	$276,903	20	10.910	$3,020,999
	Tank O&M	No. Events / Yr	64	$48,089	50	14.484	$696,503
		Const Cost ($)	$3,507,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	56	$12,655	20	10.910	$138,071
	Odor Control O&M	Capacity (cfm)	3,940	$13,790	20	10.910	$150,448
	Reserve / Replace	10% Gravity / 15% Pump					$43,550
			Total Annual O&M	**$352,000**		**Total PW O&M**	**$4,050,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.34	$42,053	20	10.910	$458,793
	Tank O&M	No. Events / Yr	64	$67,304	50	14.484	$974,805
		Const Cost ($)	$11,193,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	56	$12,655	20	10.910	$138,071
	Odor Control O&M	Capacity (cfm)	39,400	$137,900	20	10.910	$1,504,481
	Reserve / Replace	10% Gravity / 15% Pump					$20,536
			Total Annual O&M	**$260,000**		**Total PW O&M**	**$3,097,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	56.05	$276,903	20	10.910	$3,020,999
	Sed. Basin O&M	Flow Rate (mgd)	56.05	$6,306	50	14.484	$91,333
	Screening O&M	Flow Rate (mgd)	56.05	$12,655	20	10.910	$138,071
	Disinfection O&M	Flow Rate (mgd)	56.05	$186,867	20	10.910	$2,038,710
	Odor Control O&M	Capacity (cfm)	8,550.00	$29,925	20	10.910	$326,480
	Reserve / Replace	10% Gravity / 15% Pump					$47,913
			Total Annual O&M	**$513,000**		**Total PW O&M**	**$5,664,000**

Operation and Maintenance Costs

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	61.66	$295,109	20	10.910	$3,219,623
	HREP O&M	Flow Rate (mgd)	56.05	$248,633	20	10.910	$2,712,569
	Screening O&M	Flow Rate (mgd)	56.05	$12,655	20	10.910	$138,071
	Disinfection O&M	Flow Rate (mgd)	61.66	$198,038	20	10.910	$2,160,588
	Odor Control O&M	Capacity (cfm)	850.00	$2,975	20	10.910	$32,457
	Reserve / Replace	10% Gravity / 15% Pump					$77,729
			Total Annual O&M	**$758,000**		**Total PW O&M**	**$8,341,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	61.66	$295,109	20	10.910	$3,219,623
	Swirl / Vortex O&M	Flow Rate (mgd)	56.05	$6,306	20	10.910	$68,798
	Screening O&M	Flow Rate (mgd)	56.05	$12,655	20	10.910	$138,071
	Disinfection O&M	Flow Rate (mgd)	61.66	$198,038	20	10.910	$2,160,588
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$49,602
			Total Annual O&M	**$513,000**		**Total PW O&M**	**$5,637,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	56.05	$276,903	20	10.910	$3,020,999
	Screening O&M	Flow Rate (mgd)	56.05	$12,655	20	10.910	$138,071
	Disinfection O&M	Flow Rate (mgd)	56.05	$186,867	20	10.910	$2,038,710
	Odor Control O&M	Capacity (cfm)	870.00	$3,045	20	10.910	$33,221
	Reserve / Replace	10% Gravity / 15% Pump					$46,798
			Total Annual O&M	**$480,000**		**Total PW O&M**	**$5,278,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	55.32	$274,474	20	10.910	$2,994,499
	Tank O&M	No. Events / Yr	64	$45,107	50	14.484	$653,306
		Const Cost ($)	$2,314,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	55	$12,580	20	10.910	$137,244
	Odor Control O&M	Capacity (cfm)	2,700	$9,450	20	10.910	$103,099
	Reserve / Replace	10% Gravity / 15% Pump					$42,903
			Total Annual O&M	**$342,000**		**Total PW O&M**	**$3,931,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.28	$32,587	20	10.910	$355,521
	Tank O&M	No. Events / Yr	64	$59,149	50	14.484	$856,691
		Const Cost ($)	$7,931,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	55	$12,580	20	10.910	$137,244
	Odor Control O&M	Capacity (cfm)	26,950	$94,325	20	10.910	$1,029,080
	Reserve / Replace	10% Gravity / 15% Pump					$18,557
			Total Annual O&M	**$199,000**		**Total PW O&M**	**$2,397,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	55.32	$274,474	20	10.910	$2,994,499
	Sed. Basin O&M	Flow Rate (mgd)	55.32	$6,223	50	14.484	$90,137
	Screening O&M	Flow Rate (mgd)	55.32	$12,580	20	10.910	$137,244
	Disinfection O&M	Flow Rate (mgd)	55.32	$185,372	20	10.910	$2,022,397
	Odor Control O&M	Capacity (cfm)	8,500.00	$29,750	20	10.910	$324,571
	Reserve / Replace	10% Gravity / 15% Pump					$47,415
			Total Annual O&M	**$509,000**		**Total PW O&M**	**$5,616,000**

Operation and Maintenance Costs

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	60.85	$292,520	20	10.910	$3,191,381
	HREP O&M	Flow Rate (mgd)	55.32	$246,712	20	10.910	$2,691,613
	Screening O&M	Flow Rate (mgd)	55.32	$12,580	20	10.910	$137,244
	Disinfection O&M	Flow Rate (mgd)	60.85	$196,454	20	10.910	$2,143,300
	Odor Control O&M	Capacity (cfm)	850.00	$2,975	20	10.910	$32,457
	Reserve / Replace	10% Gravity / 15% Pump					$76,863
			Total Annual O&M	**$752,000**		**Total PW O&M**	**$8,273,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	60.85	$292,520	20	10.910	$3,191,381
	Swirl / Vortex O&M	Flow Rate (mgd)	55.32	$6,223	20	10.910	$67,897
	Screening O&M	Flow Rate (mgd)	55.32	$12,580	20	10.910	$137,244
	Disinfection O&M	Flow Rate (mgd)	60.85	$196,454	20	10.910	$2,143,300
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$49,070
			Total Annual O&M	**$508,000**		**Total PW O&M**	**$5,589,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	55.32	$274,474	20	10.910	$2,994,499
	Screening O&M	Flow Rate (mgd)	55.32	$12,580	20	10.910	$137,244
	Disinfection O&M	Flow Rate (mgd)	55.32	$185,372	20	10.910	$2,022,397
	Odor Control O&M	Capacity (cfm)	860.00	$3,010	20	10.910	$32,839
	Reserve / Replace	10% Gravity / 15% Pump					$46,303
			Total Annual O&M	**$476,000**		**Total PW O&M**	**$5,233,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	45.35	$240,347	20	10.910	$2,622,168
	Tank O&M	No. Events / Yr	64	$44,799	50	14.484	$648,852
		Const Cost ($)	$2,191,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	45	$11,570	20	10.910	$126,228
	Odor Control O&M	Capacity (cfm)	2,560	$8,960	20	10.910	$97,753
	Reserve / Replace	10% Gravity / 15% Pump					$36,663
			Total Annual O&M	**$306,000**		**Total PW O&M**	**$3,532,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.17	$31,518	20	10.910	$343,860
	Tank O&M	No. Events / Yr	64	$58,297	50	14.484	$844,344
		Const Cost ($)	$7,590,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	45	$11,570	20	10.910	$126,228
	Odor Control O&M	Capacity (cfm)	25,600	$89,600	20	10.910	$977,531
	Reserve / Replace	10% Gravity / 15% Pump					$17,088
			Total Annual O&M	**$191,000**		**Total PW O&M**	**$2,309,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	45.35	$240,347	20	10.910	$2,622,168
	Sed. Basin O&M	Flow Rate (mgd)	45.35	$5,102	50	14.484	$73,891
	Screening O&M	Flow Rate (mgd)	45.35	$11,570	20	10.910	$126,228
	Disinfection O&M	Flow Rate (mgd)	45.35	$164,234	20	10.910	$1,791,787
	Odor Control O&M	Capacity (cfm)	6,900.00	$24,150	20	10.910	$263,475
	Reserve / Replace	10% Gravity / 15% Pump					$40,552
			Total Annual O&M	**$446,000**		**Total PW O&M**	**$4,918,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	49.88	$256,149	20	10.910	$2,794,569
	HREP O&M	Flow Rate (mgd)	45.35	$219,498	20	10.910	$2,394,714
	Screening O&M	Flow Rate (mgd)	45.35	$11,570	20	10.910	$126,228
	Disinfection O&M	Flow Rate (mgd)	49.88	$174,053	20	10.910	$1,898,903
	Odor Control O&M	Capacity (cfm)	700.00	$2,450	20	10.910	$26,729
	Reserve / Replace	10% Gravity / 15% Pump					$65,137
			Total Annual O&M	**$664,000**		**Total PW O&M**	**$7,306,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	49.88	$256,149	20	10.910	$2,794,569
	Swirl / Vortex O&M	Flow Rate (mgd)	45.35	$5,102	20	10.910	$55,659
	Screening O&M	Flow Rate (mgd)	45.35	$11,570	20	10.910	$126,228
	Disinfection O&M	Flow Rate (mgd)	49.88	$174,053	20	10.910	$1,898,903
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$41,881
			Total Annual O&M	**$447,000**		**Total PW O&M**	**$4,917,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	45.35	$240,347	20	10.910	$2,622,168
	Screening O&M	Flow Rate (mgd)	45.35	$11,570	20	10.910	$126,228
	Disinfection O&M	Flow Rate (mgd)	45.35	$164,234	20	10.910	$1,791,787
	Odor Control O&M	Capacity (cfm)	700.00	$2,450	20	10.910	$26,729
	Reserve / Replace	10% Gravity / 15% Pump					$39,609
			Total Annual O&M	**$419,000**		**Total PW O&M**	**$4,607,000**

Operation and Maintenance Costs

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	28.97	$178,178	20	10.910	$1,943,907
	Tank O&M	No. Events / Yr	64	$44,077	50	14.484	$638,387
		Const Cost ($)	$1,902,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	29	$9,991	20	10.910	$108,996
	Odor Control O&M	Capacity (cfm)	2,250	$7,875	20	10.910	$85,916
	Reserve / Replace	10% Gravity / 15% Pump					$26,400
			Total Annual O&M	**$241,000**		**Total PW O&M**	**$2,804,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.90	$28,896	20	10.910	$315,257
	Tank O&M	No. Events / Yr	64	$56,262	50	14.484	$814,870
		Const Cost ($)	$6,776,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	29	$9,991	20	10.910	$108,996
	Odor Control O&M	Capacity (cfm)	22,450	$78,575	20	10.910	$857,248
	Reserve / Replace	10% Gravity / 15% Pump					$14,525
			Total Annual O&M	**$174,000**		**Total PW O&M**	**$2,111,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	28.97	$178,178	20	10.910	$1,943,907
	Sed. Basin O&M	Flow Rate (mgd)	28.97	$3,260	50	14.484	$47,210
	Screening O&M	Flow Rate (mgd)	28.97	$9,991	20	10.910	$108,996
	Disinfection O&M	Flow Rate (mgd)	28.97	$125,008	20	10.910	$1,363,832
	Odor Control O&M	Capacity (cfm)	4,500.00	$15,750	20	10.910	$171,832
	Reserve / Replace	10% Gravity / 15% Pump					$29,229
			Total Annual O&M	**$333,000**		**Total PW O&M**	**$3,665,000**

Operation and Maintenance Costs

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	31.87	$189,892	20	10.910	$2,071,714
	HREP O&M	Flow Rate (mgd)	28.97	$168,660	20	10.910	$1,840,066
	Screening O&M	Flow Rate (mgd)	28.97	$9,991	20	10.910	$108,996
	Disinfection O&M	Flow Rate (mgd)	31.87	$132,481	20	10.910	$1,445,364
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$45,933
			Total Annual O&M	**$503,000**		**Total PW O&M**	**$5,529,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	31.87	$189,892	20	10.910	$2,071,714
	Swirl / Vortex O&M	Flow Rate (mgd)	28.97	$3,260	20	10.910	$35,561
	Screening O&M	Flow Rate (mgd)	28.97	$9,991	20	10.910	$108,996
	Disinfection O&M	Flow Rate (mgd)	31.87	$132,481	20	10.910	$1,445,364
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$30,010
			Total Annual O&M	**$336,000**		**Total PW O&M**	**$3,692,000**

ACSO 015PS32	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	28.97	$178,178	20	10.910	$1,943,907
	Screening O&M	Flow Rate (mgd)	28.97	$9,991	20	10.910	$108,996
	Disinfection O&M	Flow Rate (mgd)	28.97	$125,008	20	10.910	$1,363,832
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$28,552
			Total Annual O&M	**$315,000**		**Total PW O&M**	**$3,462,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$75.6	$75,567,000	$0
1	$75.6	$75,567,000	$0
2	$75.6	$75,567,000	$0
4	$75.6	$75,567,000	$0
6	$75.6	$75,567,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$51.9	$44,224,000	$7,632,000
1	$21.2	$18,096,000	$3,097,000
2	$16.6	$14,163,000	$2,397,000
4	$15.6	$13,288,000	$2,309,000
6	$13.6	$11,508,000	$2,111,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$33.2	$27,884,000	$5,323,000
1	$19.7	$15,636,000	$4,050,000
2	$18.1	$14,218,000	$3,931,000
4	$15.9	$12,399,000	$3,532,000
6	$12.1	$9,279,000	$2,804,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$29.8	$22,621,000	$7,184,000
1	$19.9	$14,253,000	$5,637,000
2	$19.7	$14,105,000	$5,589,000
4	$17.0	$12,105,000	$4,917,000
6	$12.4	$8,753,000	$3,692,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$42.6	$32,735,000	$9,912,000
1	$34.2	$25,839,000	$8,341,000
2	$33.8	$25,558,000	$8,273,000
4	$29.0	$21,707,000	$7,306,000
6	$20.7	$15,210,000	$5,529,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$40.4	$33,543,000	$6,810,000
1	$35.7	$30,059,000	$5,664,000
2	$35.5	$29,918,000	$5,616,000
4	$32.9	$27,967,000	$4,918,000
6	$28.4	$24,726,000	$3,665,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$24.6	$18,289,000	$6,302,000
1	$20.0	$14,672,000	$5,278,000
2	$19.8	$14,525,000	$5,233,000
4	$17.1	$12,488,000	$4,607,000
6	$12.4	$8,925,000	$3,462,000

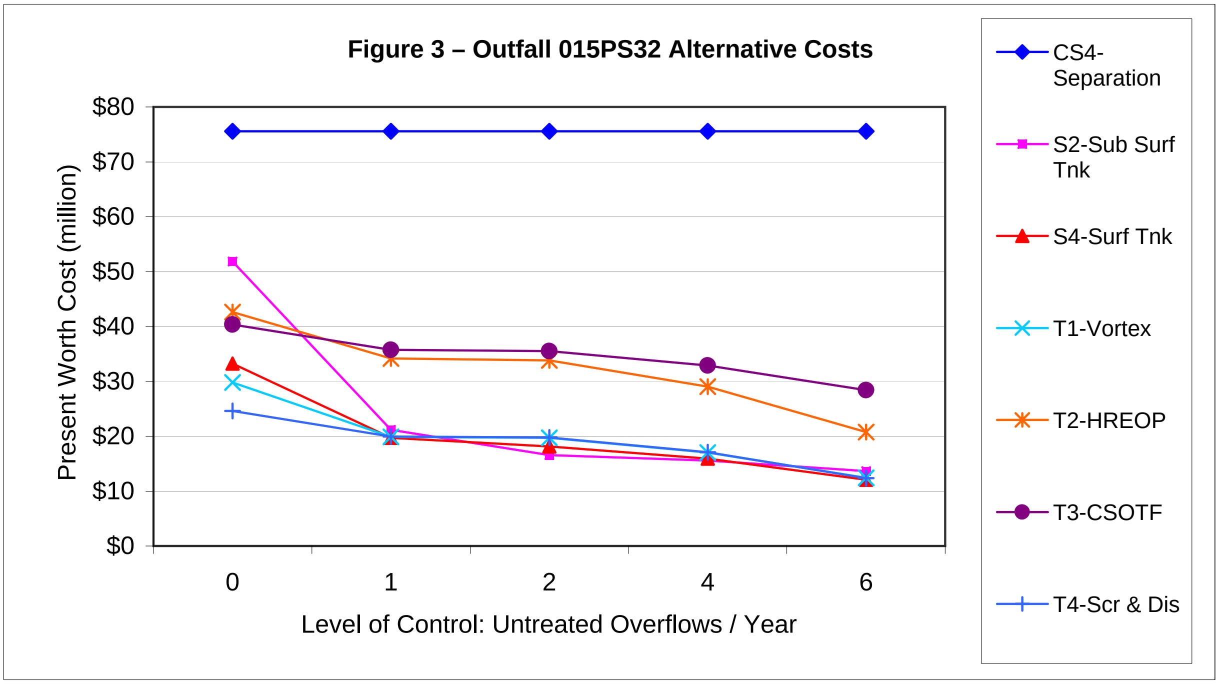


Figure 3 – Outfall 015PS32 Alternative Costs
Present Worth Cost (million)
$80
$70
$60
$50
$40
$30
$20
$10
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 015PS32
Location Name	Warrington Avenue
Model ID	ADC 015PS32.1
Structure Type	Outfall
PWSA Sewershed	Bausman, Brook and Warrington
Stream of Discharge	Saw Mill Run
NPDES Permit Number	015PS32
Owner	ALCOSAN

Results Summary

Number of Events:	64
Peak Volume:	1,392,766 ft^3
	10.42 MG
Total Volume:	5,994,417 ft^3
	44.84 MG
Peak Rate:	114.19 cfs

Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 0:35	2213	1/5/2005 14:45	1392765.82	10418.585	0	33.33	7
1/11/2005 8:45	1164	1/11/2005 11:35	446201.81	3337.813	1	24.92	13
2/14/2005 5:41	1018	2/14/2005 10:00	304622.17	2278.726	2	11.55	30
8/20/2005 18:15	154	8/20/2005 18:30	292605.32	2188.834	3	114.19	0
1/3/2005 8:45	1048	1/3/2005 14:00	289789.35	2167.769	4	14.82	27
7/5/2005 16:20	149	7/5/2005 17:00	263828.68	1973.570	5	85.60	2
5/13/2005 22:30	180	5/13/2005 22:45	254465.01	1903.526	6	70.17	4
11/29/2005 6:45	449	11/29/2005 7:30	233878.14	1749.525	7	20.80	19
3/28/2005 9:10	744	3/28/2005 19:15	227868.51	1704.570	8	18.43	21
11/14/2005 21:45	433	11/14/2005 23:05	178712.74	1336.861	9	20.13	20
1/13/2005 22:50	379	1/14/2005 2:15	175468.98	1312.596	10	18.04	22
7/26/2005 19:45	104	7/26/2005 20:00	148880.75	1113.702	11	72.53	3
4/1/2005 19:35	933	4/2/2005 6:45	144029.18	1077.410	12	16.16	24
8/29/2005 11:35	264	8/29/2005 13:45	142142.67	1063.298	13	86.73	1
1/8/2005 1:41	438	1/8/2005 5:45	123932.16	927.075	14	21.62	17
7/15/2005 17:40	95	7/15/2005 18:00	103624.83	775.166	15	53.33	5
2/20/2005 19:20	227	2/20/2005 20:30	102364.05	765.734	16	23.23	14
4/23/2005 3:45	109	4/23/2005 4:15	93484.61	699.312	17	31.41	9
10/21/2005 19:05	780	10/22/2005 6:55	91250.28	682.598	18	26.51	10
5/11/2005 22:35	135	5/11/2005 23:00	84660.09	633.300	19	21.37	18
9/29/2005 5:30	107	9/29/2005 5:45	72421.57	541.750	20	44.83	6
2/9/2005 15:15	180	2/9/2005 16:45	70742.81	529.192	21	25.48	12
5/14/2005 16:05	144	5/14/2005 16:15	52196.31	390.455	22	14.71	28
10/25/2005 1:30	276	10/25/2005 3:50	51169.02	382.770	23	6.34	38
12/15/2005 13:21	463	12/15/2005 14:00	46379.77	346.944	24	11.13	32
10/25/2005 14:15	454	10/25/2005 18:00	46054.93	344.514	25	5.21	42
5/23/2005 16:20	80	5/23/2005 16:45	45272.27	338.659	26	23.04	15
5/28/2005 8:30	114	5/28/2005 9:30	44205.67	330.680	27	14.82	26
7/21/2005 14:25	88	7/21/2005 14:45	40819.39	305.349	28	25.85	11
11/9/2005 19:30	70	11/9/2005 19:45	40313.53	301.565	29	32.07	8
10/7/2005 10:10	109	10/7/2005 10:50	31934.70	238.888	30	11.15	31
10/24/2005 13:10	312	10/24/2005 14:45	30029.94	224.639	31	4.43	48
2/16/2005 7:10	123	2/16/2005 8:15	26276.80	196.564	32	6.76	37

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
8/27/2005 15:20	55	8/27/2005 15:30	26139.64	195.538	33	21.74	16
4/22/2005 16:00	195	4/22/2005 18:05	25703.42	192.274	34	5.68	39
10/22/2005 15:55	99	10/22/2005 16:45	23868.68	178.550	35	8.16	34
3/23/2005 12:10	148	3/23/2005 12:45	22788.04	170.466	36	5.01	44
3/23/2005 2:30	213	3/23/2005 5:15	22199.30	166.062	37	4.46	47
11/1/2005 15:46	127	11/1/2005 16:30	17753.05	132.802	38	6.98	35
11/9/2005 4:20	50	11/9/2005 4:30	17014.26	127.275	39	17.00	23
3/27/2005 16:50	95	3/27/2005 18:00	15848.99	118.558	40	4.55	45
7/25/2005 13:20	50	7/25/2005 13:30	14052.38	105.119	41	15.47	25
7/17/2005 16:30	70	7/17/2005 16:45	13884.19	103.861	42	10.67	33
11/16/2005 4:10	480	11/16/2005 4:20	12965.29	96.987	43	5.34	41
8/8/2005 8:55	70	8/8/2005 9:20	11792.09	88.211	44	4.54	46
9/16/2005 21:35	40	9/16/2005 21:45	11534.68	86.285	45	11.76	29
6/14/2005 19:05	50	6/14/2005 19:15	11255.55	84.197	46	6.98	36
9/26/2005 5:45	264	9/26/2005 9:45	6699.72	50.117	47	4.04	49
6/3/2005 9:00	44	6/3/2005 9:15	5901.42	44.146	48	5.49	40
10/21/2005 7:20	44	10/21/2005 7:45	5622.90	42.062	49	3.68	50
5/28/2005 18:10	49	5/28/2005 18:30	5075.00	37.964	50	3.31	51
4/20/2005 19:35	245	4/20/2005 23:15	4679.02	35.001	51	2.68	54
5/7/2005 13:20	30	5/7/2005 13:30	4184.27	31.300	52	5.09	43
4/3/2005 1:50	289	4/3/2005 2:00	3845.92	28.769	53	2.13	58
11/8/2005 14:55	39	11/8/2005 15:15	3379.89	25.283	54	3.02	53
4/27/2005 0:35	40	4/27/2005 1:00	3273.84	24.490	55	2.64	55
8/26/2005 20:55	34	8/26/2005 21:05	3258.41	24.375	56	2.51	56
12/25/2005 12:40	35	12/25/2005 12:50	2015.23	15.075	57	1.57	60
5/20/2005 6:10	159	5/20/2005 6:30	1985.58	14.853	58	0.90	62
5/14/2005 9:25	34	5/14/2005 9:35	1879.82	14.062	59	1.67	59
6/28/2005 18:10	15	6/28/2005 18:15	1276.14	9.546	60	3.03	52
4/30/2005 6:17	37	4/30/2005 6:45	1030.01	7.705	61	1.29	61
9/23/2005 2:50	15	9/23/2005 3:00	1006.27	7.527	62	2.21	57
10/26/2005 7:30	9	10/26/2005 7:35	112.29	0.840	63	0.38	63

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 015PS32
Location Name	Warrington Avenue
Model ID	ADC 015PS32.1
Structure Type	Outfall
PWSA Sewershed	Bausman, Brook and Warrington
Stream of Discharge	Saw Mill Run
NPDES Permit Number	015PS32
Owner	ALCOSAN
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	64
Peak Volume:	1,392,766 ft^3
	10.42 MG
Total Volume:	5,994,417 ft^3
	44.84 MG
Peak Rate:	114.19 cfs

Figure 1 - Outfall 015PS32 CSO Volume

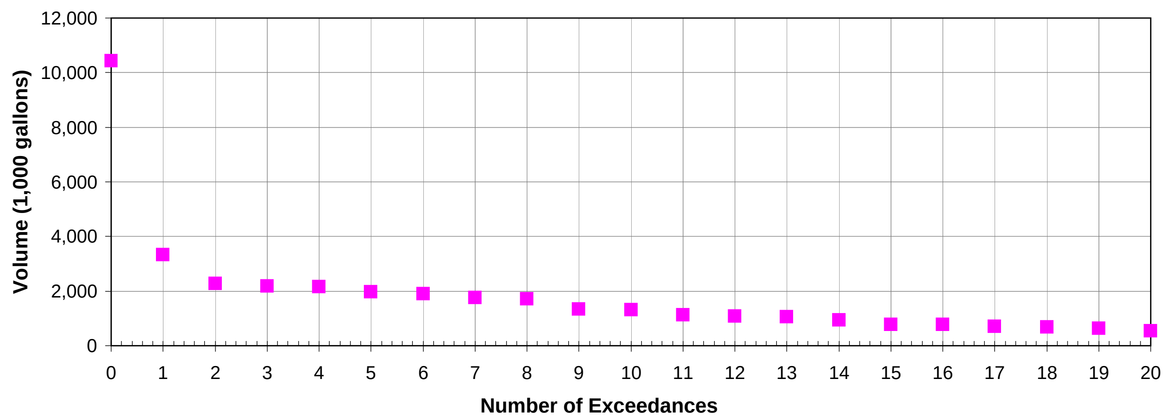
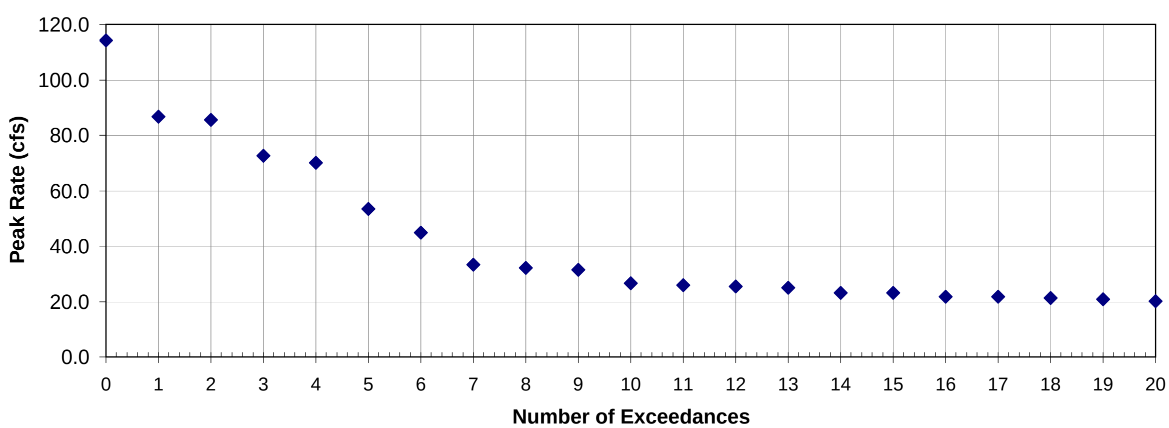


Figure 2 - Outfall 015PS32 CSO Peak Flow Rate



D.30.4 BAUSMAN, BROOK, AND WARRINGTON SEWERSHED – WARRINGTON AVENUE – NPDES# 015PS32

Description of Outfall

Outfall 015PS32 conveys overflows from the ALCOSAN diversion chamber 015PS32 to Saw Mill Run, and ultimately into the Ohio River. The outfall is located along Saw Mill Run, near the intersection of Warrington Avenue and Saw Mill Run Boulevard. The Bausman, Brook, and Warrington Street Sewersheds are located in portions of Allentown, Beltzhoover, Bon Air, Carrick, Knoxville, and Mount Washington sections in the City of Pittsburgh. The Bausman and Brook Street Sewersheds also include portions of Mount Oliver Borough. These Sewersheds include approximately 871 acres of residential, business and commercial users. The 015PS32 Sewershed (Warrington Ave.) consists of 376 acres, or approximately 44% of the total service area. The Bausman, Brook and Warrington Sewersheds are comprised of approximately 751 manholes and 219,457 linear feet (41.6 miles) of mostly combined sewer up to 72 inches in diameter.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 015PS32 typically experiences 64 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 015PS32 is approximately 10.42 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 015PS32 is approximately 114.2 CFS. *Figure 1 – Outfall 015PS32 CSO Volume* and *Figure 2 – Outfall 015PS32 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

Figure 1 - Outfall 015PS32 CSO Volume

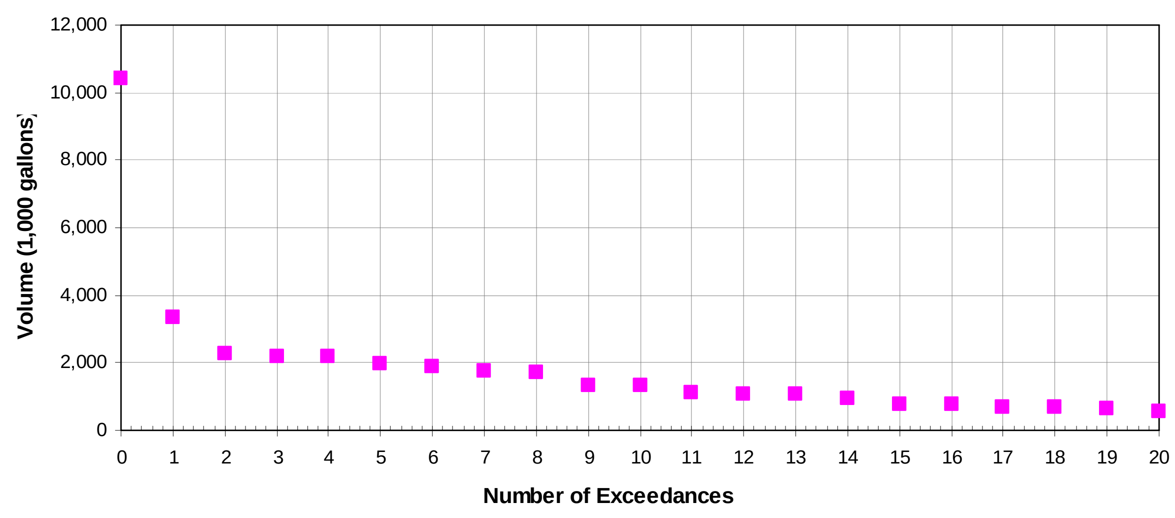
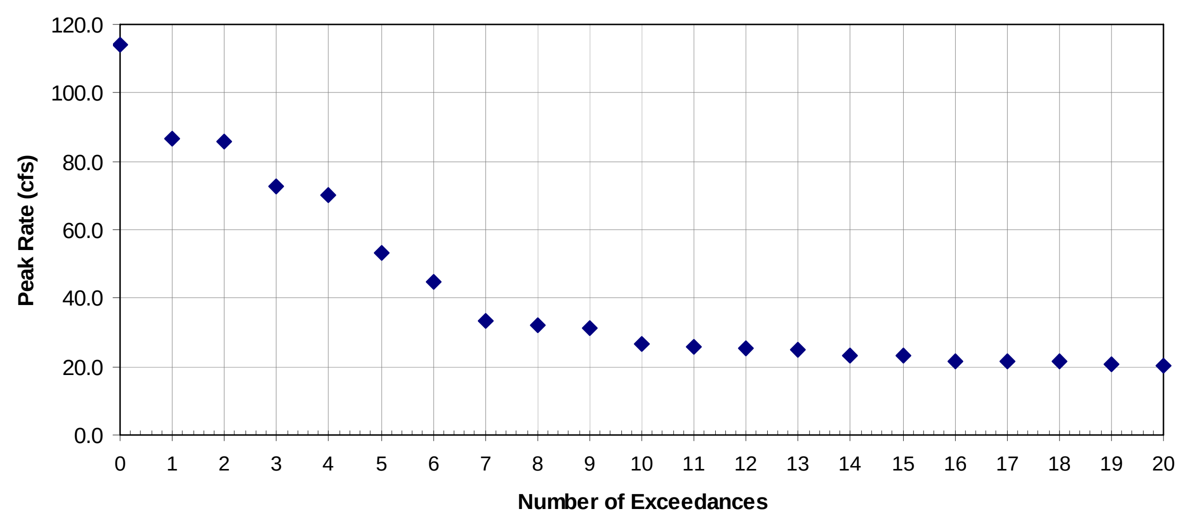


Figure 2 - Outfall 015PS32 CSO Peak Flow Rate



There appears to be a limited amount of available space for potential storage or treatment facilities to the west of the existing South Busway route in an existing parking facility near the end of Hargrove Street. CSOs would be required to be pumped from the outfall to this location. Potential sites near the outfall do not appear to be available. The site is generally bounded by Saw Mill Run and steep slopes to the north and private development to the south, east and west.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 015PS32. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-015PS32: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-015PS32: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-015PS32: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-015PS32: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-015PS32: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-015PS32: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

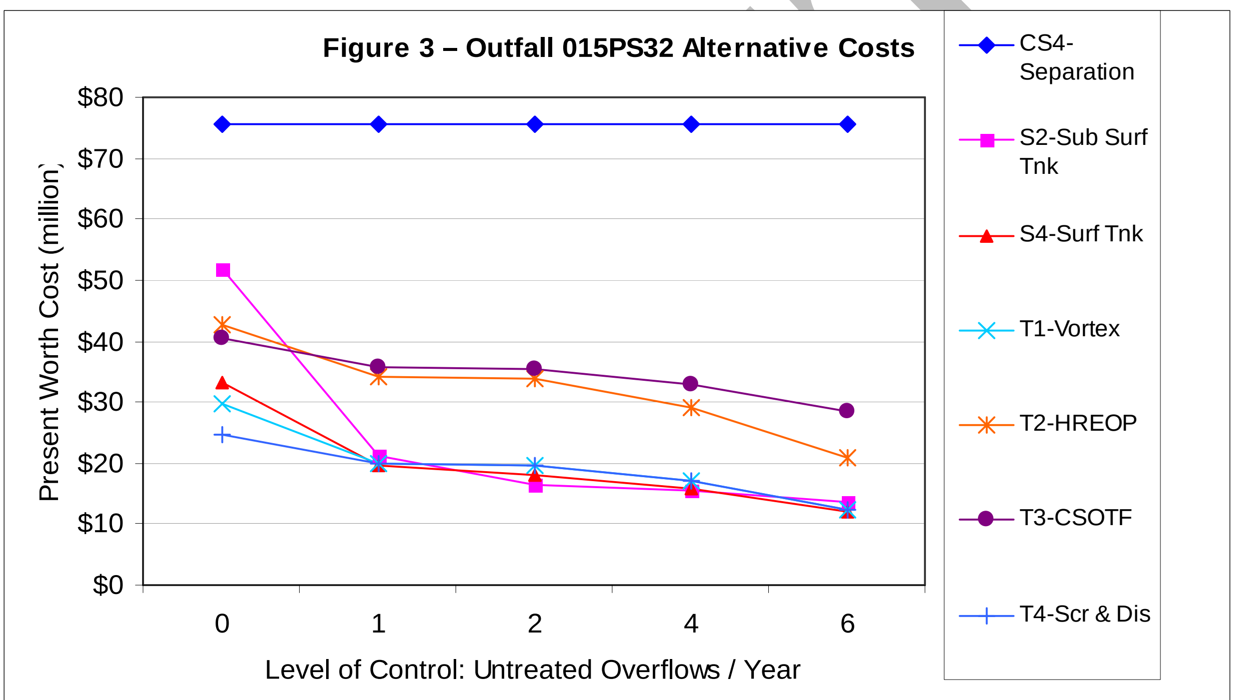
T4-015PS32: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 015PS32 Alternative Costs, illustrates the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall “ranking” of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

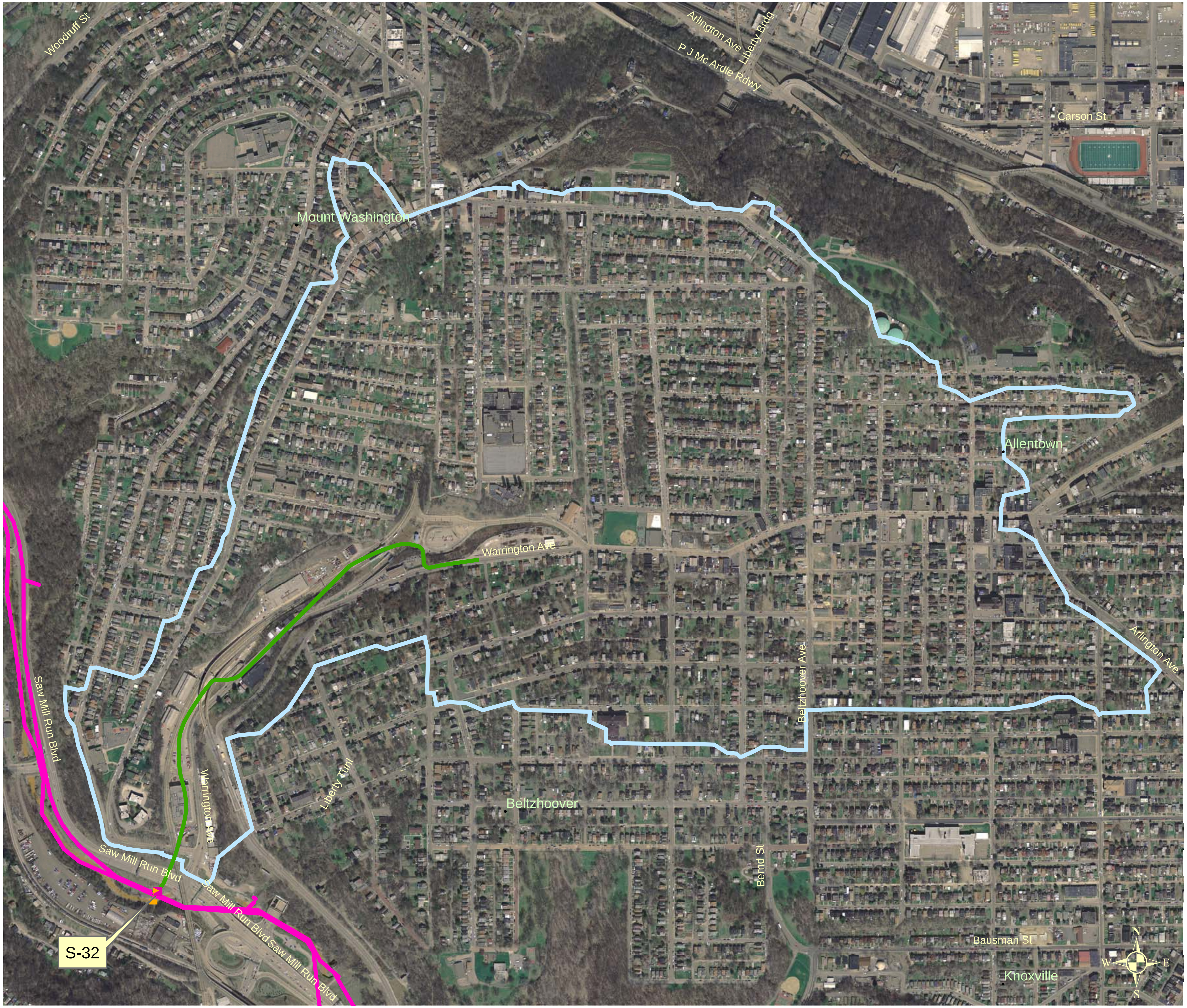
Recommendations

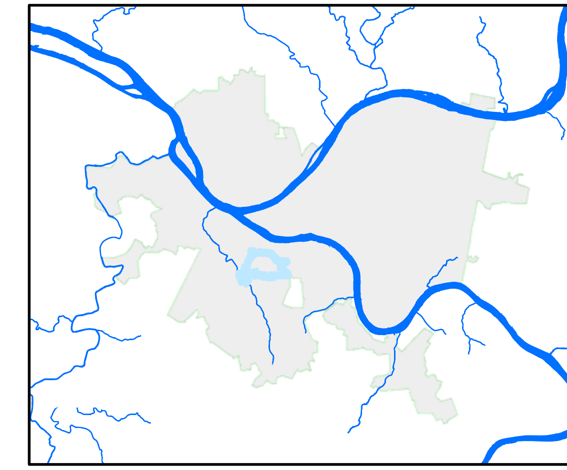
Based upon the above, for control level 0, it is recommended that Alternative S4-015PS32: Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control levels 1 through 6, it is recommended that Alternative S2-015PS32: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Space does not appear to be available for the 0 control level. A deeper storage structure would reduce the footprint required. Significant critical infrastructure and topography exists in the vicinity of the outfall.





Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

500 0 500
Feet

Attachment 1
S-32
Tributary Area Map
Warrington Ave.
Sewershed

CSO Controls Alternatives

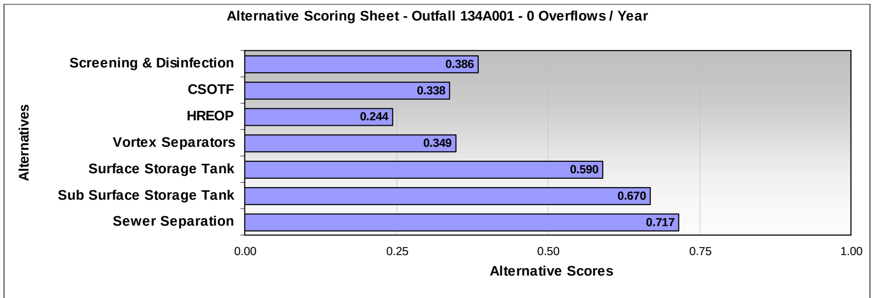
PWSA

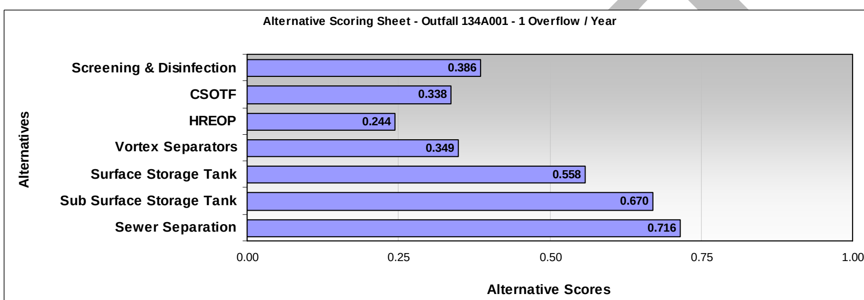
SW-D-0244.pdf

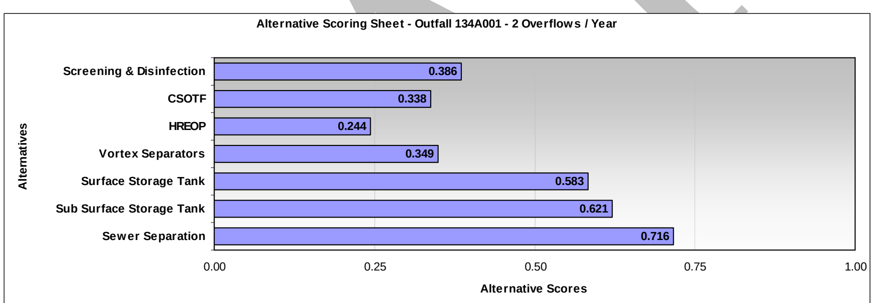
Attachment 2 - CSO Alternatives Development Worksheet

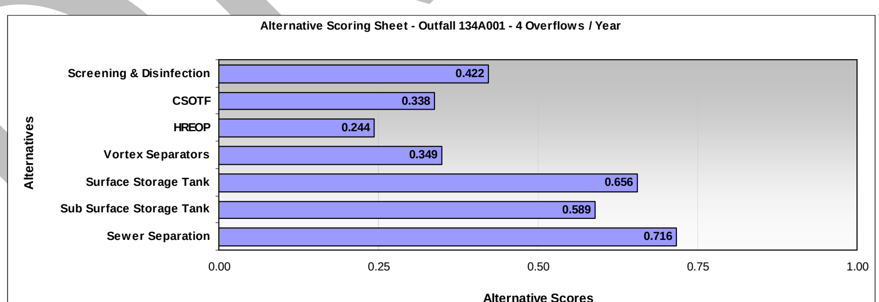
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not provide adequate CSO control.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only.
Sewer separation	Y	Sewer separation within the 376 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will be not evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

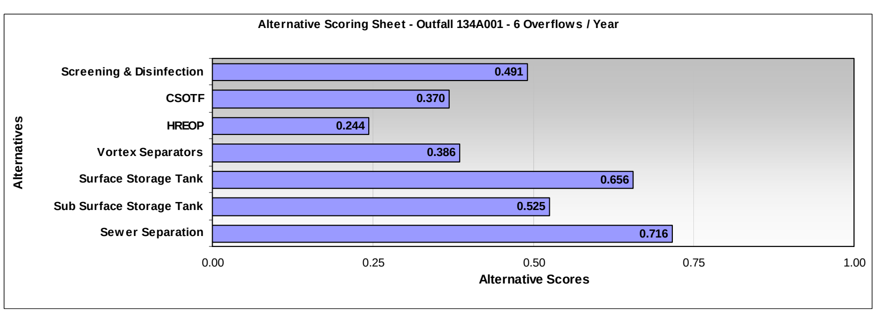
Attachment 3 – Alternative Scoring Sheet

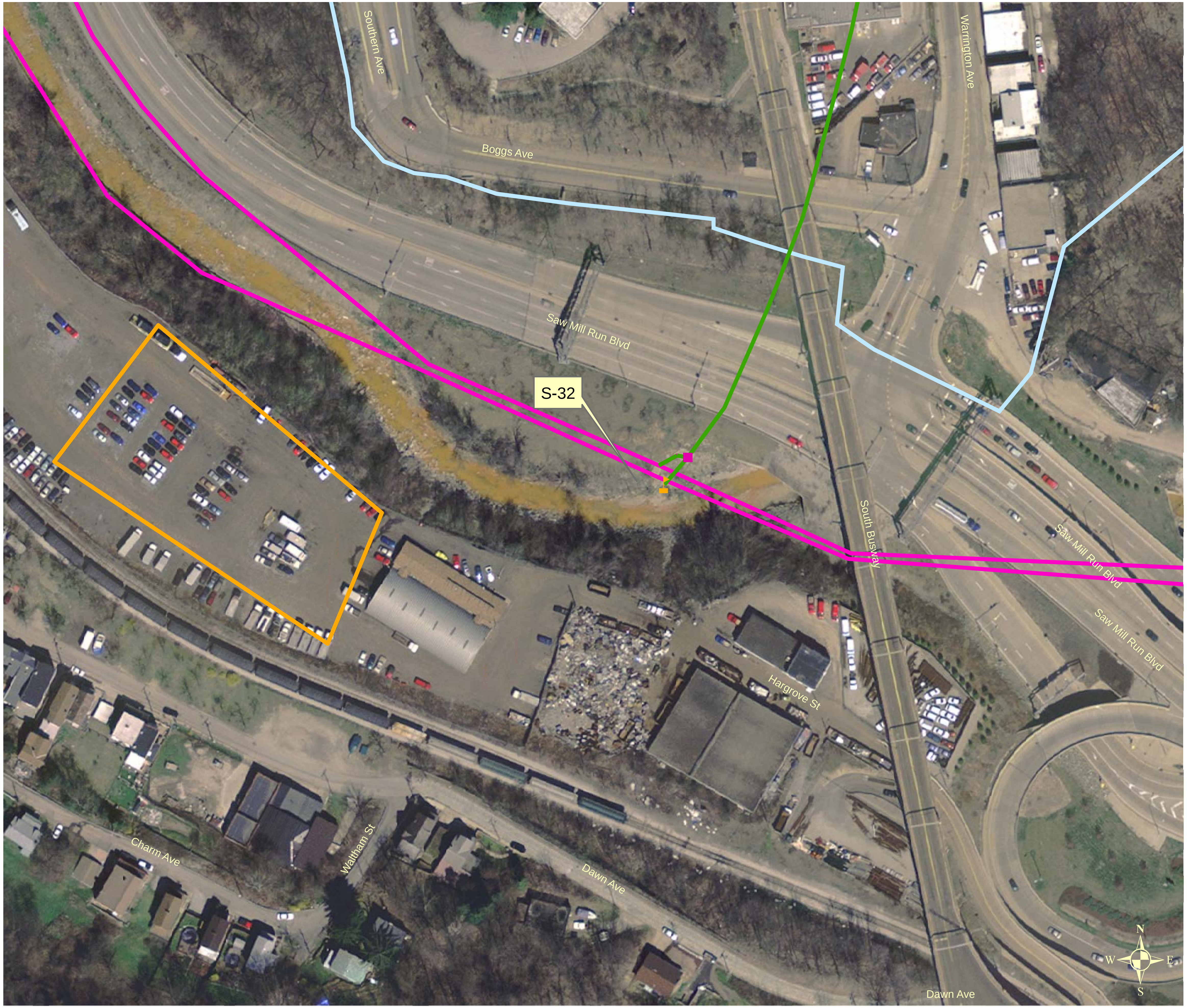


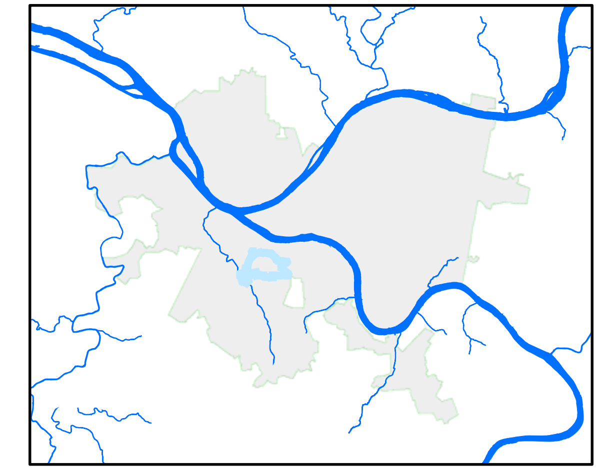












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100
Feet

Attachment 4
S-32
Facilities Boundary Map
Warrington Ave. Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0244.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	4	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: CS4-Separation		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	1	1	1	1	1
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: CS4-Separation		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: CS4-Separation		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	5	5	5	5	5
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	3	5	5	5	4
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	4	4	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	4	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

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Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	1	1	1	1	1
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	1	1	1	1	1
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T3-CSOTF		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	1	1	1	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	2	2	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.680**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.743**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.764**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.769**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.769**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.752**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.720**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.720**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.459**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.496**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.496**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.496**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.528**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Total Score

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

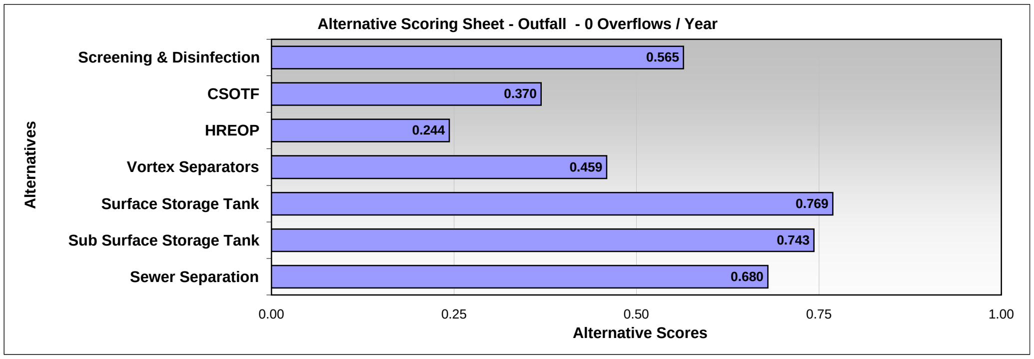
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

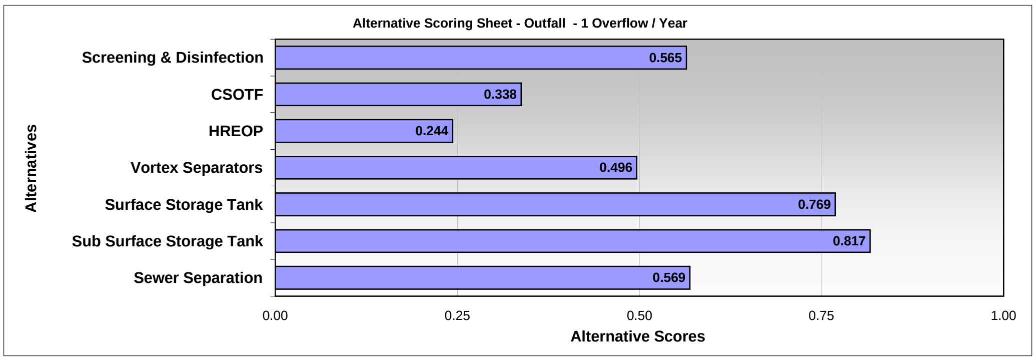
Total Score

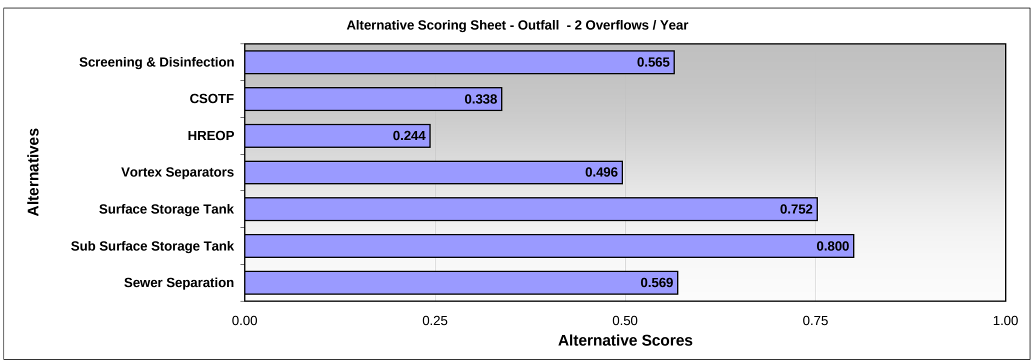
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

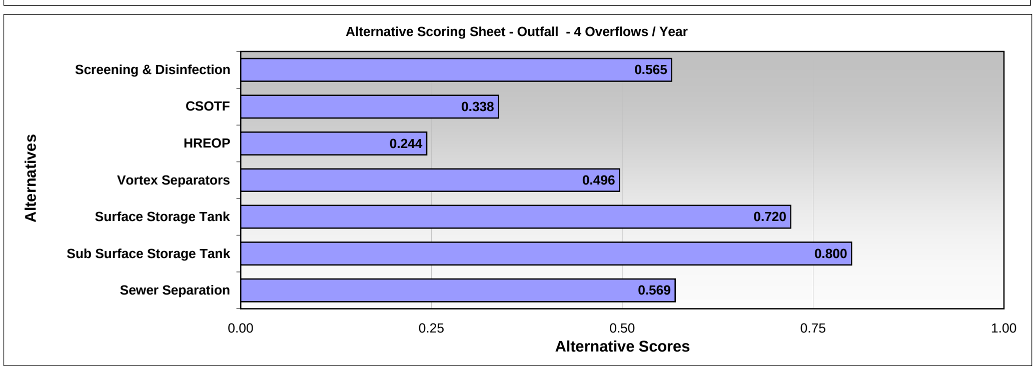
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.565**

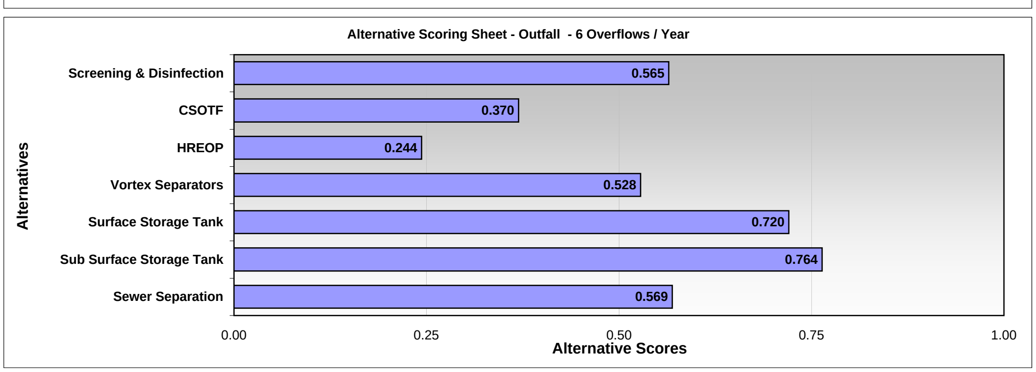
Alternative Scoring Sheet











RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	0	
Peak Volume	522,754	CF
	3.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	73.10	CFS
	47.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)				**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		125		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**24,920,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		54,276		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**109,000**		
			TOTAL CAPITAL COST $	**25,068,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	0	
Peak Volume	522,754	CF
	3.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	73.10	CFS
	47.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001			
SURFACE STORAGE TANK			
0 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	3.91	523,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	4.60	615,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	Sufficient Depth	Ref: Tech Parmtrs, Rev as Req'd
Length (Ft)	249		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)	166		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)	4.64	620,010	Sufficient Volume
Tank Area (SF)	41,000		= Length x Width
Construction Cost (Storage Tank)	**4,168,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Rev as Req'd Ref: Tech Par
Influent Pumping Rate (MGD / CFS)	47.24	73.10	= Peak Rate
Force Main Diameter (In)	47		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 7,415,000**	**$ 56,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	73.10		Ref: Technical Parameters
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,288		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe)	**$ 4,120,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	923,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	4,620		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$ 304,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	47.24		Ref: CSO Statistics
Construction Cost (Screening)	**$ 2,600,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		Typ 2, Rev as Req'd
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes / Detention (Min)		No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$ -	$ -	
Construction Cost (Disinfection)	**$ -**		No Disinfection
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators)	**$ 39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	77,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 154,000**		
		TOTAL CAPITAL COST	**$ 18,856,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	0	
Peak Volume	522,754	CF
	3.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	73.10	CFS
	47.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SUB-SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank Default Value	
Sizing Basis: Peak Volume (MG / CF)		3.91	523,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.60	615,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	Sufficient Depth	Ref: Tech Parameters, Rev as Req'd
Length (Ft)		249		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		166		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.64	620,010	Sufficient Volume
Tank Area (SF)		41,000		= Length x Width
Construction Cost (Storage Tank)		**12,956,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		3.91	6.05	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		14		Input by Engineer
Force Main Velocity (FPS)		5.7	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,035,000**	**$ 23,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		73.10		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**4,120,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		923,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		46,150		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,844,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		47.24		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,600,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		Typ 2, Rev as Req'd
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		No Disinfection
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		77,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**154,000**		
			TOTAL CAPITAL COST $	**23,771,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	0	
Peak Volume	522,754	CF
	3.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	73.10	CFS
	47.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
0 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		47.24	73.10	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		5		
Construction Cost (Swirl / Vortex)	**$**	**3,183,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		51.97	80.41	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		50		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,991,000**	**$ 60,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		73.10		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**4,120,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		144,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		7,200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**430,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		47.24		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,600,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		51.97		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		113	54	
Passes / Detention (Min)		5	15.18	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,314,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		49,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**98,000**		
			TOTAL CAPITAL COST $	**20,095,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	0	
Peak Volume	522,754	CF
	3.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	73.10	CFS
	47.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001

SEDIMENTATION BASIN (CSOTF)

0 Overflows / Year

Parameter	$	Value		Reference
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		47.24	73.10	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		7,900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		127	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		63	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.72	96,012	
Construction Cost (CSOTF)	**$**	**16,389,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		47.24	73.10	= Peak Flow x % Req Pump
Force Main Diameter (In)		47		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,415,000**	**$ 56,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		73.10		Ref: CSO Statistics
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**4,120,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		144,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		7,200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**430,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		47.24		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,600,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		47.24		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		108	52	
Passes / Detention (Min)		5	15.37	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,237,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		24,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**		
			TOTAL CAPITAL COST $	**32,334,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	0	
Peak Volume	522,754	CF
	3.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	73.10	CFS
	47.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
0 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		47.24	73.10	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		560		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		34	**OK**	Input by Engineer
Width (Ft)		17	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**8,794,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		51.97	80.41	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		50		Input by Engineer
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,991,000**	**$ 60,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		73.10		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**4,120,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		14,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		700		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**69,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		47.24		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,600,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		51.97		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		113	54	Input by Engineer
Passes / Detention (Min)		5	**15.18**	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,314,000	$ 1,353,000	
Construction Cost (Disinfection)	**$**	**2,667,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		44,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**88,000**		
			TOTAL CAPITAL COST $	**26,428,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	0	
Peak Volume	522,754	CF
	3.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	73.10	CFS
	47.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001

SCREENING AND DISINFECTION

0 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		47.24		73.10	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,600,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		47.24		73.10	= Peak Flow x % Req Pump
Force Main Diameter (In)		47			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,415,000**	**$**	**56,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		73.10			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**4,120,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		14,600			=CFS x 200
Odor Control Flow Rate (CFM)		730			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**72,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		47.24			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		108		52	
Passes / Detention (Min)		5		**15.37**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,237,000	$	1,278,000	
Construction Cost (Disinfection)	**$**	**2,515,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		27,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**			
				TOTAL CAPITAL COST $	**16,871,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	1	
Peak Volume	255,053	CF
	1.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	49.16	CFS
	31.77	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		125		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**24,920,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		54,276		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**109,000**		
			TOTAL CAPITAL COST $	**25,068,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	1	
Peak Volume	255,053	CF
	1.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	49.16	CFS
	31.77	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SURFACE STORAGE TANK				
1 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.91	255,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.24	300,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		174		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		116		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.26	302,760	**Sufficient Volume**
Tank Area (SF)		20,000		= Length x Width
Construction Cost (Storage Tank)		**1,907,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		31.77	49.16	= Peak Rate
Force Main Diameter (In)		39		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,528,000**	**$ 47,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		49.16		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		450,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,250		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**173,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		31.77		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,883,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		48,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**96,000**		
			TOTAL CAPITAL COST $	**12,426,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	1	
Peak Volume	255,053	CF
	1.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	49.16	CFS
	31.77	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001

SUB-SURFACE STORAGE TANK

1 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.91		255,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.24		300,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		Sufficient Depth	Ref: Tech Parameters, Rev as Req'd
Length (Ft)		174			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		116			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.26		302,760	Sufficient Volume
Tank Area (SF)		20,000			= Length x Width
Construction Cost (Storage Tank)		**6,789,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		1.91		2.95	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		9			Input by Engineer
Force Main Velocity (FPS)		6.7		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,692,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		49.16			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		450,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		22,500			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,050,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		31.77			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,883,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			Typ 2, Rev as Req'd
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			No Disinfection
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		48,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**96,000**			
			TOTAL CAPITAL COST	**$**	**14,321,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	1	
Peak Volume	255,053	CF
	1.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	49.16	CFS
	31.77	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
1 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	31.77	49.16	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	34.95	54.08	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	41		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**5,915,000**	**$ 49,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	49.16		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,288		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**2,753,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	31.77		Ref: CSO Statistics
Construction Cost (Screening) $	**1,883,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	34.95		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	93	45	
Passes	3	**15.48**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**1,024,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	33,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**66,000**		
		TOTAL CAPITAL COST $	**11,989,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	1	
Peak Volume	255,053	CF
	1.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	49.16	CFS
	31.77	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001

SEDIMENTATION BASIN (CSOTF)

1 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		31.77	49.16	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		5,300		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		104	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		52	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.49	64,896	
Construction Cost (CSOTF)	**$**	**16,372,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		31.77	49.16	= Peak Flow x % Req Pump
Force Main Diameter (In)		39		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,528,000**	**$ 47,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		49.16		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		97,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,850		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**315,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		31.77		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,883,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		31.77		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		89	42	
Passes		3	15.21	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**967,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		18,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**36,000**		
			TOTAL CAPITAL COST $	**27,940,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	1	
Peak Volume	255,053	CF
	1.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	49.16	CFS
	31.77	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		31.77		49.16	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		380			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		29		**OK**	Input by Engineer
Width (Ft)		14		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**6,259,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		34.95		54.08	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		41			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,915,000**	**$**	**49,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		49.16			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		10,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		500			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**53,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		31.77			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,883,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		34.95			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		93		45	Input by Engineer
Passes		3		**15.48**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,024,000	$	907,000	
Construction Cost (Disinfection)	**$**	**1,931,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		37,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**74,000**			
				TOTAL CAPITAL COST $	**18,956,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	1	
Peak Volume	255,053	CF
	1.91	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	49.16	CFS
	31.77	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		31.77		49.16	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,883,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		31.77		49.16	= Peak Flow x % Req Pump
Force Main Diameter (In)		39			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,528,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		49.16			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,800			=CFS x 200
Odor Control Flow Rate (CFM)		490			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**52,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		31.77			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		89		42	
Passes		3		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	967,000	$	842,000	
Construction Cost (Disinfection)	**$**	**1,809,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		26,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST $	**12,163,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	2	
Peak Volume	200,012	CF
	1.50	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	43.70	CFS
	28.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		125		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**24,920,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		54,276		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**109,000**		
			TOTAL CAPITAL COST $	**25,068,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	2	
Peak Volume	200,012	CF
	1.50	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	43.70	CFS
	28.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001

SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.50	200,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.76	235,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		154		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		103		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.78	237,930	**Sufficient Volume**
Tank Area (SF)		16,000		= Length x Width
Construction Cost (Storage Tank)		**1,463,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		28.24	43.70	= Peak Rate
Force Main Diameter (In)		37		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,097,000**	**$ 45,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		43.70		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		353,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,770		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**143,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		28.24		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,720,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		41,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**82,000**		
			TOTAL CAPITAL COST $	**11,342,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	2	
Peak Volume	200,012	CF
	1.50	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	43.70	CFS
	28.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001			
SUB-SURFACE STORAGE TANK			
2 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	1.50	200,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	1.76	235,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	154		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	103		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	1.78	237,930	**Sufficient Volume**
Tank Area (SF)	16,000		= Length x Width
Construction Cost (Storage Tank)	**5,522,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.50	2.31	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	8		Input by Engineer
Force Main Velocity (FPS)	6.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,556,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	43.70		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,288		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**2,753,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	353,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	17,650		= ACH x Volume / 60
Construction Cost (Odor Control) $	**868,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	28.24		Ref: CSO Statistics
Construction Cost (Screening) $	**1,720,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	41,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**82,000**		
		TOTAL CAPITAL COST $	**12,558,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	2	
Peak Volume	200,012	CF
	1.50	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	43.70	CFS
	28.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001

SWIRL CONCENTRATOR / VORTEX SEPARATOR

2 Overflows / Year

1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		28.24	43.70	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		31.07	48.07	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		38		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,442,000**	**$ 46,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		43.70		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.24		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,720,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		31.07		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		88	42	
Passes		3	**15.38**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**954,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		29,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**58,000**		
			TOTAL CAPITAL COST	**$ 11,272,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	2	
Peak Volume	200,012	CF
	1.50	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	43.70	CFS
	28.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001

SEDIMENTATION BASIN (CSOTF)

2 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		28.24	43.70	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		4,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		99	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		49	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.44	58,212	
Construction Cost (CSOTF)	**$**	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		28.24	43.70	= Peak Flow x % Req Pump
Force Main Diameter (In)		37		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,097,000**	**$ 45,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		43.70		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		87,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**290,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.24		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,720,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		28.24		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		84	40	
Passes		3	**15.38**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**902,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		16,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**32,000**		
			TOTAL CAPITAL COST $	**27,249,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	2	
Peak Volume	200,012	CF
	1.50	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	43.70	CFS
	28.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
2 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		28.24	43.70	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		340		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		27	OK	Input by Engineer
Width (Ft)		14	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**5,687,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		31.07	48.07	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		38		Input by Engineer
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,442,000**	**$ 46,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		43.70		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		450		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		28.24		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,720,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		31.07		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		88	42	Input by Engineer
Passes		3	15.38	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	954,000	$ 834,000	
Construction Cost (Disinfection)	**$**	**1,788,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		35,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**		
			TOTAL CAPITAL COST $	**17,594,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	2	
Peak Volume	200,012	CF
	1.50	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	43.70	CFS
	28.24	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SCREENING AND DISINFECTION				
2 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		28.24	43.70	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,720,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		28.24	43.70	= Peak Flow x % Req Pump
Force Main Diameter (In)		37		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,097,000**	**$ 45,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		43.70		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,700		=CFS x 200
Odor Control Flow Rate (CFM)		440		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**48,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		28.24		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		84	40	
Passes		3	**15.38**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	902,000	$ 782,000	
Construction Cost (Disinfection)	**$**	**1,684,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		25,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**11,436,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	4	
Peak Volume	171,946	CF
	1.29	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	39.42	CFS
	25.48	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		125		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**24,920,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		54,276		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**109,000**		
			TOTAL CAPITAL COST $	**25,068,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	4	
Peak Volume	171,946	CF
	1.29	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	39.42	CFS
	25.48	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001			
SURFACE STORAGE TANK			
4 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	1.29	172,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	1.51	202,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	143		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	96		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	1.54	205,920	**Sufficient Volume**
Tank Area (SF)	14,000		= Length x Width
Construction Cost (Storage Tank)	**1,241,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	25.48	39.42	= Peak Rate
Force Main Diameter (In)	35		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**4,760,000**	**$ 43,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	39.42		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,288		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**2,753,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	303,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	1,520		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**127,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	25.48		Ref: CSO Statistics
Construction Cost (Screening) $	**1,592,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	38,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**76,000**		
		TOTAL CAPITAL COST $	**10,631,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	4	
Peak Volume	171,946	CF
	1.29	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	39.42	CFS
	25.48	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001			
SUB-SURFACE STORAGE TANK			
4 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	1.29	172,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	1.51	202,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	143		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	96		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	1.54	205,920	**Sufficient Volume**
Tank Area (SF)	14,000		= Length x Width
Construction Cost (Storage Tank)	**4,875,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.29	1.99	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	8		Input by Engineer
Force Main Velocity (FPS)	5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,378,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	39.42		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,288		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**2,753,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	303,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	15,150		= ACH x Volume / 60
Construction Cost (Odor Control) $	**770,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	25.48		Ref: CSO Statistics
Construction Cost (Screening) $	**1,592,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	38,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**76,000**		
		TOTAL CAPITAL COST $	**11,501,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	4	
Peak Volume	171,946	CF
	1.29	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	39.42	CFS
	25.48	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
4 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		25.48	39.42	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		28.02	43.36	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		36		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,071,000**	**$ 44,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		39.42		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		25.48		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,592,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		28.02		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		83	40	
Passes		3	**15.31**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**898,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		26,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**		
			TOTAL CAPITAL COST $	**10,709,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	4	
Peak Volume	171,946	CF
	1.29	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	39.42	CFS
	25.48	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		25.48	39.42	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		4,300		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		94	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		47	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.40	53,016	
Construction Cost (CSOTF)	**$**	**16,370,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		25.48	39.42	= Peak Flow x % Req Pump
Force Main Diameter (In)		35		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,760,000**	**$ 43,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		39.42		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		80,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,000		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**271,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		25.48		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,592,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		25.48		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		80	38	
Passes		3	**15.42**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**850,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		15,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**30,000**		
			TOTAL CAPITAL COST $	**26,708,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	4	
Peak Volume	171,946	CF
	1.29	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	39.42	CFS
	25.48	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
4 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		25.48		39.42	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		300			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		25		OK	Input by Engineer
Width (Ft)		13		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**5,241,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		28.02		43.36	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		36			Input by Engineer
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,071,000**	**$**	**44,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		39.42			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		25.48			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,592,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		28.02			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		83		40	Input by Engineer
Passes		3		15.31	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	898,000	$	775,000	
Construction Cost (Disinfection)	**$**	**1,673,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		34,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**			
			TOTAL CAPITAL COST	**$**	**16,526,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	4	
Peak Volume	171,946	CF
	1.29	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	39.42	CFS
	25.48	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		25.48		39.42	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,592,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		25.48		39.42	= Peak Flow x % Req Pump
Force Main Diameter (In)		35			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,760,000**	**$**	**43,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		39.42			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**2,753,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,900			=CFS x 200
Odor Control Flow Rate (CFM)		400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		25.48			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		80		38	
Passes		3		**15.42**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	850,000	$	732,000	
Construction Cost (Disinfection)	**$**	**1,582,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		25,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST $	**10,864,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	6	
Peak Volume	129,567	CF
	0.97	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	19.83	CFS
	12.82	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		125		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**24,920,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		54,276		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**109,000**		
			TOTAL CAPITAL COST $	**25,068,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	6	
Peak Volume	129,567	CF
	0.97	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	19.83	CFS
	12.82	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001

SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.97	130,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	1.14	153,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	125		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	83		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	1.16	155,625	**Sufficient Volume**
Tank Area (SF)	10,000		= Length x Width
Construction Cost (Storage Tank)	**911,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	12.82	19.83	= Peak Rate
Force Main Diameter (In)	25		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**3,215,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	19.83		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,288		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**2,057,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	230,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	1,150		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**102,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	12.82		Ref: CSO Statistics
Construction Cost (Screening) $	**1,006,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	34,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**68,000**		
		TOTAL CAPITAL COST $	**7,431,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	6	
Peak Volume	129,567	CF
	0.97	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	19.83	CFS
	12.82	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001

SUB-SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.97		130,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.14		153,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		125			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		83			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.16		155,625	**Sufficient Volume**
Tank Area (SF)		10,000			= Length x Width
Construction Cost (Storage Tank)		**3,899,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.97		1.50	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		7			Input by Engineer
Force Main Velocity (FPS)		5.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,108,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		19.83			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**2,057,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		230,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,500			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**621,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		12.82			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,006,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		34,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**			
				TOTAL CAPITAL COST $	**8,815,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	6	
Peak Volume	129,567	CF
	0.97	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	19.83	CFS
	12.82	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
6 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	12.82	19.83	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	14.10	21.82	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	26		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**3,372,000**	**$ 34,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	19.83		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,288		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**2,057,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	12.82		Ref: CSO Statistics
Construction Cost (Screening) $	**1,006,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	14.10		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	59	29	
Passes	3	**15.69**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**629,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	13,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**26,000**		
		TOTAL CAPITAL COST $	**7,423,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	6	
Peak Volume	129,567	CF
	0.97	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	19.83	CFS
	12.82	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001			
SEDIMENTATION BASIN (CSOTF)			
6 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	12.82	19.83	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	2,200		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	67	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)	34	Area OK	= Area Req'd / Length
Max Length : Width Ratio	3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)	0.20	27,336	
Construction Cost (CSOTF) $	**16,378,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)	12.82	19.83	= Peak Flow x % Req Pump
Force Main Diameter (In)	25		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.8	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**3,215,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	19.83		Ref: CSO Statistics
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	3,288		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**2,057,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	41,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	2,050		= ACH x Volume / 60
Construction Cost (Odor Control) $	**161,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	12.82		Ref: CSO Statistics
Construction Cost (Screening) $	**1,006,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow (MGD)	12.82		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	57	27	
Passes	3	15.52	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**603,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	10,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**20,000**		
		TOTAL CAPITAL COST $	**23,512,000**

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RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	6	
Peak Volume	129,567	CF
	0.97	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	19.83	CFS
	12.82	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
6 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		12.82	19.83	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		160		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		19	**OK**	Input by Engineer
Width (Ft)		9	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**3,217,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		14.10	21.82	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		26		Input by Engineer
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,372,000**	**$ 34,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		19.83		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**2,057,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		12.82		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,006,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		14.10		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		59	29	Input by Engineer
Passes		3	**15.69**	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	629,000	$ 508,000	
Construction Cost (Disinfection)	**$**	**1,137,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		28,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**		
			TOTAL CAPITAL COST $	**10,944,000**

RESULTS SUMMARY		
Number of Events / Year	69	
Number of Overflows / Year	6	
Peak Volume	129,567	CF
	0.97	MG
Total Volume	3,464,571	CF
	25.91	MG
Peak Rate	19.83	CFS
	12.82	MGD

Capital Costs - / Sewershed DC 034E001 and DC 035M001					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		12.82		19.83	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,006,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		12.82		19.83	= Peak Flow x % Req Pump
Force Main Diameter (In)		25			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,215,000**	**$**	**33,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		19.83			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		3,288			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**2,057,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=CFS x 200
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		12.82			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		57		27	
Passes		3		**15.52**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	603,000	$	479,000	
Construction Cost (Disinfection)	**$**	**1,082,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
			TOTAL CAPITAL COST	**$**	**7,506,000**

Operation and Maintenance Costs

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	47.24	$247,006	20	10.910	$2,694,824
	Tank O&M	No. Events / Yr	69	$52,814	50	14.484	$764,931
		Const Cost ($)	$4,168,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	47	$11,759	20	10.910	$128,290
	Odor Control O&M	Capacity (cfm)	4,620	$16,170	20	10.910	$176,414
	Reserve / Replace	10% Gravity / 15% Pump					$38,152
			Total Annual O&M	**$328,000**		**Total PW O&M**	**$3,803,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.91	$46,745	20	10.910	$509,987
	Tank O&M	No. Events / Yr	69	$74,784	50	14.484	$1,083,135
		Const Cost ($)	$12,956,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	47	$11,759	20	10.910	$128,290
	Odor Control O&M	Capacity (cfm)	46,150	$161,525	20	10.910	$1,762,228
	Reserve / Replace	10% Gravity / 15% Pump					$20,390
			Total Annual O&M	**$295,000**		**Total PW O&M**	**$3,504,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	47.24	$247,006	20	10.910	$2,694,824
	Sed. Basin O&M	Flow Rate (mgd)	47.24	$5,315	50	14.484	$76,977
	Screening O&M	Flow Rate (mgd)	47.24	$11,759	20	10.910	$128,290
	Disinfection O&M	Flow Rate (mgd)	47.24	$168,379	20	10.910	$1,837,003
	Odor Control O&M	Capacity (cfm)	7,200.00	$25,200	20	10.910	$274,930
	Reserve / Replace	10% Gravity / 15% Pump					$41,859
			Total Annual O&M	**$458,000**		**Total PW O&M**	**$5,054,000**

Operation and Maintenance Costs

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	51.97	$263,246	20	10.910	$2,872,003
	HREP O&M	Flow Rate (mgd)	47.24	$224,843	20	10.910	$2,453,027
	Screening O&M	Flow Rate (mgd)	47.24	$11,759	20	10.910	$128,290
	Disinfection O&M	Flow Rate (mgd)	51.97	$178,445	20	10.910	$1,946,822
	Odor Control O&M	Capacity (cfm)	700.00	$2,450	20	10.910	$26,729
	Reserve / Replace	10% Gravity / 15% Pump					$67,357
			Total Annual O&M	**$681,000**		**Total PW O&M**	**$7,494,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	51.97	$263,246	20	10.910	$2,872,003
	Swirl / Vortex O&M	Flow Rate (mgd)	47.24	$5,315	20	10.910	$57,983
	Screening O&M	Flow Rate (mgd)	47.24	$11,759	20	10.910	$128,290
	Disinfection O&M	Flow Rate (mgd)	51.97	$178,445	20	10.910	$1,946,822
	Odor Control O&M	Capacity (cfm)	7,200.00	$25,200	20	10.910	$274,930
	Reserve / Replace	10% Gravity / 15% Pump					$48,748
			Total Annual O&M	**$484,000**		**Total PW O&M**	**$5,329,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	47.24	$247,006	20	10.910	$2,694,824
	Screening O&M	Flow Rate (mgd)	47.24	$11,759	20	10.910	$128,290
	Disinfection O&M	Flow Rate (mgd)	47.24	$168,379	20	10.910	$1,837,003
	Odor Control O&M	Capacity (cfm)	730.00	$2,555	20	10.910	$27,875
	Reserve / Replace	10% Gravity / 15% Pump					$40,886
			Total Annual O&M	**$430,000**		**Total PW O&M**	**$4,729,000**

Operation and Maintenance Costs

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	31.77	$189,496	20	10.910	$2,067,389
	Tank O&M	No. Events / Yr	69	$47,161	50	14.484	$683,062
		Const Cost ($)	$1,907,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	32	$10,253	20	10.910	$111,865
	Odor Control O&M	Capacity (cfm)	2,250	$7,875	20	10.910	$85,916
	Reserve / Replace	10% Gravity / 15% Pump					$28,147
			Total Annual O&M	**$255,000**		**Total PW O&M**	**$2,976,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.91	$28,941	20	10.910	$315,743
	Tank O&M	No. Events / Yr	69	$59,366	50	14.484	$859,834
		Const Cost ($)	$6,789,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	32	$10,253	20	10.910	$111,865
	Odor Control O&M	Capacity (cfm)	22,500	$78,750	20	10.910	$859,158
	Reserve / Replace	10% Gravity / 15% Pump					$14,881
			Total Annual O&M	**$178,000**		**Total PW O&M**	**$2,161,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	31.77	$189,496	20	10.910	$2,067,389
	Sed. Basin O&M	Flow Rate (mgd)	31.77	$3,574	50	14.484	$51,769
	Screening O&M	Flow Rate (mgd)	31.77	$10,253	20	10.910	$111,865
	Disinfection O&M	Flow Rate (mgd)	31.77	$132,229	20	10.910	$1,442,612
	Odor Control O&M	Capacity (cfm)	4,850.00	$16,975	20	10.910	$185,196
	Reserve / Replace	10% Gravity / 15% Pump					$31,163
			Total Annual O&M	**$353,000**		**Total PW O&M**	**$3,890,000**

Operation and Maintenance Costs

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	34.95	$201,955	20	10.910	$2,203,315
	HREP O&M	Flow Rate (mgd)	31.77	$178,055	20	10.910	$1,942,573
	Screening O&M	Flow Rate (mgd)	31.77	$10,253	20	10.910	$111,865
	Disinfection O&M	Flow Rate (mgd)	34.95	$140,134	20	10.910	$1,528,854
	Odor Control O&M	Capacity (cfm)	500.00	$1,750	20	10.910	$19,092
	Reserve / Replace	10% Gravity / 15% Pump					$49,209
			Total Annual O&M	**$533,000**		**Total PW O&M**	**$5,855,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	34.95	$201,955	20	10.910	$2,203,315
	Swirl / Vortex O&M	Flow Rate (mgd)	31.77	$3,574	20	10.910	$38,995
	Screening O&M	Flow Rate (mgd)	31.77	$10,253	20	10.910	$111,865
	Disinfection O&M	Flow Rate (mgd)	34.95	$140,134	20	10.910	$1,528,854
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$32,040
			Total Annual O&M	**$356,000**		**Total PW O&M**	**$3,915,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	31.77	$189,496	20	10.910	$2,067,389
	Screening O&M	Flow Rate (mgd)	31.77	$10,253	20	10.910	$111,865
	Disinfection O&M	Flow Rate (mgd)	31.77	$132,229	20	10.910	$1,442,612
	Odor Control O&M	Capacity (cfm)	490.00	$1,715	20	10.910	$18,711
	Reserve / Replace	10% Gravity / 15% Pump					$30,448
			Total Annual O&M	**$334,000**		**Total PW O&M**	**$3,671,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	28.24	$175,164	20	10.910	$1,911,031
	Tank O&M	No. Events / Yr	69	$46,051	50	14.484	$666,985
		Const Cost ($)	$1,463,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	28	$9,922	20	10.910	$108,252
	Odor Control O&M	Capacity (cfm)	1,770	$6,195	20	10.910	$67,587
	Reserve / Replace	10% Gravity / 15% Pump					$25,863
			Total Annual O&M	**$238,000**		**Total PW O&M**	**$2,780,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.50	$24,602	20	10.910	$268,411
	Tank O&M	No. Events / Yr	69	$56,199	50	14.484	$813,958
		Const Cost ($)	$5,522,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	28	$9,922	20	10.910	$108,252
	Odor Control O&M	Capacity (cfm)	17,650	$61,775	20	10.910	$673,961
	Reserve / Replace	10% Gravity / 15% Pump					$13,388
			Total Annual O&M	**$153,000**		**Total PW O&M**	**$1,878,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	28.24	$175,164	20	10.910	$1,911,031
	Sed. Basin O&M	Flow Rate (mgd)	28.24	$3,177	50	14.484	$46,020
	Screening O&M	Flow Rate (mgd)	28.24	$9,922	20	10.910	$108,252
	Disinfection O&M	Flow Rate (mgd)	28.24	$123,079	20	10.910	$1,342,784
	Odor Control O&M	Capacity (cfm)	4,350.00	$15,225	20	10.910	$166,104
	Reserve / Replace	10% Gravity / 15% Pump					$28,716
			Total Annual O&M	**$327,000**		**Total PW O&M**	**$3,603,000**

Operation and Maintenance Costs

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	31.07	$186,681	20	10.910	$2,036,677
	HREP O&M	Flow Rate (mgd)	28.24	$166,146	20	10.910	$1,812,645
	Screening O&M	Flow Rate (mgd)	28.24	$9,922	20	10.910	$108,252
	Disinfection O&M	Flow Rate (mgd)	31.07	$130,437	20	10.910	$1,423,058
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$45,079
			Total Annual O&M	**$495,000**		**Total PW O&M**	**$5,443,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	31.07	$186,681	20	10.910	$2,036,677
	Swirl / Vortex O&M	Flow Rate (mgd)	28.24	$3,177	20	10.910	$34,665
	Screening O&M	Flow Rate (mgd)	28.24	$9,922	20	10.910	$108,252
	Disinfection O&M	Flow Rate (mgd)	31.07	$130,437	20	10.910	$1,423,058
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$29,477
			Total Annual O&M	**$331,000**		**Total PW O&M**	**$3,632,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	28.24	$175,164	20	10.910	$1,911,031
	Screening O&M	Flow Rate (mgd)	28.24	$9,922	20	10.910	$108,252
	Disinfection O&M	Flow Rate (mgd)	28.24	$123,079	20	10.910	$1,342,784
	Odor Control O&M	Capacity (cfm)	440.00	$1,540	20	10.910	$16,801
	Reserve / Replace	10% Gravity / 15% Pump					$28,058
			Total Annual O&M	**$310,000**		**Total PW O&M**	**$3,407,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	25.48	$163,507	20	10.910	$1,783,850
	Tank O&M	No. Events / Yr	69	$45,496	50	14.484	$658,947
		Const Cost ($)	$1,241,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	25	$9,666	20	10.910	$105,454
	Odor Control O&M	Capacity (cfm)	1,520	$5,320	20	10.910	$58,041
	Reserve / Replace	10% Gravity / 15% Pump					$24,096
			Total Annual O&M	**$224,000**		**Total PW O&M**	**$2,630,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.29	$22,239	20	10.910	$242,622
	Tank O&M	No. Events / Yr	69	$54,581	50	14.484	$790,530
		Const Cost ($)	$4,875,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	25	$9,666	20	10.910	$105,454
	Odor Control O&M	Capacity (cfm)	15,150	$53,025	20	10.910	$578,500
	Reserve / Replace	10% Gravity / 15% Pump					$12,047
			Total Annual O&M	**$140,000**		**Total PW O&M**	**$1,729,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	25.48	$163,507	20	10.910	$1,783,850
	Sed. Basin O&M	Flow Rate (mgd)	25.48	$2,866	50	14.484	$41,512
	Screening O&M	Flow Rate (mgd)	25.48	$9,666	20	10.910	$105,454
	Disinfection O&M	Flow Rate (mgd)	25.48	$115,588	20	10.910	$1,261,054
	Odor Control O&M	Capacity (cfm)	4,000.00	$14,000	20	10.910	$152,739
	Reserve / Replace	10% Gravity / 15% Pump					$26,800
			Total Annual O&M	**$306,000**		**Total PW O&M**	**$3,371,000**

Operation and Maintenance Costs

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	28.02	$174,257	20	10.910	$1,901,134
	HREP O&M	Flow Rate (mgd)	25.48	$156,373	20	10.910	$1,706,023
	Screening O&M	Flow Rate (mgd)	25.48	$9,666	20	10.910	$105,454
	Disinfection O&M	Flow Rate (mgd)	28.02	$122,498	20	10.910	$1,336,442
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$41,840
			Total Annual O&M	**$465,000**		**Total PW O&M**	**$5,106,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	28.02	$174,257	20	10.910	$1,901,134
	Swirl / Vortex O&M	Flow Rate (mgd)	25.48	$2,866	20	10.910	$31,270
	Screening O&M	Flow Rate (mgd)	25.48	$9,666	20	10.910	$105,454
	Disinfection O&M	Flow Rate (mgd)	28.02	$122,498	20	10.910	$1,336,442
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$27,462
			Total Annual O&M	**$310,000**		**Total PW O&M**	**$3,402,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	25.48	$163,507	20	10.910	$1,783,850
	Screening O&M	Flow Rate (mgd)	25.48	$9,666	20	10.910	$105,454
	Disinfection O&M	Flow Rate (mgd)	25.48	$115,588	20	10.910	$1,261,054
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$26,185
			Total Annual O&M	**$291,000**		**Total PW O&M**	**$3,192,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	12.82	$103,329	20	10.910	$1,127,309
	Tank O&M	No. Events / Yr	69	$44,671	50	14.484	$646,998
		Const Cost ($)	$911,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	13	$8,528	20	10.910	$93,040
	Odor Control O&M	Capacity (cfm)	1,150	$4,025	20	10.910	$43,913
	Reserve / Replace	10% Gravity / 15% Pump					$16,131
			Total Annual O&M	**$161,000**		**Total PW O&M**	**$1,927,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.97	$18,408	20	10.910	$200,827
	Tank O&M	No. Events / Yr	69	$52,141	50	14.484	$755,190
		Const Cost ($)	$3,899,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	13	$8,528	20	10.910	$93,040
	Odor Control O&M	Capacity (cfm)	11,500	$40,250	20	10.910	$439,125
	Reserve / Replace	10% Gravity / 15% Pump					$8,946
			Total Annual O&M	**$120,000**		**Total PW O&M**	**$1,497,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	12.82	$103,329	20	10.910	$1,127,309
	Sed. Basin O&M	Flow Rate (mgd)	12.82	$1,442	50	14.484	$20,886
	Screening O&M	Flow Rate (mgd)	12.82	$8,528	20	10.910	$93,040
	Disinfection O&M	Flow Rate (mgd)	12.82	$76,062	20	10.910	$829,832
	Odor Control O&M	Capacity (cfm)	2,050.00	$7,175	20	10.910	$78,279
	Reserve / Replace	10% Gravity / 15% Pump					$17,932
			Total Annual O&M	**$197,000**		**Total PW O&M**	**$2,167,000**

Operation and Maintenance Costs

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	14.10	$110,122	20	10.910	$1,201,427
	HREP O&M	Flow Rate (mgd)	12.82	$104,403	20	10.910	$1,139,032
	Screening O&M	Flow Rate (mgd)	12.82	$8,528	20	10.910	$93,040
	Disinfection O&M	Flow Rate (mgd)	14.10	$80,609	20	10.910	$879,440
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$27,026
			Total Annual O&M	**$305,000**		**Total PW O&M**	**$3,348,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	14.10	$110,122	20	10.910	$1,201,427
	Swirl / Vortex O&M	Flow Rate (mgd)	12.82	$1,442	20	10.910	$15,732
	Screening O&M	Flow Rate (mgd)	12.82	$8,528	20	10.910	$93,040
	Disinfection O&M	Flow Rate (mgd)	14.10	$80,609	20	10.910	$879,440
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$18,205
			Total Annual O&M	**$201,000**		**Total PW O&M**	**$2,208,000**

DC 034E001 and DC 035M001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	12.82	$103,329	20	10.910	$1,127,309
	Screening O&M	Flow Rate (mgd)	12.82	$8,528	20	10.910	$93,040
	Disinfection O&M	Flow Rate (mgd)	12.82	$76,062	20	10.910	$829,832
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$17,564
			Total Annual O&M	**$189,000**		**Total PW O&M**	**$2,075,000**

Cost Summary

CS4-Separation — SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$25.1	$25,068,000	$0
1	$25.1	$25,068,000	$0
2	$25.1	$25,068,000	$0
4	$25.1	$25,068,000	$0
6	$25.1	$25,068,000	$0

S2-Sub Surf Tnk — SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$27.3	$23,771,000	$3,504,000
1	$16.5	$14,321,000	$2,161,000
2	$14.4	$12,558,000	$1,878,000
4	$13.2	$11,501,000	$1,729,000
6	$10.3	$8,815,000	$1,497,000

S4-Surf Tnk — SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$22.7	$18,856,000	$3,803,000
1	$15.4	$12,426,000	$2,976,000
2	$14.1	$11,342,000	$2,780,000
4	$13.3	$10,631,000	$2,630,000
6	$9.4	$7,431,000	$1,927,000

T1-Vortex — SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$25.4	$20,095,000	$5,329,000
1	$15.9	$11,989,000	$3,915,000
2	$14.9	$11,272,000	$3,632,000
4	$14.1	$10,709,000	$3,402,000
6	$9.6	$7,423,000	$2,208,000

T2-HREOP — HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$33.9	$26,428,000	$7,494,000
1	$24.8	$18,956,000	$5,855,000
2	$23.0	$17,594,000	$5,443,000
4	$21.6	$16,526,000	$5,106,000
6	$14.3	$10,944,000	$3,348,000

T3-CSOTF — SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$37.4	$32,334,000	$5,054,000
1	$31.8	$27,940,000	$3,890,000
2	$30.9	$27,249,000	$3,603,000
4	$30.1	$26,708,000	$3,371,000
6	$25.7	$23,512,000	$2,167,000

T4-Scr & Dis — SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$21.6	$16,871,000	$4,729,000
1	$15.8	$12,163,000	$3,671,000
2	$14.8	$11,436,000	$3,407,000
4	$14.1	$10,864,000	$3,192,000
6	$9.6	$7,506,000	$2,075,000

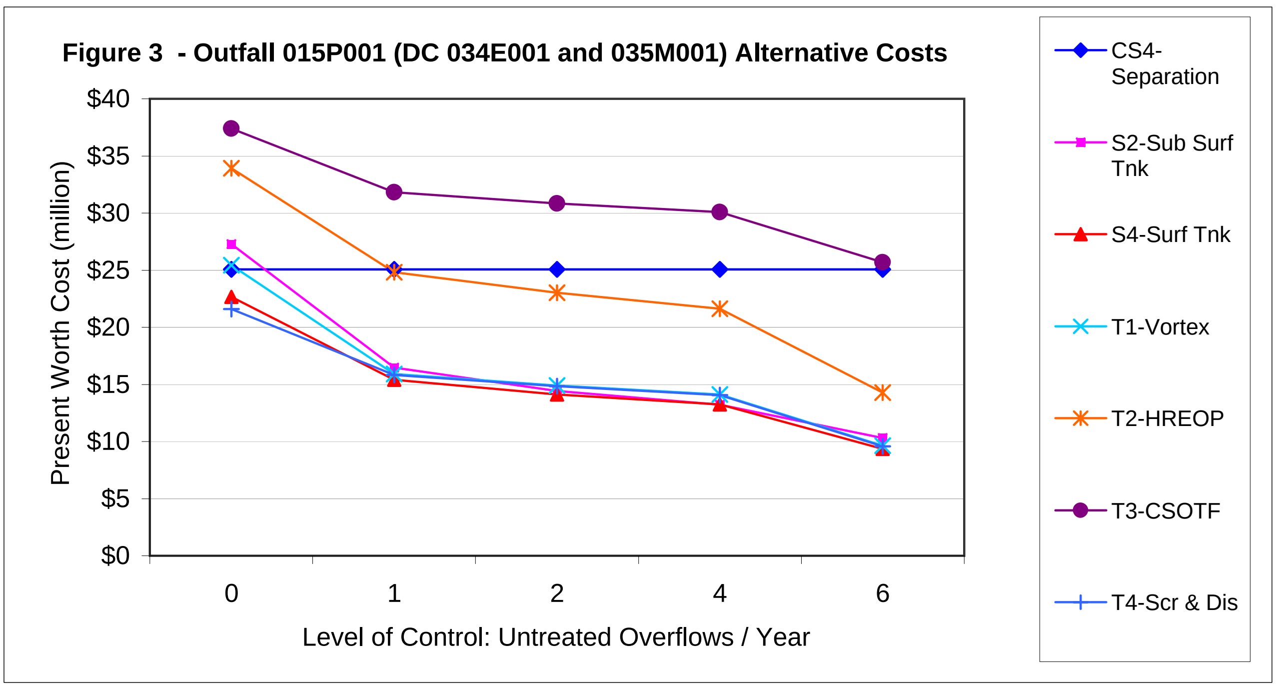


Figure 3 - Outfall 015P001 (DC 034E001 and 035M001) Alternative Costs
$40
$35
$30
$25
$20
$15
$10
$5
$0
Present Worth Cost (million)
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	DC 034E001 and DC 035M001
Location Name	
Model ID	DC 034E001 and DC 035M001.1
Structure Type	Diversion Chamber
PWSA Sewershed	Plummers Run
Stream of Discharge	Saw Mill Run
NPDES Permit Number	
Owner	

Results Summary

Number of Events:	69
Peak Volume:	522,754 ft^3
	3.91 MG
Total Volume:	3,464,571 ft^3
	25.92 MG
Peak Rate:	73.10 cfs

Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 0:46	2206	1/5/2005 14:45	522753.55	3910.458	0	14.50	11
5/13/2005 22:25	711	5/13/2005 22:45	255052.94	1907.924	1	73.10	0
10/24/2005 12:10	2175	10/25/2005 2:30	200011.89	1496.189	2	5.11	31
1/11/2005 8:36	1146	1/11/2005 17:15	177992.17	1331.470	3	9.16	19
11/29/2005 6:41	498	11/29/2005 11:30	171945.80	1286.241	4	12.40	16
11/14/2005 21:45	596	11/15/2005 3:45	131439.88	983.236	5	14.16	12
8/20/2005 18:20	188	8/20/2005 19:00	129567.48	969.230	6	49.16	1
1/3/2005 8:10	1092	1/3/2005 14:00	124291.65	929.764	7	5.47	30
3/28/2005 9:05	737	3/28/2005 19:15	122019.36	912.766	8	13.11	14
2/14/2005 5:17	1020	2/14/2005 10:00	117201.88	876.729	9	4.61	33
7/5/2005 16:30	180	7/5/2005 16:45	113573.69	849.588	10	39.42	4
7/26/2005 19:45	149	7/26/2005 20:15	104371.50	780.751	11	43.70	2
7/15/2005 17:35	155	7/15/2005 18:00	95383.58	713.517	12	40.63	3
10/21/2005 19:00	834	10/22/2005 6:45	87062.37	651.270	13	19.83	6
1/13/2005 22:41	365	1/14/2005 2:15	77425.64	579.182	14	8.32	20
12/15/2005 11:05	651	12/15/2005 14:00	70647.27	528.477	15	7.38	22
8/29/2005 9:05	444	8/29/2005 13:45	64909.62	485.556	16	15.64	9
4/23/2005 3:41	180	4/23/2005 4:05	62413.78	466.886	17	17.83	7
5/11/2005 22:35	184	5/11/2005 23:00	59511.03	445.172	18	13.08	15
4/1/2005 19:26	927	4/2/2005 6:50	58698.62	439.095	19	6.63	26
2/9/2005 15:10	218	2/9/2005 16:45	51854.95	387.901	20	15.01	10
7/21/2005 14:25	162	7/21/2005 14:45	51573.00	385.792	21	17.36	8
9/29/2005 5:15	168	9/29/2005 5:45	51547.56	385.602	22	20.49	5
3/23/2005 2:28	781	3/23/2005 12:45	47600.77	356.078	23	3.88	38
1/8/2005 1:32	447	1/8/2005 5:35	45446.78	339.965	24	7.14	24
2/20/2005 19:07	470	2/20/2005 20:30	45224.67	338.303	25	11.47	17
9/26/2005 5:40	338	9/26/2005 9:45	34702.87	259.595	26	5.76	28
10/7/2005 8:50	302	10/7/2005 11:00	34284.79	256.467	27	7.33	23
5/28/2005 8:25	184	5/28/2005 9:30	32331.24	241.854	28	7.74	21
11/16/2005 4:05	499	11/16/2005 4:20	24971.18	186.797	29	6.86	25
11/1/2005 15:06	221	11/1/2005 16:30	24336.00	182.045	30	4.87	32
10/22/2005 15:48	178	10/22/2005 16:45	23921.21	178.943	31	5.54	29
4/22/2005 15:55	244	4/22/2005 18:30	23209.01	173.615	32	3.83	39

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
11/9/2005 19:30	113	11/9/2005 19:45	22673.86	169.612	33	13.63	13
8/27/2005 15:15	103	8/27/2005 15:30	18581.38	138.998	34	10.60	18
4/30/2005 4:36	205	4/30/2005 6:45	17455.90	130.579	35	4.03	36
5/20/2005 2:41	503	5/20/2005 8:50	13497.30	100.967	36	1.60	52
3/27/2005 16:50	147	3/27/2005 18:00	13253.90	99.146	37	2.84	43
6/11/2005 17:36	135	6/11/2005 18:00	12980.34	97.099	38	6.45	27
7/17/2005 16:20	109	7/17/2005 16:45	12812.45	95.844	39	4.29	34
6/14/2005 18:55	105	6/14/2005 19:30	11905.67	89.060	40	4.17	35
10/21/2005 7:15	120	10/21/2005 7:45	9663.82	72.290	41	3.17	41
12/25/2005 11:09	190	12/25/2005 13:00	7702.78	57.621	42	2.56	46
5/14/2005 16:25	122	5/14/2005 17:00	7540.59	56.407	43	2.40	48
7/25/2005 13:20	258	7/25/2005 13:35	7372.85	55.153	44	3.62	40
11/8/2005 14:25	108	11/8/2005 15:15	6865.02	51.354	45	1.85	51
5/23/2005 16:30	91	5/23/2005 16:45	6799.71	50.865	46	4.01	37
5/30/2005 19:30	92	5/30/2005 20:00	6774.78	50.679	47	2.65	45
8/26/2005 20:50	147	8/26/2005 21:15	6726.30	50.316	48	2.48	47
6/3/2005 8:50	93	6/3/2005 9:15	6348.82	47.492	49	2.71	44
5/7/2005 12:10	142	5/7/2005 13:30	5670.43	42.418	50	2.87	42
8/8/2005 8:50	83	8/8/2005 9:15	4893.17	36.603	51	1.89	49
6/28/2005 18:09	81	6/28/2005 18:20	3862.34	28.892	52	1.89	50
5/28/2005 18:05	77	5/28/2005 18:30	3459.35	25.878	53	1.40	53
4/27/2005 0:27	86	4/27/2005 1:00	2812.39	21.038	54	1.25	55
2/16/2005 7:34	82	2/16/2005 8:15	2723.23	20.371	55	1.20	56
11/24/2005 8:10	252	11/24/2005 12:00	2273.48	17.007	56	0.42	62
4/20/2005 19:40	277	4/20/2005 23:30	2259.31	16.901	57	0.86	59
8/5/2005 11:10	62	8/5/2005 11:35	2081.59	15.571	58	1.08	57
9/16/2005 21:35	48	9/16/2005 21:50	1949.46	14.583	59	1.35	54
4/3/2005 1:55	296	4/3/2005 6:15	1537.37	11.500	60	0.71	60
10/24/2005 2:50	71	10/24/2005 3:15	1245.10	9.314	61	0.39	63
11/9/2005 4:30	62	11/9/2005 4:50	1194.40	8.935	62	0.52	61
9/23/2005 2:50	33	9/23/2005 3:05	977.33	7.311	63	0.98	58
1/30/2005 13:56	56	1/30/2005 14:30	568.11	4.250	64	0.24	65
3/8/2005 1:15	52	3/8/2005 1:45	335.52	2.510	65	0.17	66
11/23/2005 20:00	27	11/23/2005 20:15	252.76	1.891	66	0.27	64
12/26/2005 6:20	21	12/26/2005 6:30	132.29	0.990	67	0.17	67
3/20/2005 7:27	25	3/20/2005 7:45	109.99	0.823	68	0.11	68

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Partnering to achieve long term benefits PWSA CSO Team Metcalf & Eddy Baker/Wade-Trim

Structure ID	DC 034E001 and DC 035M001
Location Name	
Model ID	DC 034E001 and DC 035M001.1
Structure Type	Diversion Chamber
PWSA Sewershed	Plummers Run
Stream of Discharge	Saw Mill Run
NPDES Permit Number	
Owner	
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	69
Peak Volume:	522,754 ft^3
	3.91 MG
Total Volume:	3,464,571 ft^3
	25.92 MG
Peak Rate:	73.10 cfs

Figure 1 - Outfall 015P001 (DC 034E001 and DC 035M001)
CSO Volume

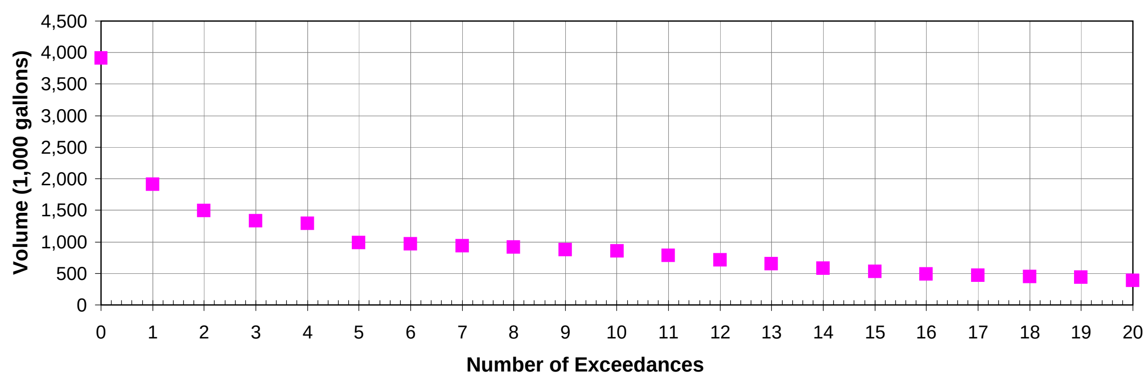
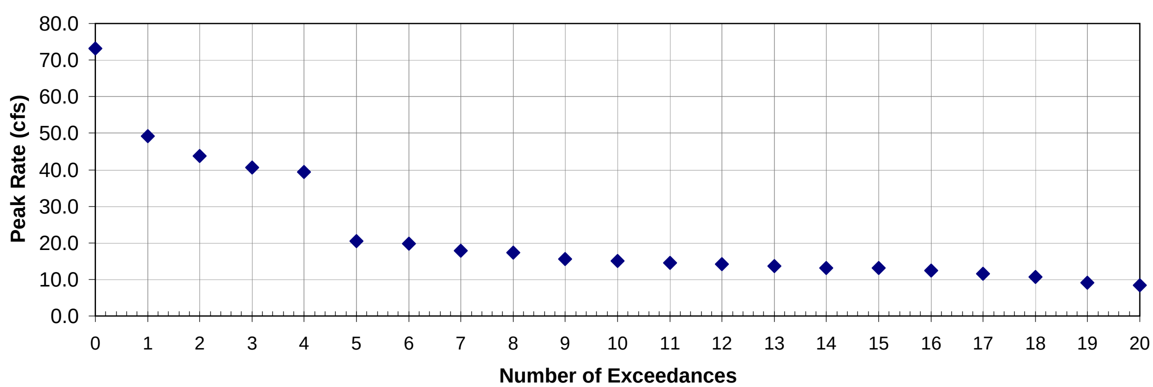


Figure 2 - Outfall 015P001 (DC 034E001 and DC 035M001)
CSO Peak Flow Rate



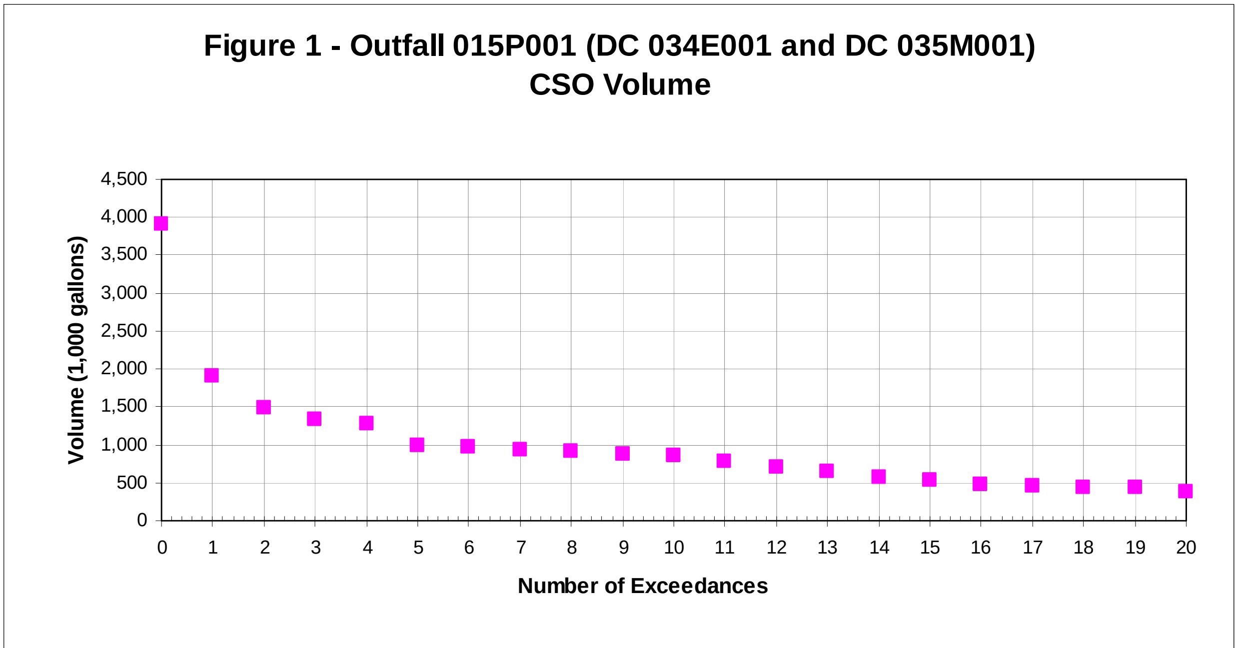
D.31.1 CSO 015P001 (DC 034E001 and DC 035M001) – PLUMMER'S RUN SEWERSHED – NPDES #015P001

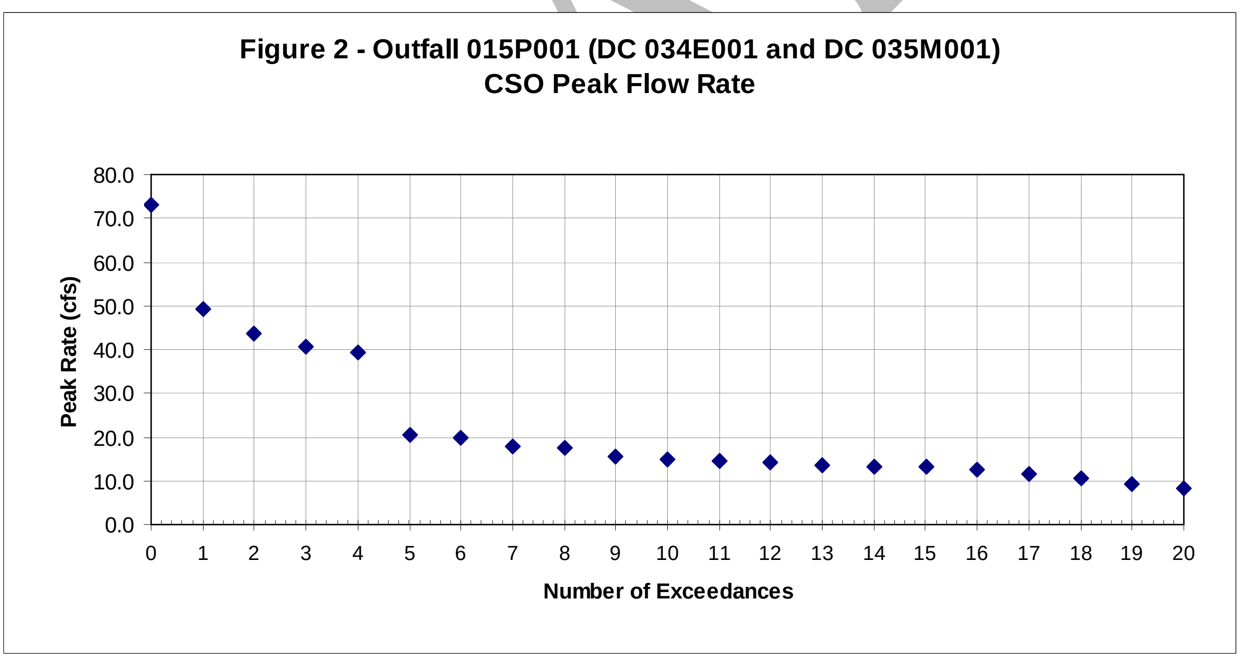
Description of Outfall

Outfall 015P001 (DC 034E001 and DC 035M001) conveys flows from the overflow portion of the Plummers Run trunk sewer to Saw Mill Run, and ultimately to the Ohio River. The outfall is located in the City of Pittsburgh at Saw Mill Run near the Liberty Tunnels. The tributary sewershed is called the Plummers Run Sewershed and is 611 acres of residential, commercial, and business users. The Plummers Run Sewershed is comprised of approximately 742 manholes and 167,939 linear feet (31.8 miles) of sanitary, combined, and storm sewers up to 89 inches in diameter. The sewersheds upstream of PWSA Diversion Structures 034E001 and 035M001 consist of 125 acres of residential, commercial, and business users. PWSA Diversion Structures 034N001, 035P001, 035S001, 062C001, 062D001, and 062K001 are not applicable to this analysis, along with their related acreages, manholes, and length of sewers, as they are considered either remote location or low flow structures. Similarly, PWSA Diversion Structures 062C002 and 062K001 are not applicable to this analysis, along with their related acreages, manholes, and length of sewers, as they have no overflow activations.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 015P001 (DC 034E001 and DC 035M001) typically experiences 69 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 015P001 (DC 034E001 and DC 035M001) is approximately 3.91 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 015P001 is approximately 73.1 CFS. *Figure 1 – Outfall 015P001 (DC 034E001 and DC 035M001) CSO Volume* and *Figure 2 – Outfall 015P001 (DC 034E001 and DC 035M001) CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.





Space appears to be extremely limited for storage or treatment facilities. A significant storage and treatment footprint is required for all control levels. The outfall is located in a very congested area of the Saw Mill Run area with critical infrastructure to the south and east, including the Liberty Tunnels and multiple lanes of Saw Mill Run Boulevard. Significant site work and property acquirement will be required to construct a storage or treatment facility near the outfall. The site is generally bounded by Saw Mill Run Boulevard to the south, the Liberty Tunnels to the east, Saw Mill Run and steep slopes to the north and private development to the west. A cursory review of available space upstream of the outfall was conducted. The area upstream of the outfall includes areas along West Liberty Avenue, which is significantly congested with critical infrastructure and underground utilities. Siting a storage or treatment facility upstream of the outfall also appears to be non-feasible.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 015P001 (DC 034E001 and DC 35M001). Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-015P001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-015P001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-015P001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-015P001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-015P001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-015P001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-015P001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 015P001 (DC 034E001 and DC 035M001) Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.

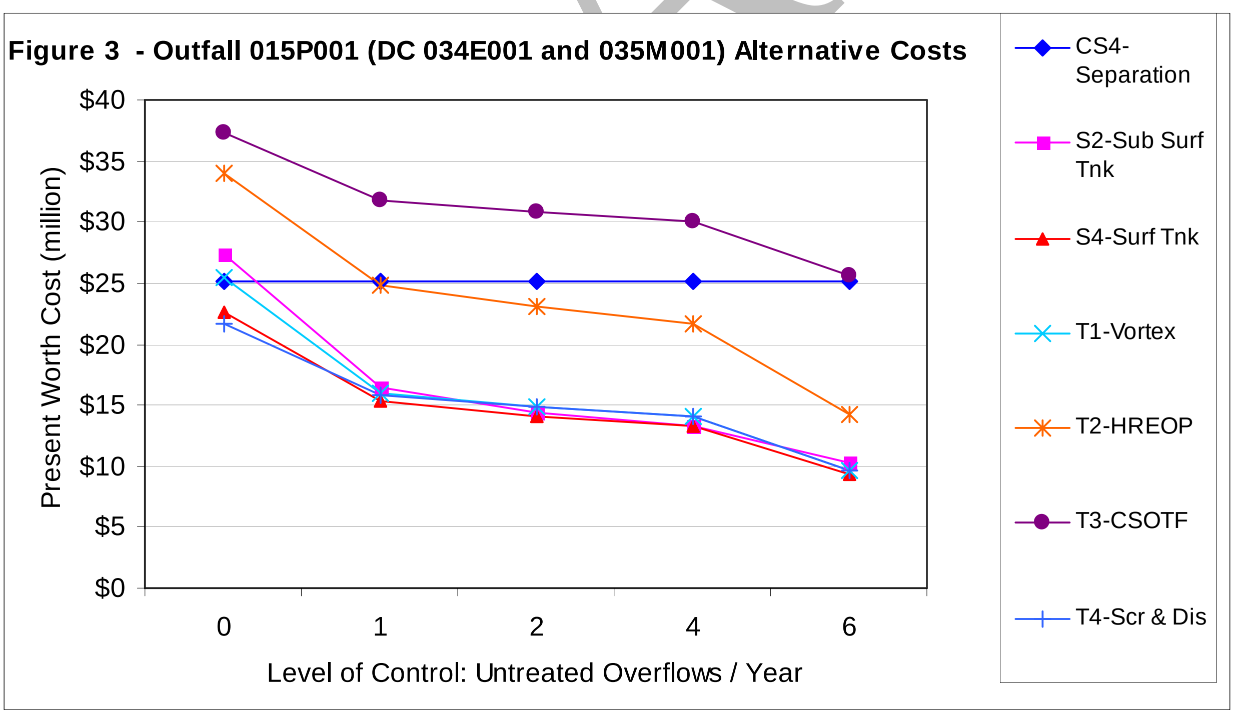


Figure 3 - Outfall 015P001 (DC 034E001 and 035M001) Alternative Costs

The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

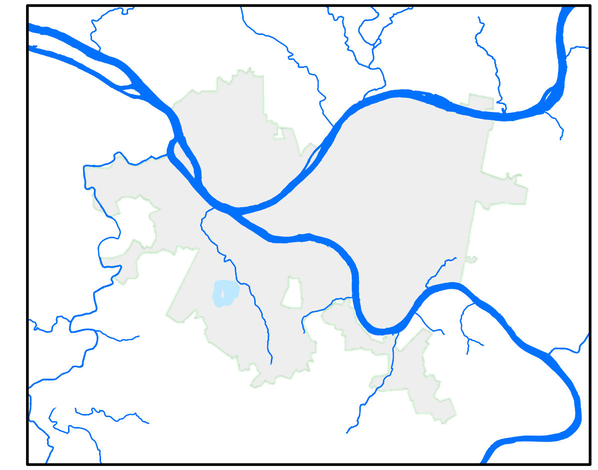
Recommendations

Based upon the above, for control level 0, it is recommended that Alternative S4-015P001: Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control levels 1 through 6, it is recommended that Alternative S2-015P001: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Space does not appear to be available for a sub-surface storage facility at any of the control levels. A significant amount of property acquisition and site work will be required to construct said facility near the outfall. The tank could be constructed with deeper sidewalls to reduce the required footprint for the facility. Significant permitting issues could arise with PennDOT to construct a control facility in this area.



Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- **Trunk Sewer**
- **PWSA Diversion Structure**
- **Combined Sewer Outfall**

400 0 400 Feet

Attachment 1
DC 034E001 and DC 035M001 (CSO 015P001) Tributary Area Map Plummers Run Sewershed

CSO Controls Alternatives

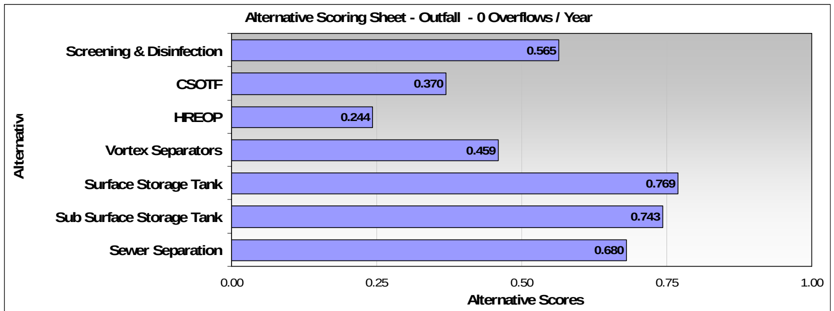
PWSA

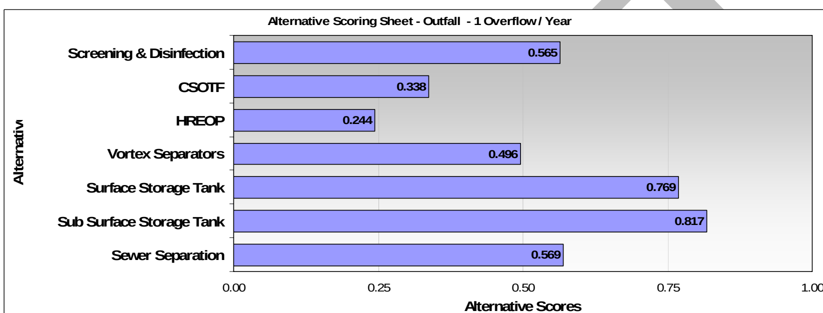
SW-D-0246.pdf

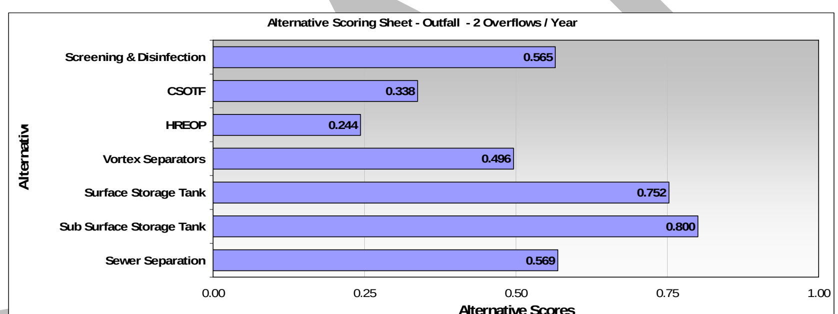
Attachment 2 - CSO Alternatives Development Worksheet

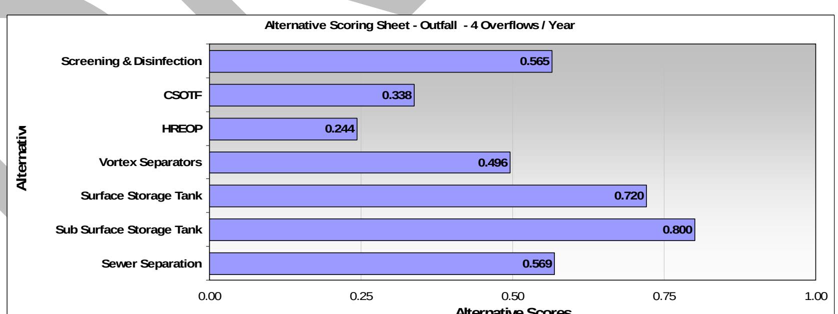
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	A relief sewer will not be evaluated.
Sewer separation	Y	Sewer separation within the 125 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

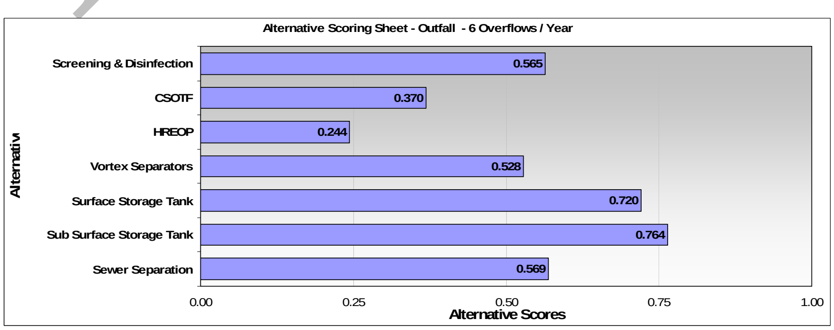
Attachment 3 – Alternative Scoring Sheet

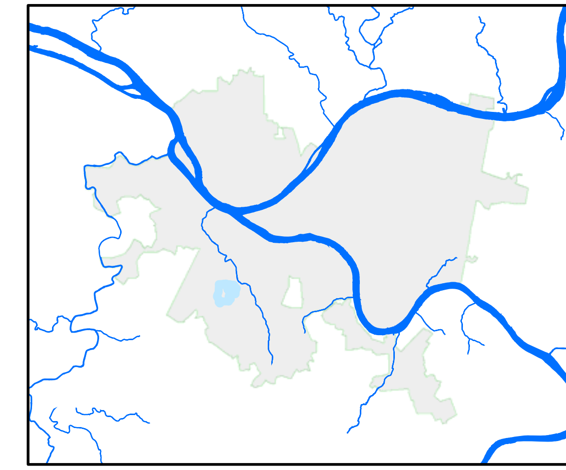












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- Combined Sewer Outfall

425 0 425 Feet

Attachment 4
DC 034E001 and DC 035M001 (CSO 015P001) Facilities Boundary Map Plummers Run Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0246.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	4	3	3	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	1	1	1	1	1
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	2	2	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	3	2	2	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	4	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	2	2	2	2	2
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.733**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.696**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.659**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.659**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.714**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.714**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.661**

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.661**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.661**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.568**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.568**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.520**

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.520**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.488**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.487**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.288**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.288**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.288**

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.288**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.288**

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Total Score

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

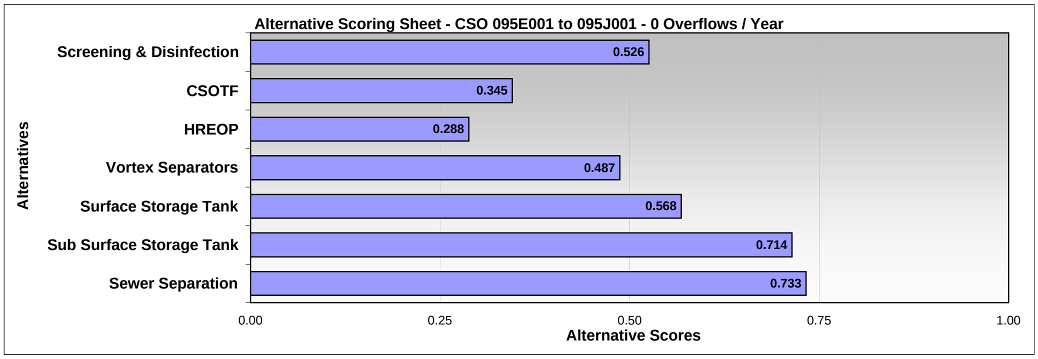
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

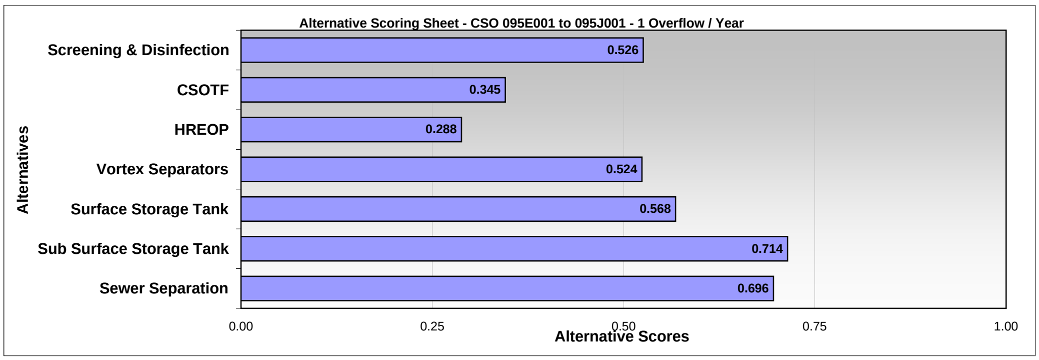
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

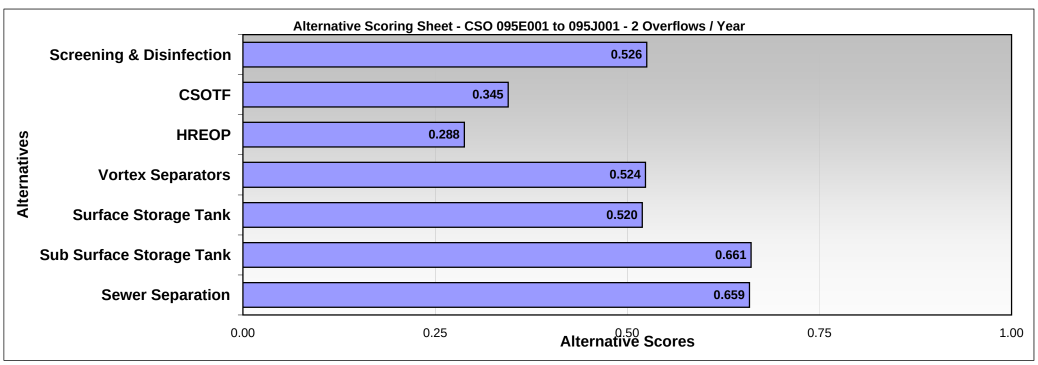
Total Score

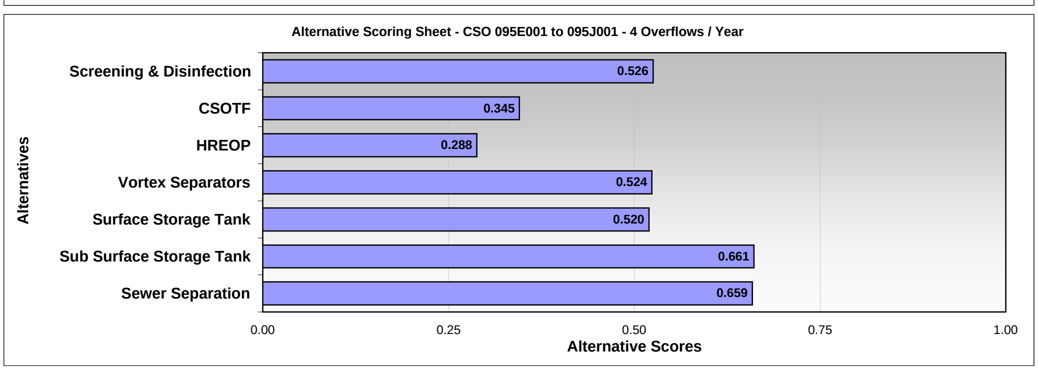
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

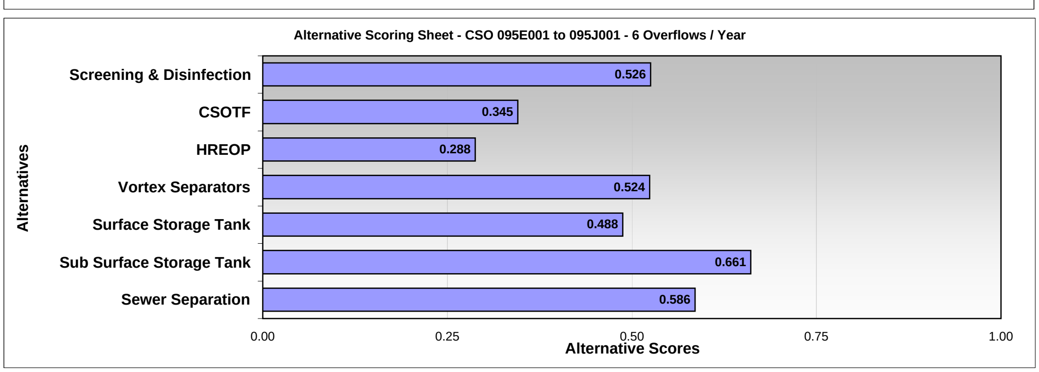
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**


Alternative Scoring Sheet - CSO 095E001 to 095J001 - 0 Overflows / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.288
Vortex Separators
0.487
Surface Storage Tank
0.568
Sub Surface Storage Tank
0.714
Sewer Separation
0.733
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - CSO 095E001 to 095J001 - 1 Overflow / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.288
Vortex Separators
0.524
Surface Storage Tank
0.568
Sub Surface Storage Tank
0.714
Sewer Separation
0.696
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - CSO 095E001 to 095J001 - 2 Overflows / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.288
Vortex Separators
0.524
Surface Storage Tank
0.520
Sub Surface Storage Tank
0.661
Sewer Separation
0.659
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - CSO 095E001 to 095J001 - 4 Overflows / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.288
Vortex Separators
0.524
Surface Storage Tank
0.520
Sub Surface Storage Tank
0.661
Sewer Separation
0.659
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - CSO 095E001 to 095J001 - 6 Overflows / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.288
Vortex Separators
0.524
Surface Storage Tank
0.488
Sub Surface Storage Tank
0.661
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	0	
Peak Volume	54,320	CF
	0.41	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	25.80	CFS
	16.67	MGD

#N/A			
CONSOLIDATION SEWERS			
0 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		7,800	Input by Engineer
Peak Flow (CFS)		6.45	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		12.90	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		19.35	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		25.80	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,633,000	
Construction Cost (Consolidation Sewers)	**$**	**5,293,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
TOTAL CAPITAL COST	**$**		**5,408,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	0	
Peak Volume	54,320	CF
	0.41	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	25.80	CFS
	16.67	MGD

#N/A				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		100		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		43,560		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**87,000**		
			TOTAL CAPITAL COST	**$ 15,087,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	0	
Peak Volume	54,320	CF
	0.41	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	25.80	CFS
	16.67	MGD

#N/A				
SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.41	54,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.48	64,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		81		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		54		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		0.49	65,610	**Sufficient Volume**
Tank Area (SF)		4,000		= Length x Width
Construction Cost (Storage Tank)		**353,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		16.67	25.80	= Peak Rate
Force Main Diameter (In)		28		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,686,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.80		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		96,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		480		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**51,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.67		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,184,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.41		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.20		= Peak Vol/DW Time
Construction Cost	**$**	**8,098,614**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		25,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST	**$ 19,165,614**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	0	
Peak Volume	54,320	CF
	0.41	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	25.80	CFS
	16.67	MGD

#N/A

SUB-SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.41	54,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.48	64,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	Sufficient Depth	Ref: Tech Par, Rev as Req'd
Length (Ft)		81		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		54		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.49	65,610	Sufficient Volume
Tank Area (SF)		4,000		= Length x Width
Construction Cost (Storage Tank)		**2,165,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.41	0.63	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		4		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		7.2	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**630,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.80		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		96,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,800		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**313,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		16.67		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,184,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.41		Ref: CSO Statistics
Dewatering Time (Days)		2		Typ 2, Rev as Req'd
Dewatering Pumping Rate (MGD)		0.20		= Peak Vol/DW Time
Construction Cost	**$**	**8,098,614**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		25,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST	**$ 18,161,614**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	0	
Peak Volume	54,320	CF
	0.41	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	25.80	CFS
	16.67	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
0 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		16.67		25.80	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		2			
Construction Cost (Swirl / Vortex)	**$**	**1,685,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		18.34		28.38	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		29			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,889,000**	**$**	**37,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		25.80			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		58,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		2,900			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**211,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.67			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,184,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		18.34			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		68		32	
Passes / Detention (Min)		3		**15.33**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**713,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		17,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**34,000**			
			TOTAL CAPITAL COST	**$**	**13,460,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	0	
Peak Volume	54,320	CF
	0.41	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	25.80	CFS
	16.67	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
0 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		16.67	25.80	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		2,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		76	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		38	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.26	34,656	
Construction Cost (CSOTF)	**$**	**16,374,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		16.67	25.80	= Peak Rate
Force Main Diameter (In)		28		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,686,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.80		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		52,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**194,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.67		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,184,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		16.67		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		65	31	
Passes / Detention (Min)		3	**15.62**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**680,000**		
7. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.26		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.13		= Peak Vol/DW Time
Construction Cost	**$**	**8,062,914**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
9. Land Acquisition Parameters				
Land Required - CSOTF (SF)		12,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**24,000**		
			TOTAL CAPITAL COST	**$ 35,947,914**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	0	
Peak Volume	54,320	CF
	0.41	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	25.80	CFS
	16.67	MGD

	#N/A			
	HIGH RATE END OF PIPE TREATMENT (HREOP)			
	0 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		16.67	25.80	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		200		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		11	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**3,830,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		18.34	28.38	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		29		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,889,000**	**$ 37,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.80		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		300		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.67		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,184,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		18.34		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		68	32	
Passes / Detention (Min)		3	**15.33**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	713,000	$ 591,000	
Construction Cost (Disinfection)	**$**	**1,304,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		30,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST	**$ 16,047,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	0	
Peak Volume	54,320	CF
	0.41	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	25.80	CFS
	16.67	MGD

#N/A				
SCREENING AND DISINFECTION				
0 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		16.67	25.80	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,184,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		16.67	25.80	= Peak Flow x % Req Pump
Force Main Diameter (In)		28		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,686,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.80		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		5,200		=CFS x 200
Odor Control Flow Rate (CFM)		260		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**32,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		16.67		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		65	31	
Passes / Detention (Min)		3	**15.62**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	680,000	$ 563,000	
Construction Cost (Disinfection)	**$**	**1,243,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		24,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**		
			TOTAL CAPITAL COST	**$ 11,936,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	1	
Peak Volume	24,942	CF
	0.19	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	20.35	CFS
	13.15	MGD

#N/A			
CONSOLIDATION SEWERS			
1 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		7,800	Width of Sewershed along Riverline
Peak Flow (CFS)		6.45	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		12.90	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		19.35	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		25.80	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,633,000	
Construction Cost (Consolidation Sewers)	**$**	**5,293,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 5,408,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	1	
Peak Volume	24,942	CF
	0.19	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	20.35	CFS
	13.15	MGD

		#N/A		
		SEWER SEPARATION		
		1 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		100		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		43,560		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**87,000**		
			TOTAL CAPITAL COST	**$ 15,087,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	1	
Peak Volume	24,942	CF
	0.19	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	20.35	CFS
	13.15	MGD

#N/A					
SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.19		25,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.22		29,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		55			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		37			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.23		30,525	**Sufficient Volume**
Tank Area (SF)		2,000			= Length x Width
Construction Cost (Storage Tank)		**151,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		13.15		20.35	= Peak Rate
Force Main Diameter (In)		25			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,256,000**	**$**	**33,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		20.35			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		44,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		220			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**28,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		13.15			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,021,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.19			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.09			= Peak Vol/DW Time
Construction Cost	**$**	**8,045,279**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		22,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST	**$ 18,285,279**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	1	
Peak Volume	24,942	CF
	0.19	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	20.35	CFS
	13.15	MGD

#N/A				
SUB-SURFACE STORAGE TANK				
1 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.19	25,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.22	29,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		55		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		37		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.23	30,525	**Sufficient Volume**
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**1,489,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.19	0.29	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**443,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		20.35		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		44,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**170,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		13.15		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,021,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.19		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.09		= Peak Vol/DW Time
Construction Cost	**$**	**8,045,279**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		22,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST	**$ 16,933,279**

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RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	1	
Peak Volume	24,942	CF
	0.19	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	20.35	CFS
	13.15	MGD

		#N/A				
		SWIRL CONCENTRATOR / VORTEX SEPARATOR				
		1 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters						
Sizing Basis: Peak Flow (MGD / CFS)		13.15		20.35	Ref: CSO Statistics	
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters	
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer	
Number of Units Required @ Given Loading Rate		0				
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**	
2. Dewatering Pump Station / Force Main Parameters						
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters	
Underflow Rate (%)		10%			Ref: Technical Parameters	
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**	
Dewatering Pumping Rate (MGD / CFS)		14.47		22.39	= Peak Vol / DW Time x % Req Pump	
Force Main Diameter (In)		26			DW Pump Rate / 2 FPS	
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**	
Force Main Length (Ft)		100			Input by Engineer	
Construction Cost (PS / Force Main)	**$**	**3,417,000**	**$**	**34,000**		
3. Consolidation and/or Outfall Pipe Parameters						
Peak Flow (CFS)		20.35			Ref: Technical Parameters	
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"	
Length (Ft)		-			Input by Engineer	
Depth (Ft)		-			Input by Engineer	
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls	
4. Odor Control Parameters						
Air Changes / Hour (ACH)		3			Ref: Technical Parameters	
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD	
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60	
Construction Cost (Odor Control)	**$**	**-**				
5. Screening Parameters						
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**	
Peak Flow, into facility (MGD)		13.15			Ref: CSO Statistics	
Construction Cost (Screening)	**$**	**1,021,000**				
6. Disinfection Parameters						
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**	
Peak Flow (MGD)		14.47			Ref: Peak flow of PS	
Cl_2 Contact Tank Length / Width (Ft)		60		29		
Passes		3		**15.54**	Ref: Tech Param-15 min minimum	
				OK Detn Time		
Construction Cost (Disinfection)	**$**	**636,000**				
7. Regulator / Vortex Drop Parameters						
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer	
Number Regulators		1			Input by Engineer	
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**	
Construction Cost (Regulators/Vortex)	**$**	**299,000**				
8. Land Acquisition Parameters						
Land Required - Swirl / Vortex (SF)		14,000			= (0.0154 x Swirl Cap(CFS)) x 43560	
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters	
Land Acquisition Cost	**$**	**28,000**				
				TOTAL CAPITAL COST	**$**	**10,843,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	1	
Peak Volume	24,942	CF
	0.19	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	20.35	CFS
	13.15	MGD

#N/A

SEDIMENTATION BASIN (CSOTF)

1 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		13.15		20.35	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		2,200			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		67		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		34		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.20		27,336	
Construction Cost (CSOTF)	**$**	**16,378,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		13.15		20.35	= Peak Rate
Force Main Diameter (In)		25			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,256,000**	**$**	**33,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		20.35			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		41,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,050			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**161,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		13.15			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,021,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		13.15			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		57		28	
Passes		3		**15.68**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**610,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.19			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.09			= Peak Vol/DW Time
Construction Cost	**$**	**8,045,279**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		10,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**20,000**			
			TOTAL CAPITAL COST	**$**	**35,231,279**

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Capital Costs

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	1	
Peak Volume	24,942	CF
	0.19	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	20.35	CFS
	13.15	MGD

		#N/A			
		HIGH RATE END OF PIPE TREATMENT (HREOP)			
		1 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		13.15		20.35	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		160			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		19		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		9		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**3,271,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		14.47		22.39	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		26			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,417,000**	**$**	**34,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		20.35			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		13.15			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,021,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		14.47			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		60		29	
Passes		3		15.54	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	636,000	$	514,000	
Construction Cost (Disinfection)	**$**	**1,150,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		28,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**			
			TOTAL CAPITAL COST	**$**	**14,682,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	1	
Peak Volume	24,942	CF
	0.19	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	20.35	CFS
	13.15	MGD

		#N/A		
		SCREENING AND DISINFECTION		
		1 Overflows / Year		
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		13.15	20.35	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,021,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		13.15	20.35	= Peak Flow x % Req Pump
Force Main Diameter (In)		25		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,256,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		20.35		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,100		=CFS x 200
Odor Control Flow Rate (CFM)		210		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**27,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		13.15		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		57	28	
Passes		3	**15.68**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	610,000	$ 487,000	
Construction Cost (Disinfection)	**$**	**1,097,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		24,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**		
			TOTAL CAPITAL COST	**$ 11,189,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	2	
Peak Volume	22,918	CF
	0.17	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	16.00	CFS
	10.34	MGD

#N/A			
CONSOLIDATION SEWERS			
2 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		7,800	Width of Sewershed along Riverline
Peak Flow (CFS)		6.45	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		12.90	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		19.35	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		25.80	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,633,000	
Construction Cost (Consolidation Sewers)	**$**	**5,293,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
TOTAL CAPITAL COST	**$**		**5,408,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	2	
Peak Volume	22,918	CF
	0.17	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	16.00	CFS
	10.34	MGD

		#N/A		
		SEWER SEPARATION		
		2 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		100		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		43,560		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**87,000**		
			TOTAL CAPITAL COST	**$ 15,087,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	2	
Peak Volume	22,918	CF
	0.17	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	16.00	CFS
	10.34	MGD

#N/A					
SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.17		23,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.20		27,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		53			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		36			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.21		28,620	**Sufficient Volume**
Tank Area (SF)		2,000			= Length x Width
Construction Cost (Storage Tank)		**138,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		10.34		16.00	= Peak Rate
Force Main Diameter (In)		22			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,838,000**	**$**	**30,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		16.00			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		41,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		210			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**27,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		10.34			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**891,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.17			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.09			= Peak Vol/DW Time
Construction Cost	**$**	**8,041,604**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		22,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST	**$ 17,716,604**

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RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	2	
Peak Volume	22,918	CF
	0.17	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	16.00	CFS
	10.34	MGD

#N/A				
SUB-SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.17	23,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.20	27,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		53		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		36		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.21	28,620	**Sufficient Volume**
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**1,442,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.17	0.27	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**430,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		16.00		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		41,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,050		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**161,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		10.34		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**891,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.17		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.09		= Peak Vol/DW Time
Construction Cost	**$**	**8,041,604**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		22,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST	**$ 16,730,604**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	2	
Peak Volume	22,918	CF
	0.17	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	16.00	CFS
	10.34	MGD

#N/A				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
2 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		10.34	16.00	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		11.38	17.60	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		23		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,925,000**	**$ 31,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		16.00		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		10.34		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**891,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		11.38		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		54	25	
Passes		3	**15.34**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**574,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		11,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**22,000**		
			TOTAL CAPITAL COST	**$ 10,150,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	2	
Peak Volume	22,918	CF
	0.17	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	16.00	CFS
	10.34	MGD

		#N/A			
		SEDIMENTATION BASIN (CSOTF)			
		2 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		10.34		16.00	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,800			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		61		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		31		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.17		22,692	
Construction Cost (CSOTF)	**$**	**16,381,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		10.34		16.00	= Peak Rate
Force Main Diameter (In)		22			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,838,000**	**$**	**30,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		16.00			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		34,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,700			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**139,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		10.34			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**891,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		10.34			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		51		25	
Passes		3		**15.94**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**553,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.17			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.09			= Peak Vol/DW Time
Construction Cost	**$**	**8,041,604**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		9,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**			
				TOTAL CAPITAL COST	**$ 34,598,604**

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RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	2	
Peak Volume	22,918	CF
	0.17	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	16.00	CFS
	10.34	MGD

#N/A			
HIGH RATE END OF PIPE TREATMENT (HREOP)			
2 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	10.34	16.00	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	130		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	17	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)	9	Area OK	= Area Req'd / Length
Max Length : Width Ratio	3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		Typ 12, Rev as Req'd
Construction Cost (HREOP) $	**2,825,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)	11.38	17.60	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)	23		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,925,000**	**$ 31,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	16.00		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	4,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)	200		= ACH x Volume / 60
Construction Cost (Odor Control) $	**26,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	10.34		Ref: CSO Statistics
Construction Cost (Screening) $	**891,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow (MGD)	11.38		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	54	25	
Passes	3	15.34	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection / CC Tank) $	574,000	$ 446,000	
Construction Cost (Disinfection) $	**1,020,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - HREOP (SF)	27,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**54,000**		
		TOTAL CAPITAL COST $	**13,479,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	2	
Peak Volume	22,918	CF
	0.17	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	16.00	CFS
	10.34	MGD

#N/A					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		10.34		16.00	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**891,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		10.34		16.00	= Peak Flow x % Req Pump
Force Main Diameter (In)		22			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,838,000**	**$**	**30,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		16.00			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,200			=CFS x 200
Odor Control Flow Rate (CFM)		160			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**22,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		10.34			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		51		25	
Passes		3		**15.94**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	553,000	$	429,000	
Construction Cost (Disinfection)	**$**	**982,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
			TOTAL CAPITAL COST	**$**	**10,518,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	4	
Peak Volume	19,968	CF
	0.15	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	14.99	CFS
	9.69	MGD

		#N/A	
		CONSOLIDATION SEWERS	
		4 Overflows / Year	
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		7,800	Width of Sewershed along Riverline
Peak Flow (CFS)		6.45	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		12.90	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		19.35	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		25.80	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,633,000	
Construction Cost (Consolidation Sewers)	**$**	**5,293,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 5,408,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	4	
Peak Volume	19,968	CF
	0.15	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	14.99	CFS
	9.69	MGD

#N/A				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		100		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		43,560		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**87,000**		
			TOTAL CAPITAL COST **$**	**15,087,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	4	
Peak Volume	19,968	CF
	0.15	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	14.99	CFS
	9.69	MGD

#N/A			
SURFACE STORAGE TANK			
4 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.15	20,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.18	24,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	50		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	34		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.19	25,500	**Sufficient Volume**
Tank Area (SF)	2,000		= Length x Width
Construction Cost (Storage Tank)	**119,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	9.69	14.99	= Peak Rate
Force Main Diameter (In)	21		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,777,000**	**$ 29,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	14.99		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	36,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	180		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**24,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	9.69		Ref: CSO Statistics
Construction Cost (Screening) $	**861,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	0.15		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	0.07		= Peak Vol/DW Time
Construction Cost $	**8,036,250**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	21,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**42,000**		
		TOTAL CAPITAL COST $	**17,595,250**

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RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	4	
Peak Volume	19,968	CF
	0.15	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	14.99	CFS
	9.69	MGD

#N/A					
SUB-SURFACE STORAGE TANK					
4 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.15		20,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.18		24,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		50			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		34			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.19		25,500	**Sufficient Volume**
Tank Area (SF)		2,000			= Length x Width
Construction Cost (Storage Tank)		**1,374,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.15		0.23	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		4.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**411,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		14.99			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		36,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**145,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		9.69			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**861,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.15			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.07			= Peak Vol/DW Time
Construction Cost	**$**	**8,036,250**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		21,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**			
				TOTAL CAPITAL COST	**$ 16,590,250**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	4	
Peak Volume	19,968	CF
	0.15	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	14.99	CFS
	9.69	MGD

#N/A				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
4 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		9.69	14.99	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		10.66	16.49	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		22		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,866,000**	**$ 30,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		14.99		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		9.69		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**861,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		10.66		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		52	25	
Passes		3	**15.76**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**560,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		10,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**20,000**		
			TOTAL CAPITAL COST	**$ 10,044,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	4	
Peak Volume	19,968	CF
	0.15	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	14.99	CFS
	9.69	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		9.69	14.99	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		59	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		30	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.16	21,240	
Construction Cost (CSOTF)	**$**	**16,382,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		9.69	14.99	= Peak Rate
Force Main Diameter (In)		21		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,777,000**	**$ 29,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		14.99		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**132,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		9.69		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**861,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		9.69		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		49	24	
Passes		3	**15.69**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**540,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.15		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.07		= Peak Vol/DW Time
Construction Cost	**$**	**8,036,250**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		9,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**		
			TOTAL CAPITAL COST	**$ 34,482,250**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	4	
Peak Volume	19,968	CF
	0.15	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	14.99	CFS
	9.69	MGD

		#N/A		
		HIGH RATE END OF PIPE TREATMENT (HREOP)		
		4 Overflows / Year		
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		9.69	14.99	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		120		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		16	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		9	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**2,722,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		10.66	16.49	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		22		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,866,000**	**$ 30,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		14.99		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		150		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**21,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		9.69		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**861,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		10.66		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		52	25	
Passes		3	**15.76**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	560,000	$ 434,000	
Construction Cost (Disinfection)	**$**	**994,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		26,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**		
			TOTAL CAPITAL COST	**$ 13,253,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	4	
Peak Volume	19,968	CF
	0.15	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	14.99	CFS
	9.69	MGD

	#N/A			
	SCREENING AND DISINFECTION			
	4 Overflows / Year			
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		9.69	14.99	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**861,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		9.69	14.99	= Peak Flow x % Req Pump
Force Main Diameter (In)		21		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,777,000**	**$ 29,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		14.99		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000		=CFS x 200
Odor Control Flow Rate (CFM)		150		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**21,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		9.69		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		49	24	
Passes		3	**15.69**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	540,000	$ 410,000	
Construction Cost (Disinfection)	**$**	**950,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		23,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST	**$ 10,391,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	6	
Peak Volume	12,031	CF
	0.09	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	9.30	CFS
	6.01	MGD

#N/A			
CONSOLIDATION SEWERS			
6 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		7,800	Width of Sewershed along Riverline
Peak Flow (CFS)		6.45	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		12.90	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		19.35	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,220,000	
Peak Flow (CFS)		25.80	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		1,950	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,633,000	
Construction Cost (Consolidation Sewers)	**$**	**5,293,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 5,408,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	6	
Peak Volume	12,031	CF
	0.09	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	9.30	CFS
	6.01	MGD

#N/A				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		100		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**15,000,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		43,560		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**87,000**		
			TOTAL CAPITAL COST **$**	**15,087,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	6	
Peak Volume	12,031	CF
	0.09	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	9.30	CFS
	6.01	MGD

#N/A					
SURFACE STORAGE TANK					
6 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.09		12,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.11		14,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		38			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		26			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.11		14,820	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**68,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		6.01		9.30	= Peak Rate
Force Main Diameter (In)		17			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,347,000**	**$**	**25,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		9.30			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		21,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		110			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**16,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		6.01			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**690,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.09			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.04			= Peak Vol/DW Time
Construction Cost	**$**	**8,021,841**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST	**$ 16,914,841**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	6	
Peak Volume	12,031	CF
	0.09	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	9.30	CFS
	6.01	MGD

#N/A					
SUB-SURFACE STORAGE TANK					
6 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.09		12,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.11		14,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		38			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		26			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.11		14,820	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**1,191,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.09		0.14	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**361,000**	**$**	**13,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		9.30			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		21,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,050			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**95,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		6.01			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**690,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.09			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.04			= Peak Vol/DW Time
Construction Cost	**$**	**8,021,841**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST	**$ 16,118,841**

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RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	6	
Peak Volume	12,031	CF
	0.09	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	9.30	CFS
	6.01	MGD

	#N/A			
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
	6 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		6.01	9.30	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		6.61	10.23	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		18		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,427,000**	**$ 26,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		9.30		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		6.01		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**690,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		6.61		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		41	20	
Passes		3	**16.04**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**477,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		6,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**		
			TOTAL CAPITAL COST	**$ 9,339,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	6	
Peak Volume	12,031	CF
	0.09	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	9.30	CFS
	6.01	MGD

		#N/A		
		SEDIMENTATION BASIN (CSOTF)		
		6 Overflows / Year		
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		6.01	9.30	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,100		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		48	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		24	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.10	13,824	
Construction Cost (CSOTF)	**$**	**16,387,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		6.01	9.30	= Peak Rate
Force Main Diameter (In)		17		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,347,000**	**$ 25,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		9.30		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		21,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,050		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**95,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		6.01		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**690,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		6.01		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		39	19	
Passes		3	**15.94**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**464,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.09		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.04		= Peak Vol/DW Time
Construction Cost	**$**	**8,021,841**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		7,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**14,000**		
			TOTAL CAPITAL COST	**$ 33,750,841**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	6	
Peak Volume	12,031	CF
	0.09	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	9.30	CFS
	6.01	MGD

		#N/A			
		HIGH RATE END OF PIPE TREATMENT (HREOP)			
		6 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		6.01		9.30	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		80			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		14		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		7		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**2,142,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		6.61		10.23	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		18			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,427,000**	**$**	**26,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		9.30			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		6.01			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**690,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		6.61			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		41		20	
Passes		3		**16.04**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	477,000	$	339,000	
Construction Cost (Disinfection)	**$**	**816,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		25,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST	**$ 11,873,000**

RESULTS SUMMARY		
Number of Events / Year	71	
Number of Overflows / Year	6	
Peak Volume	12,031	CF
	0.09	MG
Total Volume	302,627	CF
	2.26	MG
Peak Rate	9.30	CFS
	6.01	MGD

#N/A					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		6.01		9.30	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**690,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		6.01		9.30	= Peak Flow x % Req Pump
Force Main Diameter (In)		17			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,347,000**	**$**	**25,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		9.30			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**5,408,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,900			=CFS x 200
Odor Control Flow Rate (CFM)		100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		6.01			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		39		19	
Passes		3		**15.94**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	464,000	$	323,000	
Construction Cost (Disinfection)	**$**	**787,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 9,617,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	16.67	$123,177	20	10.910	$1,343,852
	Tank O&M	No. Events / Yr	71	$44,505	50	14.484	$644,591
		Const Cost ($)	$353,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	17	$8,868	20	10.910	$96,754
	Odor Control O&M	Capacity (cfm)	480	$1,680	20	10.910	$18,329
	Reserve / Replace	10% Gravity / 15% Pump					$18,398
			Total Annual O&M	**$179,000**		**Total PW O&M**	**$2,122,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.41	$10,298	20	10.910	$112,355
	Tank O&M	No. Events / Yr	71	$49,035	50	14.484	$710,201
		Const Cost ($)	$2,165,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	17	$8,868	20	10.910	$96,754
	Odor Control O&M	Capacity (cfm)	4,800	$16,800	20	10.910	$183,287
	Reserve / Replace	10% Gravity / 15% Pump					$6,642
			Total Annual O&M	**$86,000**		**Total PW O&M**	**$1,109,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	16.67	$123,177	20	10.910	$1,343,852
	Sed. Basin O&M	Flow Rate (mgd)	16.67	$1,876	50	14.484	$27,168
	Screening O&M	Flow Rate (mgd)	16.67	$8,868	20	10.910	$96,754
	Disinfection O&M	Flow Rate (mgd)	16.67	$89,279	20	10.910	$974,027
	Odor Control O&M	Capacity (cfm)	2,600.00	$9,100	20	10.910	$99,280
	Reserve / Replace	10% Gravity / 15% Pump					$20,637
			Total Annual O&M	**$233,000**		**Total PW O&M**	**$2,562,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	18.34	$131,275	20	10.910	$1,432,207
	HREP O&M	Flow Rate (mgd)	16.67	$121,867	20	10.910	$1,329,557
	Screening O&M	Flow Rate (mgd)	16.67	$8,868	20	10.910	$96,754
	Disinfection O&M	Flow Rate (mgd)	18.34	$94,616	20	10.910	$1,032,256
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$31,542
			Total Annual O&M	**$358,000**		**Total PW O&M**	**$3,934,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	18.34	$131,275	20	10.910	$1,432,207
	Swirl / Vortex O&M	Flow Rate (mgd)	16.67	$1,876	20	10.910	$20,465
	Screening O&M	Flow Rate (mgd)	16.67	$8,868	20	10.910	$96,754
	Disinfection O&M	Flow Rate (mgd)	18.34	$94,616	20	10.910	$1,032,256
	Odor Control O&M	Capacity (cfm)	2,900.00	$10,150	20	10.910	$110,736
	Reserve / Replace	10% Gravity / 15% Pump					$23,892
			Total Annual O&M	**$247,000**		**Total PW O&M**	**$2,716,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	16.67	$123,177	20	10.910	$1,343,852
	Screening O&M	Flow Rate (mgd)	16.67	$8,868	20	10.910	$96,754
	Disinfection O&M	Flow Rate (mgd)	16.67	$89,279	20	10.910	$974,027
	Odor Control O&M	Capacity (cfm)	260.00	$910	20	10.910	$9,928
	Reserve / Replace	10% Gravity / 15% Pump					$20,196
			Total Annual O&M	**$223,000**		**Total PW O&M**	**$2,445,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	13.15	$105,133	20	10.910	$1,146,994
	Tank O&M	No. Events / Yr	71	$44,000	50	14.484	$637,277
		Const Cost ($)	$151,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	13	$8,558	20	10.910	$93,362
	Odor Control O&M	Capacity (cfm)	220	$770	20	10.910	$8,401
	Reserve / Replace	10% Gravity / 15% Pump					$16,138
			Total Annual O&M	**$159,000**		**Total PW O&M**	**$1,902,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.19	$6,122	20	10.910	$66,796
	Tank O&M	No. Events / Yr	71	$47,345	50	14.484	$685,724
		Const Cost ($)	$1,489,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	13	$8,558	20	10.910	$93,362
	Odor Control O&M	Capacity (cfm)	2,200	$7,700	20	10.910	$84,007
	Reserve / Replace	10% Gravity / 15% Pump					$5,047
			Total Annual O&M	**$70,000**		**Total PW O&M**	**$935,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	13.15	$105,133	20	10.910	$1,146,994
	Sed. Basin O&M	Flow Rate (mgd)	13.15	$1,480	50	14.484	$21,434
	Screening O&M	Flow Rate (mgd)	13.15	$8,558	20	10.910	$93,362
	Disinfection O&M	Flow Rate (mgd)	13.15	$77,272	20	10.910	$843,035
	Odor Control O&M	Capacity (cfm)	2,050.00	$7,175	20	10.910	$78,279
	Reserve / Replace	10% Gravity / 15% Pump					$18,159
			Total Annual O&M	**$200,000**		**Total PW O&M**	**$2,201,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	14.47	$112,045	20	10.910	$1,222,406
	HREP O&M	Flow Rate (mgd)	13.15	$106,006	20	10.910	$1,156,522
	Screening O&M	Flow Rate (mgd)	13.15	$8,558	20	10.910	$93,362
	Disinfection O&M	Flow Rate (mgd)	14.47	$81,892	20	10.910	$893,433
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$27,416
			Total Annual O&M	**$310,000**		**Total PW O&M**	**$3,401,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	14.47	$112,045	20	10.910	$1,222,406
	Swirl / Vortex O&M	Flow Rate (mgd)	13.15	$1,480	20	10.910	$16,145
	Screening O&M	Flow Rate (mgd)	13.15	$8,558	20	10.910	$93,362
	Disinfection O&M	Flow Rate (mgd)	14.47	$81,892	20	10.910	$893,433
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$18,448
			Total Annual O&M	**$204,000**		**Total PW O&M**	**$2,244,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	13.15	$105,133	20	10.910	$1,146,994
	Screening O&M	Flow Rate (mgd)	13.15	$8,558	20	10.910	$93,362
	Disinfection O&M	Flow Rate (mgd)	13.15	$77,272	20	10.910	$843,035
	Odor Control O&M	Capacity (cfm)	210.00	$735	20	10.910	$8,019
	Reserve / Replace	10% Gravity / 15% Pump					$17,794
			Total Annual O&M	**$192,000**		**Total PW O&M**	**$2,109,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	10.34	$89,523	20	10.910	$976,693
	Tank O&M	No. Events / Yr	71	$43,967	50	14.484	$636,806
		Const Cost ($)	$138,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,312	20	10.910	$90,687
	Odor Control O&M	Capacity (cfm)	210	$735	20	10.910	$8,019
	Reserve / Replace	10% Gravity / 15% Pump					$14,076
			Total Annual O&M	**$143,000**		**Total PW O&M**	**$1,726,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.17	$5,786	20	10.910	$63,124
	Tank O&M	No. Events / Yr	71	$47,227	50	14.484	$684,022
		Const Cost ($)	$1,442,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,312	20	10.910	$90,687
	Odor Control O&M	Capacity (cfm)	2,050	$7,175	20	10.910	$78,279
	Reserve / Replace	10% Gravity / 15% Pump					$4,616
			Total Annual O&M	**$69,000**		**Total PW O&M**	**$921,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)							
#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	10.34	$89,523	20	10.910	$976,693
	Sed. Basin O&M	Flow Rate (mgd)	10.34	$1,163	50	14.484	$16,851
	Screening O&M	Flow Rate (mgd)	10.34	$8,312	20	10.910	$90,687
	Disinfection O&M	Flow Rate (mgd)	10.34	$66,738	20	10.910	$728,109
	Odor Control O&M	Capacity (cfm)	1,700.00	$5,950	20	10.910	$64,914
	Reserve / Replace	10% Gravity / 15% Pump					$15,885
			Total Annual O&M	**$172,000**		**Total PW O&M**	**$1,893,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	11.38	$95,409	20	10.910	$1,040,909
	HREP O&M	Flow Rate (mgd)	10.34	$92,021	20	10.910	$1,003,944
	Screening O&M	Flow Rate (mgd)	10.34	$8,312	20	10.910	$90,687
	Disinfection O&M	Flow Rate (mgd)	11.38	$70,728	20	10.910	$771,637
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$23,674
			Total Annual O&M	**$268,000**		**Total PW O&M**	**$2,938,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	11.38	$95,409	20	10.910	$1,040,909
	Swirl / Vortex O&M	Flow Rate (mgd)	10.34	$1,163	20	10.910	$12,693
	Screening O&M	Flow Rate (mgd)	10.34	$8,312	20	10.910	$90,687
	Disinfection O&M	Flow Rate (mgd)	11.38	$70,728	20	10.910	$771,637
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$15,919
			Total Annual O&M	**$176,000**		**Total PW O&M**	**$1,932,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	10.34	$89,523	20	10.910	$976,693
	Screening O&M	Flow Rate (mgd)	10.34	$8,312	20	10.910	$90,687
	Disinfection O&M	Flow Rate (mgd)	10.34	$66,738	20	10.910	$728,109
	Odor Control O&M	Capacity (cfm)	160.00	$560	20	10.910	$6,110
	Reserve / Replace	10% Gravity / 15% Pump					$15,567
			Total Annual O&M	**$166,000**		**Total PW O&M**	**$1,817,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	9.69	$85,713	20	10.910	$935,119
	Tank O&M	No. Events / Yr	71	$43,920	50	14.484	$636,118
		Const Cost ($)	$119,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,256	20	10.910	$90,071
	Odor Control O&M	Capacity (cfm)	180	$630	20	10.910	$6,873
	Reserve / Replace	10% Gravity / 15% Pump					$13,737
			Total Annual O&M	**$139,000**		**Total PW O&M**	**$1,682,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.15	$5,277	20	10.910	$57,573
	Tank O&M	No. Events / Yr	71	$47,057	50	14.484	$681,560
		Const Cost ($)	$1,374,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,256	20	10.910	$90,071
	Odor Control O&M	Capacity (cfm)	1,800	$6,300	20	10.910	$68,733
	Reserve / Replace	10% Gravity / 15% Pump					$4,413
			Total Annual O&M	**$67,000**		**Total PW O&M**	**$902,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)							
#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	9.69	$85,713	20	10.910	$935,119
	Sed. Basin O&M	Flow Rate (mgd)	9.69	$1,090	50	14.484	$15,789
	Screening O&M	Flow Rate (mgd)	9.69	$8,256	20	10.910	$90,071
	Disinfection O&M	Flow Rate (mgd)	9.69	$64,143	20	10.910	$699,794
	Odor Control O&M	Capacity (cfm)	1,600.00	$5,600	20	10.910	$61,096
	Reserve / Replace	10% Gravity / 15% Pump					$15,500
			Total Annual O&M	**$165,000**		**Total PW O&M**	**$1,817,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	10.66	$91,348	20	10.910	$996,601
	HREP O&M	Flow Rate (mgd)	9.69	$88,564	20	10.910	$966,229
	Screening O&M	Flow Rate (mgd)	9.69	$8,256	20	10.910	$90,071
	Disinfection O&M	Flow Rate (mgd)	10.66	$67,977	20	10.910	$741,629
	Odor Control O&M	Capacity (cfm)	150.00	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$23,019
			Total Annual O&M	**$257,000**		**Total PW O&M**	**$2,823,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	10.66	$91,348	20	10.910	$996,601
	Swirl / Vortex O&M	Flow Rate (mgd)	9.69	$1,090	20	10.910	$11,893
	Screening O&M	Flow Rate (mgd)	9.69	$8,256	20	10.910	$90,071
	Disinfection O&M	Flow Rate (mgd)	10.66	$67,977	20	10.910	$741,629
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$15,558
			Total Annual O&M	**$169,000**		**Total PW O&M**	**$1,856,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	9.69	$85,713	20	10.910	$935,119
	Screening O&M	Flow Rate (mgd)	9.69	$8,256	20	10.910	$90,071
	Disinfection O&M	Flow Rate (mgd)	9.69	$64,143	20	10.910	$699,794
	Odor Control O&M	Capacity (cfm)	150.00	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$15,198
			Total Annual O&M	**$159,000**		**Total PW O&M**	**$1,746,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	6.01	$62,278	20	10.910	$679,453
	Tank O&M	No. Events / Yr	71	$43,792	50	14.484	$634,271
		Const Cost ($)	$68,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	6	$7,940	20	10.910	$86,626
	Odor Control O&M	Capacity (cfm)	110	$385	20	10.910	$4,200
	Reserve / Replace	10% Gravity / 15% Pump					$11,496
			Total Annual O&M	**$115,000**		**Total PW O&M**	**$1,416,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.09	$3,762	20	10.910	$41,041
	Tank O&M	No. Events / Yr	71	$46,600	50	14.484	$674,934
		Const Cost ($)	$1,191,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	6	$7,940	20	10.910	$86,626
	Odor Control O&M	Capacity (cfm)	1,050	$3,675	20	10.910	$40,094
	Reserve / Replace	10% Gravity / 15% Pump					$3,608
			Total Annual O&M	**$62,000**		**Total PW O&M**	**$846,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	6.01	$62,278	20	10.910	$679,453
	Sed. Basin O&M	Flow Rate (mgd)	6.01	$676	50	14.484	$9,789
	Screening O&M	Flow Rate (mgd)	6.01	$7,940	20	10.910	$86,626
	Disinfection O&M	Flow Rate (mgd)	6.01	$47,937	20	10.910	$522,988
	Odor Control O&M	Capacity (cfm)	1,050.00	$3,675	20	10.910	$40,094
	Reserve / Replace	10% Gravity / 15% Pump					$12,973
			Total Annual O&M	**$123,000**		**Total PW O&M**	**$1,352,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	6.61	$66,373	20	10.910	$724,125
	HREP O&M	Flow Rate (mgd)	6.01	$66,859	20	10.910	$729,427
	Screening O&M	Flow Rate (mgd)	6.01	$7,940	20	10.910	$86,626
	Disinfection O&M	Flow Rate (mgd)	6.61	$50,803	20	10.910	$554,253
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$18,943
			Total Annual O&M	**$193,000**		**Total PW O&M**	**$2,117,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	6.61	$66,373	20	10.910	$724,125
	Swirl / Vortex O&M	Flow Rate (mgd)	6.01	$676	20	10.910	$7,373
	Screening O&M	Flow Rate (mgd)	6.01	$7,940	20	10.910	$86,626
	Disinfection O&M	Flow Rate (mgd)	6.61	$50,803	20	10.910	$554,253
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$13,076
			Total Annual O&M	**$126,000**		**Total PW O&M**	**$1,385,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	6.01	$62,278	20	10.910	$679,453
	Screening O&M	Flow Rate (mgd)	6.01	$7,940	20	10.910	$86,626
	Disinfection O&M	Flow Rate (mgd)	6.01	$47,937	20	10.910	$522,988
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$12,755
			Total Annual O&M	**$119,000**		**Total PW O&M**	**$1,306,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$15.1	$15,087,000	$0
1	$15.1	$15,087,000	$0
2	$15.1	$15,087,000	$0
4	$15.1	$15,087,000	$0
6	$15.1	$15,087,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$19.3	$18,161,614	$1,109,000
1	$17.9	$16,933,279	$935,000
2	$17.7	$16,730,604	$921,000
4	$17.5	$16,590,250	$902,000
6	$17.0	$16,118,841	$846,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$21.3	$19,165,614	$2,122,000
1	$20.2	$18,285,279	$1,902,000
2	$19.4	$17,716,604	$1,726,000
4	$19.3	$17,595,250	$1,682,000
6	$18.3	$16,914,841	$1,416,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$16.2	$13,460,000	$2,716,000
1	$13.1	$10,843,000	$2,244,000
2	$12.1	$10,150,000	$1,932,000
4	$11.9	$10,044,000	$1,856,000
6	$10.7	$9,339,000	$1,385,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$20.0	$16,047,000	$3,934,000
1	$18.1	$14,682,000	$3,401,000
2	$16.4	$13,479,000	$2,938,000
4	$16.1	$13,253,000	$2,823,000
6	$14.0	$11,873,000	$2,117,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$38.5	$35,947,914	$2,562,000
1	$37.4	$35,231,279	$2,201,000
2	$36.5	$34,598,604	$1,893,000
4	$36.3	$34,482,250	$1,817,000
6	$35.1	$33,750,841	$1,352,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$14.4	$11,936,000	$2,445,000
1	$13.3	$11,189,000	$2,109,000
2	$12.3	$10,518,000	$1,817,000
4	$12.1	$10,391,000	$1,746,000
6	$10.9	$9,617,000	$1,306,000

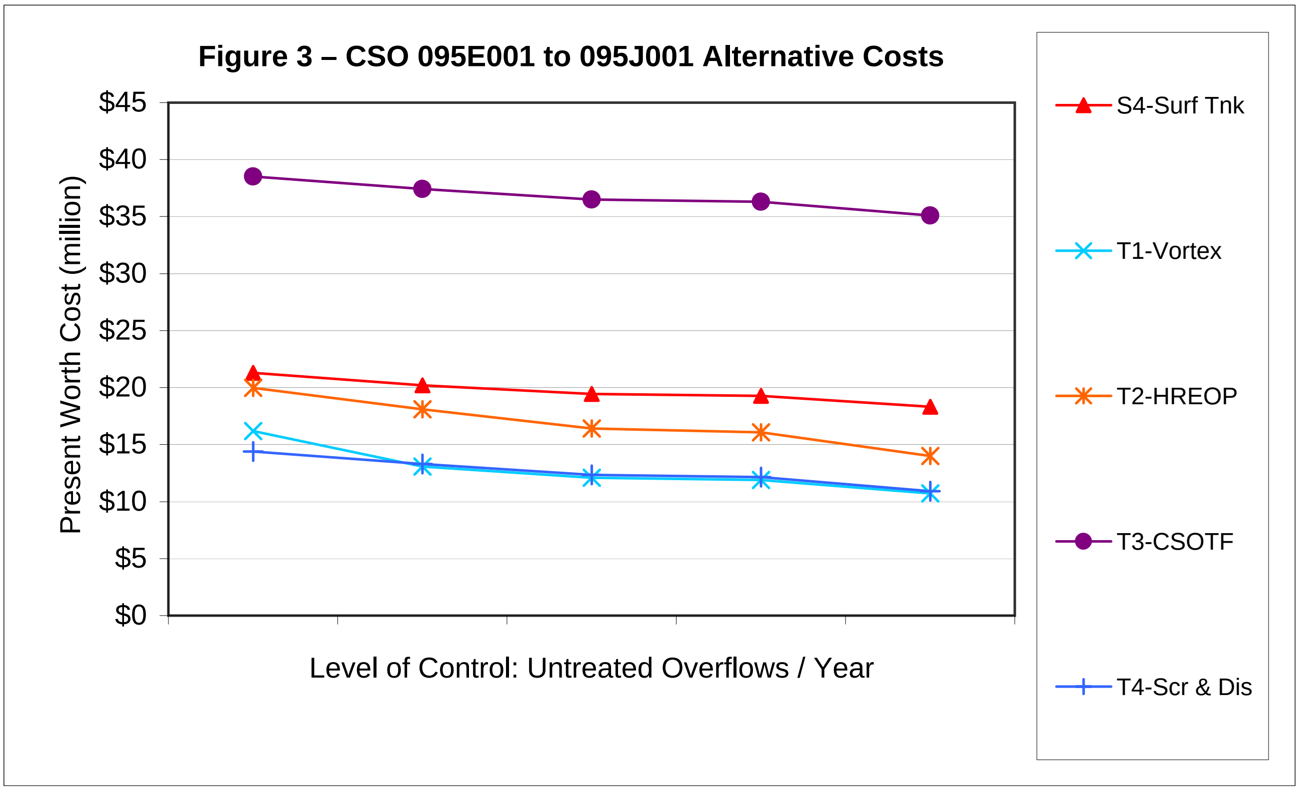


Figure 3 – CSO 095E001 to 095J001 Alternative Costs
$45
$40
$35
$30
$25
$20
$15
$10
$5
$0
Present Worth Cost (million)
Level of Control: Untreated Overflows / Year
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	CSO 095E001 to 095J001
Structures within Region	CSO 095E001, CSO 095J001
Model ID	CSO 095E001 to 095J001.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	71
Peak Volume:	54,320 ft^3
	0.41 MG
Total Volume:	302,627 ft^3
	2.26 MG
Peak Rate:	25.80 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
8/20/2005 18:20	109	8/20/2005 18:45	54320.10	406.342	0	25.80	0
1/5/2005 0:50	2104	1/5/2005 14:30	24941.70	186.576	1	1.20	22
10/21/2005 19:06	1308	10/22/2005 6:45	22917.60	171.435	2	20.35	1
5/13/2005 22:30	130	5/13/2005 22:45	20487.40	153.256	3	15.87	3
7/26/2005 19:50	38	7/26/2005 20:15	19968.15	149.372	4	14.99	4
7/5/2005 16:30	111	7/5/2005 16:45	17087.26	127.821	5	16.00	2
8/29/2005 9:10	285	8/29/2005 13:30	12031.19	89.999	6	12.15	5
9/29/2005 5:15	113	9/29/2005 5:45	9753.90	72.964	7	9.30	6
9/16/2005 21:20	39	9/16/2005 21:45	9526.51	71.263	8	7.80	8
11/29/2005 6:45	325	11/29/2005 7:30	8913.46	66.677	9	0.92	24
3/28/2005 8:57	655	3/28/2005 19:15	7712.78	57.695	10	1.75	17
4/23/2005 3:50	50	4/23/2005 4:00	6809.37	50.937	11	4.91	9
1/11/2005 8:40	1033	1/12/2005 1:30	6678.67	49.960	12	0.84	26
5/11/2005 22:35	95	5/11/2005 22:55	6553.32	49.022	13	4.25	11
11/14/2005 21:45	576	11/15/2005 4:00	6039.42	45.178	14	1.35	19
7/17/2005 16:20	65	7/17/2005 16:30	5100.97	38.158	15	7.85	7
1/3/2005 8:11	747	1/3/2005 13:30	4397.08	32.892	16	0.40	39
7/15/2005 17:30	40	7/15/2005 18:00	4166.42	31.167	17	3.40	12
4/1/2005 19:20	875	4/2/2005 6:30	3458.37	25.870	18	0.46	37
1/13/2005 22:46	263	1/14/2005 2:30	3095.51	23.156	19	0.48	36
5/23/2005 16:35	21	5/23/2005 16:45	2950.84	22.074	20	4.67	10
7/21/2005 14:50	65	7/21/2005 15:00	2933.02	21.940	21	2.59	15
10/25/2005 1:36	1080	10/25/2005 2:30	2737.32	20.476	22	0.29	50
2/14/2005 4:40	1048	2/14/2005 20:00	2736.09	20.467	23	0.26	51
1/8/2005 1:51	366	1/8/2005 5:00	2527.47	18.907	24	0.56	33
12/15/2005 10:55	569	12/15/2005 14:00	2497.81	18.685	25	0.64	29
2/20/2005 18:51	468	2/20/2005 20:30	2451.10	18.335	26	1.02	23
11/16/2005 4:05	469	11/16/2005 4:15	2432.95	18.200	27	3.32	14
2/9/2005 15:06	137	2/9/2005 16:45	2427.54	18.159	28	1.29	21
8/27/2005 15:15	26	8/27/2005 15:30	2230.90	16.688	29	3.36	13
5/28/2005 8:11	102	5/28/2005 9:30	2039.09	15.253	30	0.69	28
7/25/2005 13:35	216	7/25/2005 17:00	1769.70	13.238	31	1.90	16
10/7/2005 10:05	65	10/7/2005 10:45	1424.44	10.656	32	0.74	27

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
9/26/2005 5:51	246	9/26/2005 9:30	1190.60	8.906	33	0.37	41
3/23/2005 12:05	138	3/23/2005 12:45	1091.51	8.165	34	0.30	46
4/22/2005 15:52	181	4/22/2005 18:00	1069.35	7.999	35	0.31	45
3/23/2005 2:27	181	3/23/2005 2:45	1038.41	7.768	36	0.40	40
5/20/2005 2:22	346	5/20/2005 3:00	1036.00	7.750	37	0.31	44
6/8/2005 21:10	29	6/8/2005 21:15	892.42	6.676	38	1.32	20
3/27/2005 16:50	76	3/27/2005 17:00	856.77	6.409	39	0.51	35
6/3/2005 6:40	168	6/3/2005 9:00	777.26	5.814	40	0.30	47
8/8/2005 8:50	36	8/8/2005 9:15	761.05	5.693	41	0.51	34
7/12/2005 19:55	28	7/12/2005 20:00	716.89	5.363	42	1.39	18
5/7/2005 12:42	72	5/7/2005 13:30	661.10	4.945	43	0.60	31
10/21/2005 7:20	47	10/21/2005 7:30	658.32	4.925	44	0.37	42
5/14/2005 9:08	33	5/14/2005 9:30	602.96	4.510	45	0.60	30
11/1/2005 15:19	80	11/1/2005 16:30	594.45	4.447	46	0.26	52
1/30/2005 13:26	45	1/30/2005 14:00	586.15	4.385	47	0.29	49
11/8/2005 14:35	49	11/8/2005 14:45	552.11	4.130	48	0.24	54
6/6/2005 9:55	15	6/6/2005 10:00	448.65	3.356	49	0.89	25
10/28/2005 12:15	24	10/28/2005 12:30	445.01	3.329	50	0.42	38
2/16/2005 7:27	57	2/16/2005 8:00	365.14	2.731	51	0.20	58
10/24/2005 12:10	145	10/24/2005 12:30	336.36	2.516	52	0.15	61
4/30/2005 5:26	88	4/30/2005 6:45	324.33	2.426	53	0.14	64
8/26/2005 20:16	415	8/26/2005 22:45	304.69	2.279	54	0.24	55
10/26/2005 7:25	103	10/26/2005 7:35	302.67	2.264	55	0.35	43
12/25/2005 11:00	125	12/25/2005 11:05	294.05	2.200	56	0.19	59
4/27/2005 0:24	44	4/27/2005 0:45	265.41	1.985	57	0.15	62
6/14/2005 19:15	23	6/14/2005 19:20	262.81	1.966	58	0.56	32
5/14/2005 16:51	333	5/14/2005 22:20	200.37	1.499	59	0.21	57
4/3/2005 1:51	271	4/3/2005 2:00	165.95	1.241	60	0.17	60
6/16/2005 13:10	14	6/16/2005 13:15	140.01	1.047	61	0.25	53
8/5/2005 11:25	14	8/5/2005 11:30	132.83	0.994	62	0.22	56
4/20/2005 20:41	178	4/20/2005 23:30	110.45	0.826	63	0.13	65
6/22/2005 5:30	9	6/22/2005 5:35	90.60	0.678	64	0.30	48
5/28/2005 18:11	26	5/28/2005 18:20	90.57	0.678	65	0.09	66
2/26/2005 12:45	9	2/26/2005 12:50	45.63	0.341	66	0.14	63
10/24/2005 2:39	13	10/24/2005 2:45	33.52	0.251	67	0.05	69
5/30/2005 20:11	10	5/30/2005 20:15	29.05	0.217	68	0.05	68
11/23/2005 19:28	8	11/23/2005 19:35	19.37	0.145	69	0.04	70
4/25/2005 6:31	7	4/25/2005 6:35	16.75	0.125	70	0.06	67

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	CSO 095E001 to 095J001
Structures within Region	CSO 095E001, CSO 095J001
Model ID	CSO 095E001 to 095J001.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	71
Peak Volume:	54,320 ft^3
	0.41 MG
Total Volume:	302,627 ft^3
	2.26 MG
Peak Rate:	25.80 cfs

Figure 1 - 095E001 to 095J001 CSO Volume

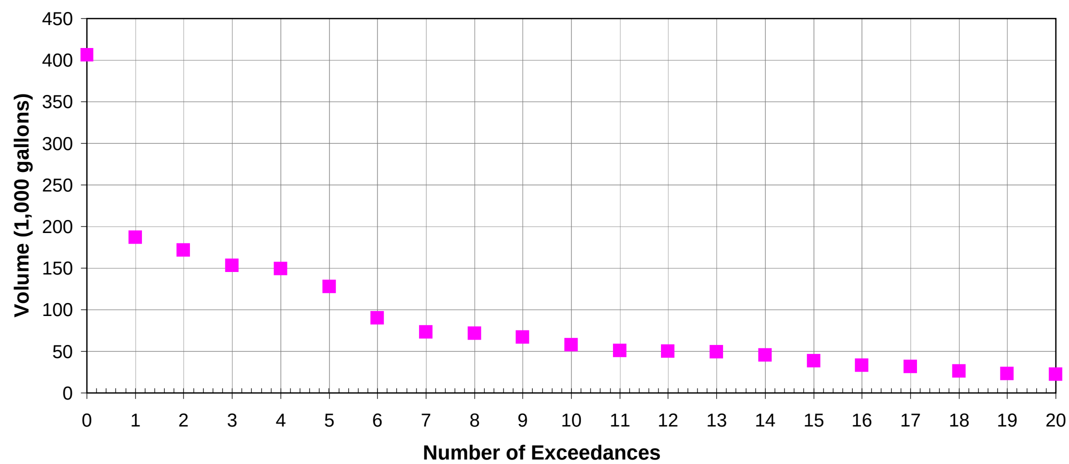
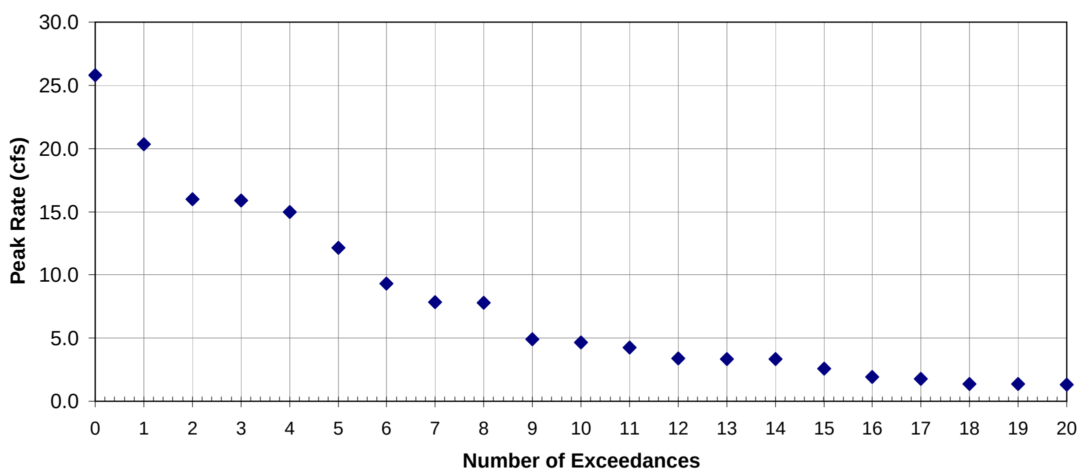


Figure 2 - 095E001 to 095J001 CSO Peak Flow Rate



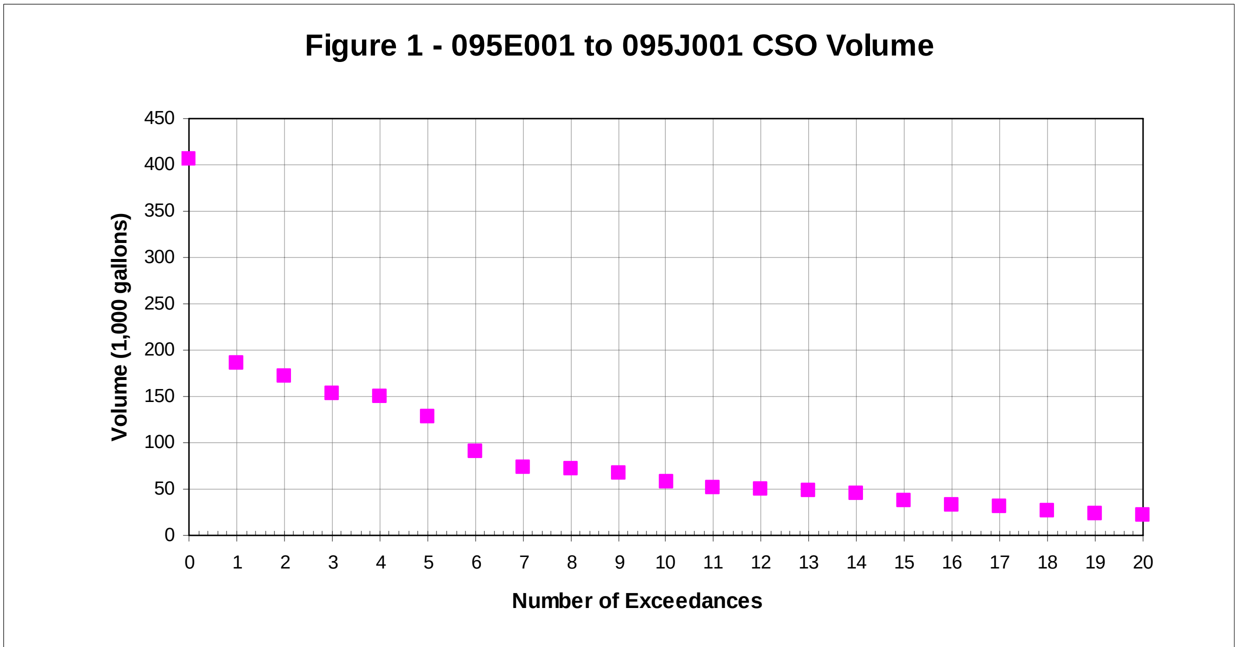
D.32.1 095E001 TO 095J001 – BROOKLINE BOULEVARD AND ENGLERT SEWERSHEDS – NPDES# CSO095E001 AND 095J001

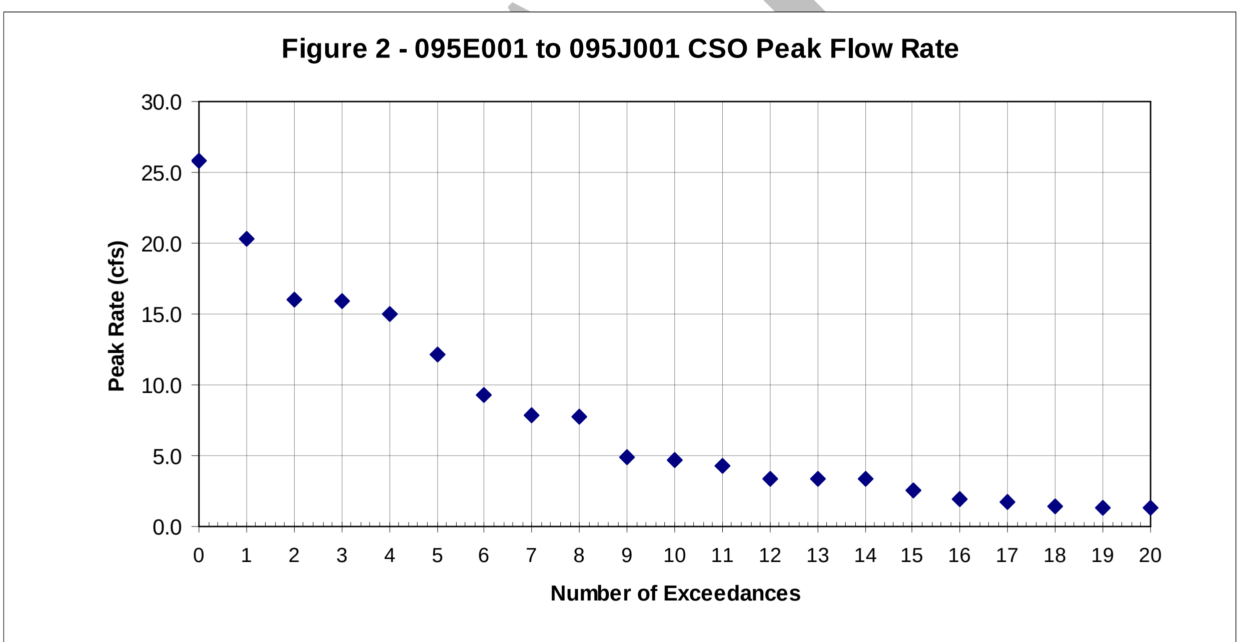
Description of Outfalls

These outfalls are included in the Brookline Boulevard Sewershed and the Englert Sewershed. CSO095E001 is in the Brookline Boulevard Sewershed, which is located in portions of Brookline and Overbrook sections in the City of Pittsburgh. This sewershed includes approximately 196 acres of residential, business and commercial users, of which approximately 84 acres are located upstream of the PWSA diversion chambers. CSO095J001 is in the Englert Sewershed, which is located in portions of Carrick and Overbrook sections in the City of Pittsburgh and in portions of Brentwood Borough, Castle Shannon Borough and Whitehall Borough. This sewershed consists of 49 acres of residential, business and commercial users, of which approximately 5 acres are located upstream of the PWSA diversion chamber. Outfalls CSO095E001 and CSO095J001 currently convey overflows from each of the respective PWSA diversion chambers to tributaries of Saw Mill Run.

Attachment 1, Tributary Area Map, shows the CSO locations and the tributary areas.

Outfalls 095E001 and 095J001 typically experience 71 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately .41 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from the outfalls is approximately 25.80 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.





A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers. The sewers are required to convey CSOs from outfalls 095E001 and 095J001 to an area between the two outfalls for storage and treatment. There appears to be space available approximately 600 feet north of outfall 095J001 in an existing parking facility that may be able to be procured for a storage or treatment facility. The site is generally bounded by Saw

Mill Run to the west, Saw Mill Run Boulevard to the east, and private development to the north and south.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4-095E001 TO 095J001: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-095E001 TO 095J001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-095E001 TO 095J001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes.

Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-095E001 TO 095J001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-095E001 TO 095J001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-095E001 TO 095J001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

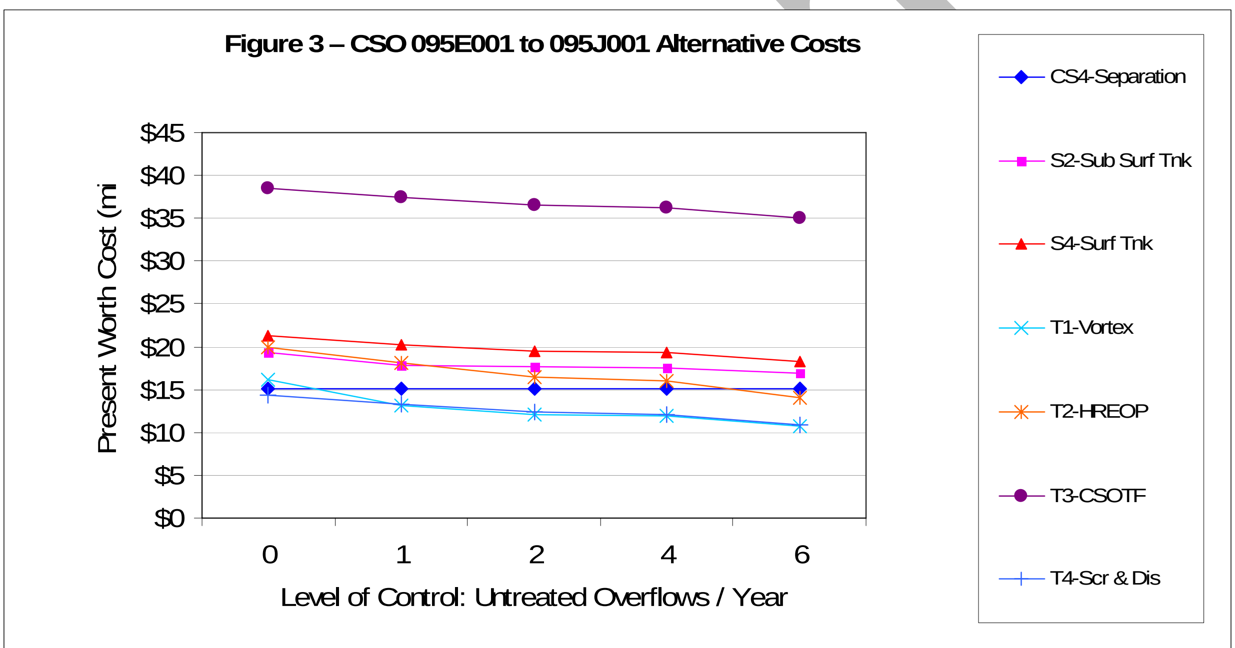
T4-095E001 TO 095J001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – 095E001 to 095J001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

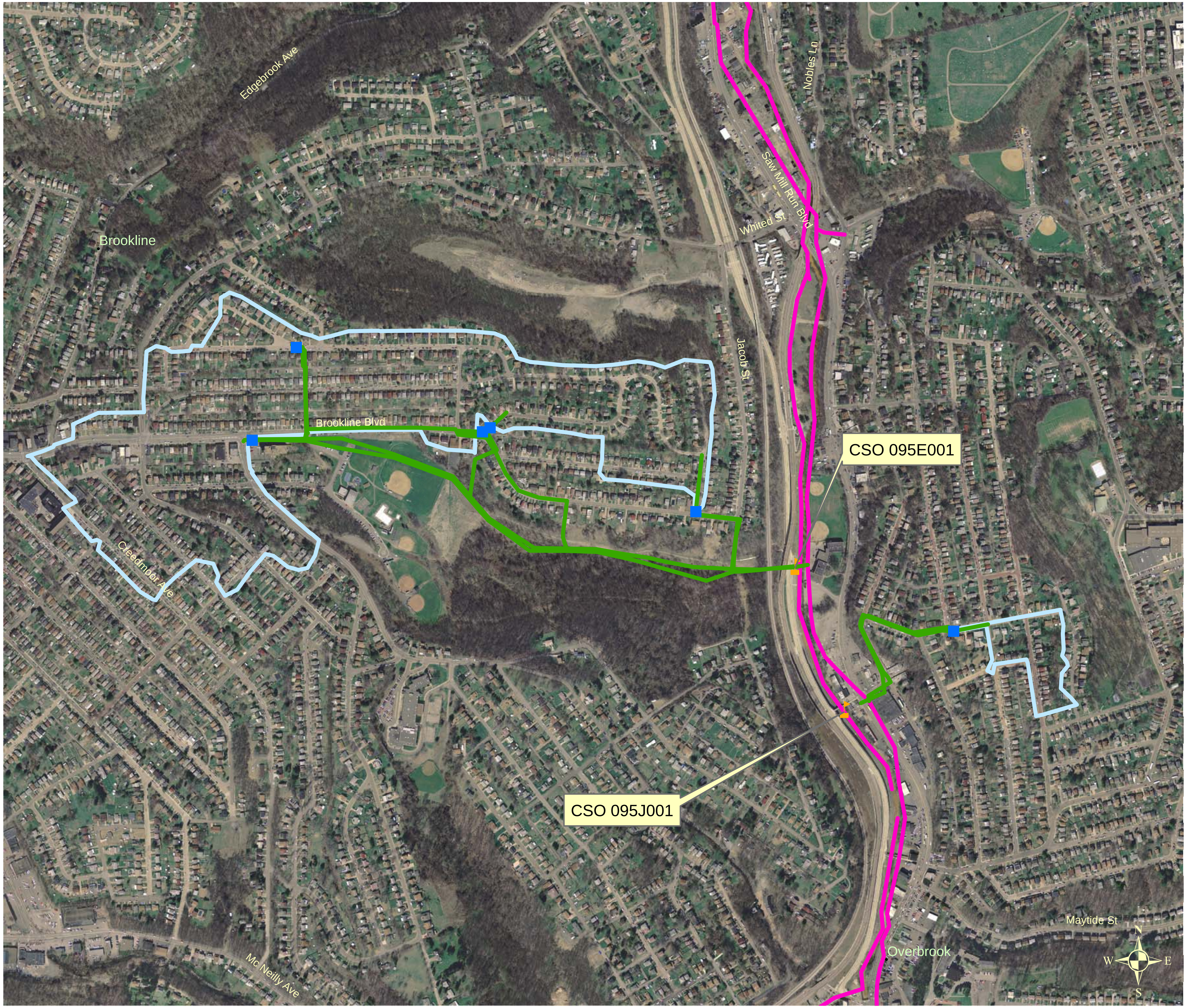
Recommendations

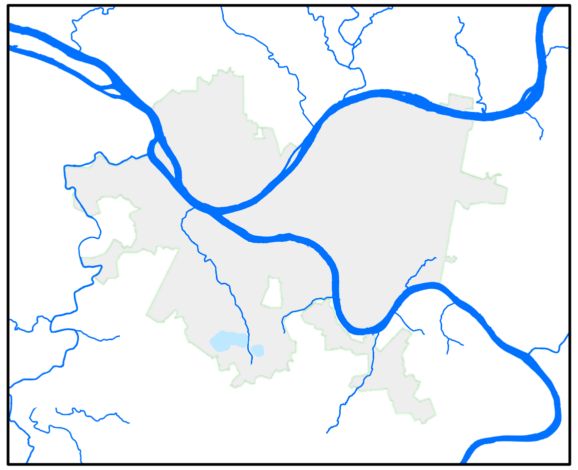
Based upon the above, for control level 0, it is recommended that Alternative CS4-095E001 to 095J001: Sewer Separation be carried forward and re-evaluated with the results of the system-wide alternatives analyses. For control levels 1 through 6, it is recommended that Alternative S2-095E001 to 095J001: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

There appears to be available space to construct a sub-surface storage facility between the two outfalls. Private property will need to be acquired for construction of the facility.





Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

500 0 500
Feet

Attachment 1 CSO 095E001 to CSO 095J001 Tributary Area Map Brookline Blvd. & Englert St. Sewersheds

CSO Controls Alternatives

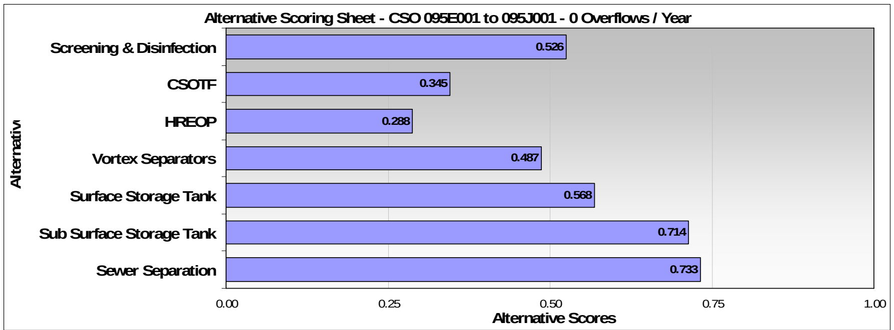
PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

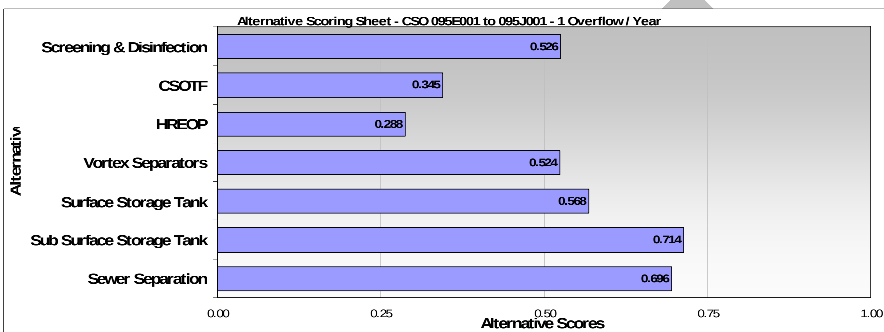
SW-D-0248.pdf

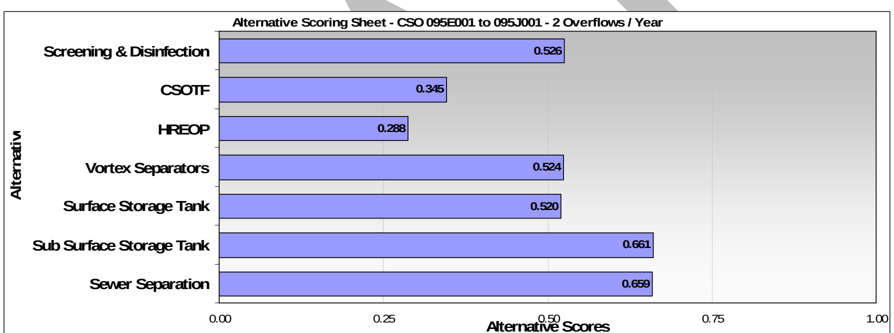
Attachment 2 - CSO Alternatives Development Worksheet

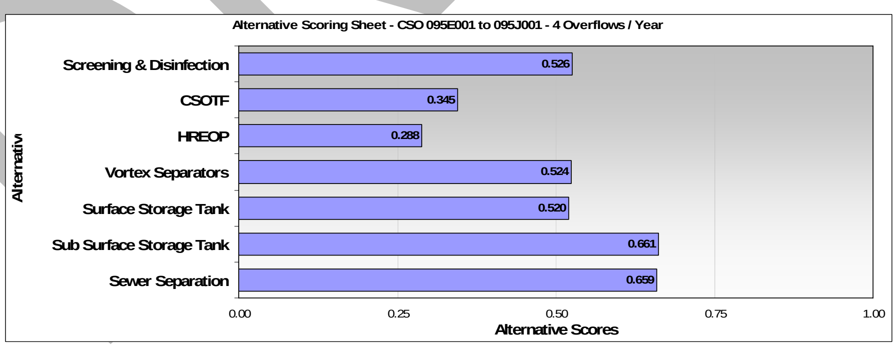
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will not be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

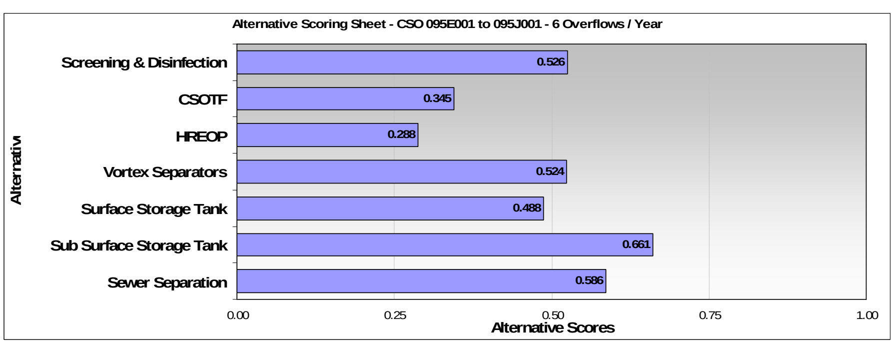
Attachment 3 – Alternative Scoring Sheet

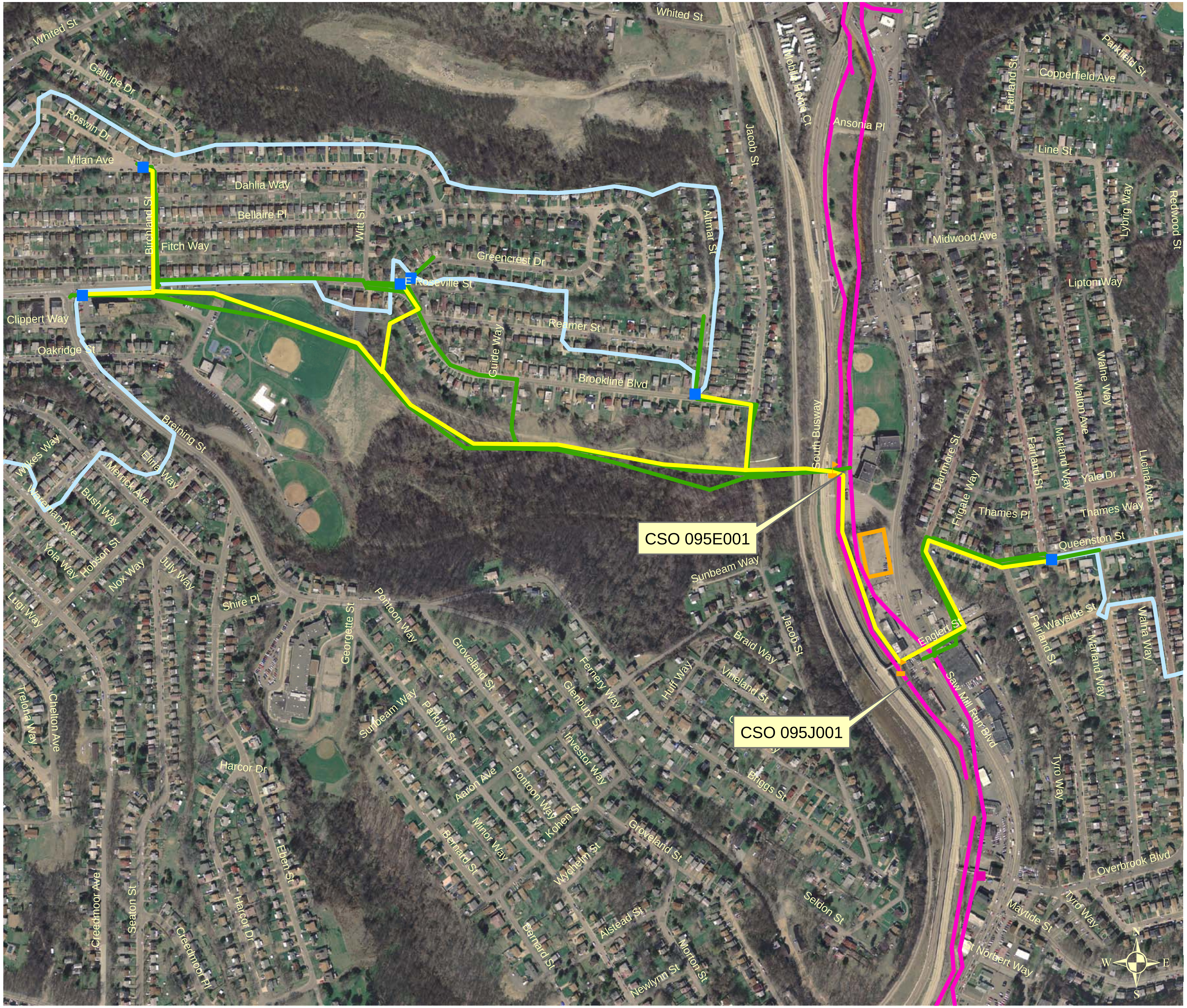


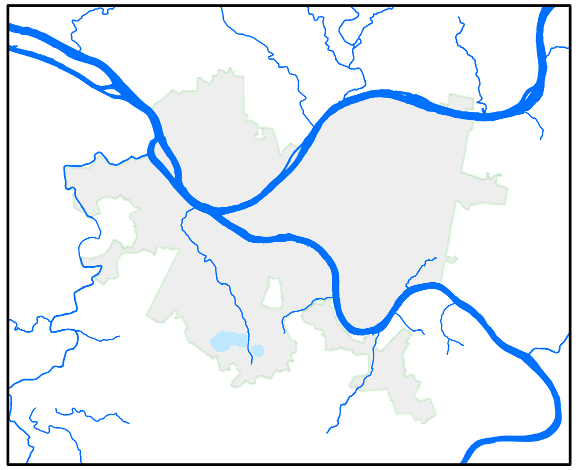












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

500 0 500 Feet

Attachment 4
CSO 095E001 to CSO 095J001 Facilities Boundary Map Brookline Blvd. & Englert St. Sewersheds

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0248.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	1	1	1	1	1
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	4	4	4	4	4
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	2	2	2	2	2
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	2	2	2	2	2
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	4	4	4	4	4
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	4	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	3	3	3	3	3
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	2	2	2	2	2
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	2	2	2	2	2
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	2	2	2	2	2
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	2	2	2	2	2
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	1	1	1	1	1
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	1	1	1	1	1
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	2	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	2	2	2	2	2
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	3	4	4	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	2	2	2	2	2
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.769**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.769**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.769**

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.769**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.769**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.632**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.632**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.615**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.615**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.615**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.528**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.528**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.512**

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.512**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.512**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.495**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.606**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.642**

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.642**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.642**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.262**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.294**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.294**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.294**

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.412**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.476**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.476**

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.476**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.476**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.457**

Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.562**

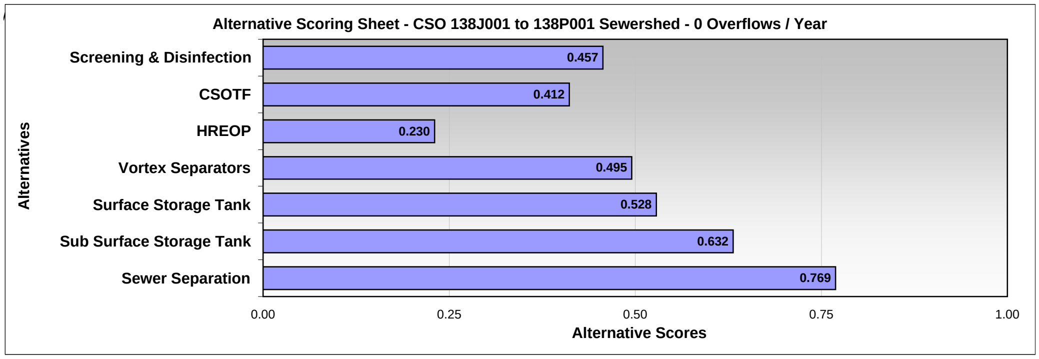
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.599**

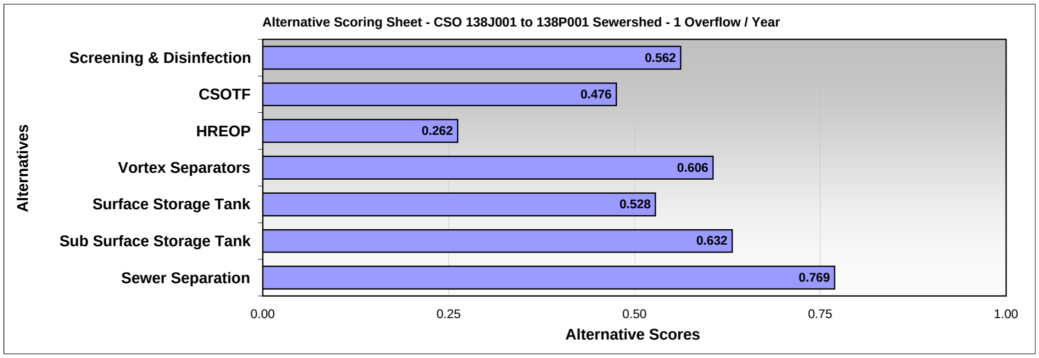
Total Score

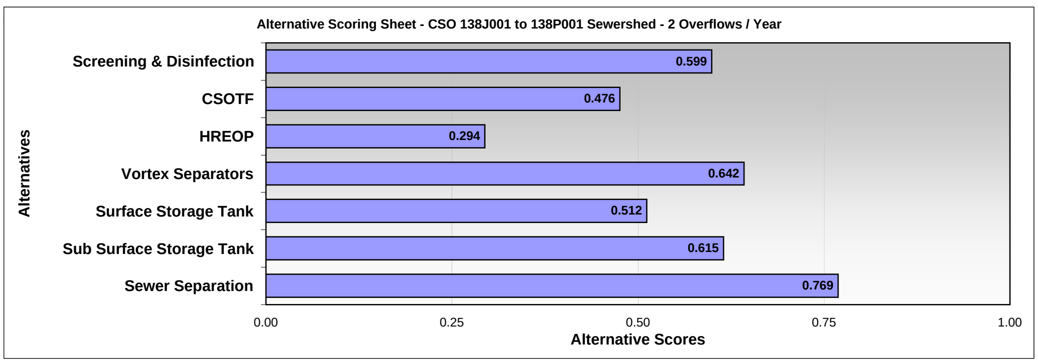
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.599**

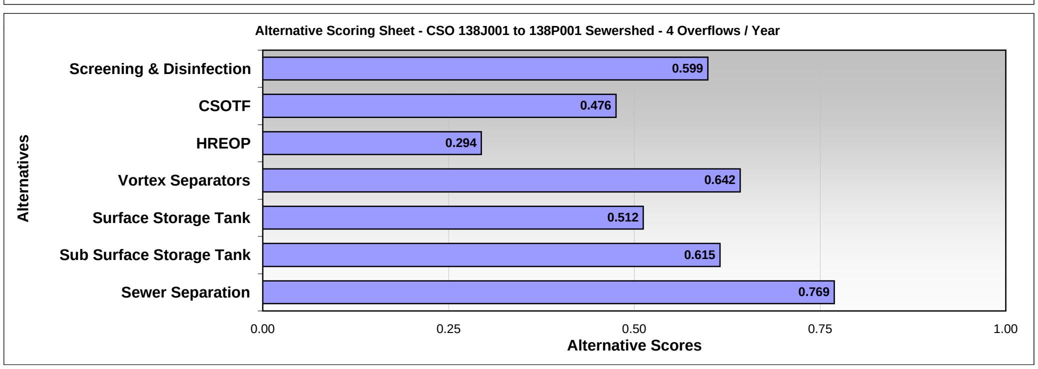
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.636**

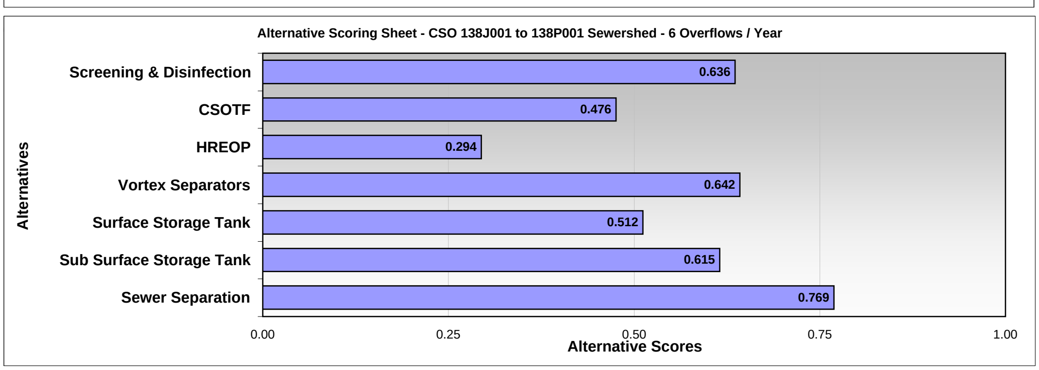
Alternative Scoring Sheet











RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	0	
Peak Volume	14,765	CF
	0.11	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	2.93	CFS
	1.90	MGD

Capital Costs - CSO 138J001 to 138P001 Region			
CONSOLIDATION SEWERS			
0 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,600	Input by Engineer
Peak Flow (CFS)		0.73	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		1.47	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.20	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.93	100% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Construction Cost (Consolidation Sewers)	**$**	**1,000,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		36	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	103,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections			Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**103,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,103,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	0	
Peak Volume	14,765	CF
	0.11	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	2.93	CFS
	1.90	MGD

Capital Costs - CSO 138J001 to 138P001 Region				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		21		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**3,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		9,148		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**		
			TOTAL CAPITAL COST	**$ 3,207,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	0	
Peak Volume	14,765	CF
	0.11	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	2.93	CFS
	1.90	MGD

Capital Costs - CSO 138J001 to 138P001 Region

SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.11	15,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.13	18,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		43		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		29		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.14	18,705	**Sufficient Volume**
Tank Area (SF)		1,000		= Length x Width
Construction Cost (Storage Tank)		**85,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		1.90	2.93	= Peak Rate
Force Main Diameter (In)		9		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,690,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		2.93		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		27,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		140		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**20,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.90		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**500,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.11		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.06		= Peak Vol/DW Time
Construction Cost	**$**	**8,026,804**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		21,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**		
			TOTAL CAPITAL COST	**$ 11,784,804**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	0	
Peak Volume	14,765	CF
	0.11	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	2.93	CFS
	1.90	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SUB-SURFACE STORAGE TANK					
0 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.11		15,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.13		18,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		43			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		29			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.14		18,705	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**1,254,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.06		0.09	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		3.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**331,000**	**$**	**13,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		2.93			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		27,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,350			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**116,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.90			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**500,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.11			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.06			= Peak Vol/DW Time
Construction Cost	**$**	**8,026,804**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		21,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**			
				TOTAL CAPITAL COST	**$ 11,684,804**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	0	
Peak Volume	14,765	CF
	0.11	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	2.93	CFS
	1.90	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
0 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.90		2.93	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		1			
Construction Cost (Swirl / Vortex)	**$**	**446,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.04		1.61	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		7			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,171,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		2.93			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		1,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**122,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.90			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**500,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		1.04			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		17		8	
Passes / Detention (Min)		3		**16.87**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**360,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		2,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**4,000**			
			TOTAL CAPITAL COST	**$**	**4,022,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	0	
Peak Volume	14,765	CF
	0.11	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	2.93	CFS
	1.90	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SEDIMENTATION BASIN (CSOTF)					
0 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.90		2.93	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		400			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		29		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		15		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.04		5,220	
Construction Cost (CSOTF)	**$**	**16,395,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		1.90		2.93	= Peak Rate
Force Main Diameter (In)		9			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.6		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,690,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		2.93			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		1.90			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**500,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		1.90			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		22		11	
Passes / Detention (Min)		3		16.51	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**378,000**			
7. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.04			Sed Basin Volume
Dewatering Time (Days)		2			Typ 2, Rev as Req'd
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,009,476**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
9. Land Acquisition Parameters					
Land Required - CSOTF (SF)		6,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**			
				TOTAL CAPITAL COST	**$ 28,450,476**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	0	
Peak Volume	14,765	CF
	0.11	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	2.93	CFS
	1.90	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
0 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.90		2.93	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		30			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		9		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		4		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**1,497,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		2.08		3.23	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		10			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,724,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		2.93			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		1.90			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**500,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		2.08			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		23		12	
Passes / Detention (Min)		3		17.11	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	382,000	$	209,000	
Construction Cost (Disinfection)	**$**	**591,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		23,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**5,788,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	0	
Peak Volume	14,765	CF
	0.11	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	2.93	CFS
	1.90	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		1.90		2.93	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**500,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		1.90		2.93	= Peak Flow x % Req Pump
Force Main Diameter (In)		9			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,690,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		2.93			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		600			=CFS x 200
Odor Control Flow Rate (CFM)		30			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**6,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		1.90			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		22		11	
Passes / Detention (Min)		3		**16.51**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	378,000	$	200,000	
Construction Cost (Disinfection)	**$**	**578,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 4,241,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	1	
Peak Volume	5,877	CF
	0.04	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.31	CFS
	0.85	MGD

Capital Costs - CSO 138J001 to 138P001 Region			
CONSOLIDATION SEWERS			
1 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,600	Width of Sewershed along Riverline
Peak Flow (CFS)		0.73	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		1.47	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.20	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.93	100% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Construction Cost (Consolidation Sewers)	**$**	**1,000,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		36	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	103,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**103,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,103,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	1	
Peak Volume	5,877	CF
	0.04	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.31	CFS
	0.85	MGD

Capital Costs - CSO 138J001 to 138P001 Region				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		21		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**3,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		9,148		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**		
			TOTAL CAPITAL COST	**$ 3,168,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	1	
Peak Volume	5,877	CF
	0.04	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.31	CFS
	0.85	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.04		6,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.05		7,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		27			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		19			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.06		7,695	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**31,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		0.85		1.31	= Peak Rate
Force Main Diameter (In)		6			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,006,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.31			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		11,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		60			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**10,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.85			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**452,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.04			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,010,669**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST	**$ 10,967,669**

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RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	1	
Peak Volume	5,877	CF
	0.04	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.31	CFS
	0.85	MGD

Capital Costs - CSO 138J001 to 138P001 Region

SUB-SURFACE STORAGE TANK

1 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.04		6,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.05		7,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		27			= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		19			= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		0.06		7,695	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**1,049,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.02		0.03	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		1			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**303,000**	**$**	**12,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.31			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		11,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**57,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.85			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**452,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.04			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,010,669**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST	**$ 11,325,669**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	1	
Peak Volume	5,877	CF
	0.04	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.31	CFS
	0.85	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
1 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.85		1.31	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		1			
Construction Cost (Swirl / Vortex)	**$**	**273,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.47		0.72	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**682,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.31			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		1,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**122,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.85			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**452,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.47			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		12		6	
Passes		3		**19.92**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**347,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		1,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**2,000**			
			TOTAL CAPITAL COST	**$**	**3,295,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	1	
Peak Volume	5,877	CF
	0.04	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.31	CFS
	0.85	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SEDIMENTATION BASIN (CSOTF)					
1 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.85		1.31	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		200			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		11		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.02		2,772	
Construction Cost (CSOTF)	**$**	**16,398,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.85		1.31	= Peak Rate
Force Main Diameter (In)		6			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,006,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.31			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.85			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**452,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.85			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		15		8	
Passes		3		**18.26**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**355,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.04			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,010,669**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		5,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**			
				TOTAL CAPITAL COST	**$ 27,675,669**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	1	
Peak Volume	5,877	CF
	0.04	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.31	CFS
	0.85	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.85		1.31	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		5		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		3		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**1,334,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.93		1.45	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		7			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,079,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.31			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.85			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**452,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.93			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		16		8	
Passes		3		**17.71**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	357,000	$	163,000	
Construction Cost (Disinfection)	**$**	**520,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		22,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
			TOTAL CAPITAL COST	**$**	**4,848,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	1	
Peak Volume	5,877	CF
	0.04	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.31	CFS
	0.85	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		0.85		1.31	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**452,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		0.85		1.31	= Peak Flow x % Req Pump
Force Main Diameter (In)		6			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,006,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.31			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		300			=CFS x 200
Odor Control Flow Rate (CFM)		20			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**4,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		0.85			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		15		8	
Passes		3		**18.26**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	355,000	$	159,000	
Construction Cost (Disinfection)	**$**	**514,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		22,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST	**$ 3,438,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	2	
Peak Volume	3,562	CF
	0.03	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.06	CFS
	0.68	MGD

Capital Costs - CSO 138J001 to 138P001 Region			
CONSOLIDATION SEWERS			
2 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,600	Width of Sewershed along Riverline
Peak Flow (CFS)		0.73	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		1.47	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.20	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.93	100% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Construction Cost (Consolidation Sewers)	**$**	**1,000,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		36	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	103,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**103,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,103,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	2	
Peak Volume	3,562	CF
	0.03	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.06	CFS
	0.68	MGD

Capital Costs - CSO 138J001 to 138P001 Region				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		21		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**3,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		9,148		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**		
			TOTAL CAPITAL COST	**$ 3,168,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	2	
Peak Volume	3,562	CF
	0.03	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.06	CFS
	0.68	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.03		4,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.03		5,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		23			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		16			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.04		5,520	**Sufficient Volume**
Tank Area (SF)		0			= Length x Width
Construction Cost (Storage Tank)		**18,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		0.68		1.06	= Peak Rate
Force Main Diameter (In)		6			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**866,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.06			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		40			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**7,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.68			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**444,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.03			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.01			= Peak Vol/DW Time
Construction Cost	**$**	**8,006,467**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
			TOTAL CAPITAL COST	**$**	**10,799,467**

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RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	2	
Peak Volume	3,562	CF
	0.03	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.06	CFS
	0.68	MGD

Capital Costs - CSO 138J001 to 138P001 Region

SUB-SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.03	4,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.03	5,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		23		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		16		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.04	5,520	**Sufficient Volume**
Tank Area (SF)		0		= Length x Width
Construction Cost (Storage Tank)		**996,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.01	0.02	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		1		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		3.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**296,000**	**$ 12,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		1.06		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		400		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**444,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.03		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.01		= Peak Vol/DW Time
Construction Cost	**$**	**8,006,467**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST	**$ 11,241,467**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	2	
Peak Volume	3,562	CF
	0.03	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.06	CFS
	0.68	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
2 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.68		1.06	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		1			
Construction Cost (Swirl / Vortex)	**$**	**239,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.38		0.58	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		4			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**604,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.06			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		1,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**122,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.68			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**444,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.38			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		11		5	
Passes		3		**18.91**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**345,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		1,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**2,000**			
			TOTAL CAPITAL COST	**$**	**3,172,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	2	
Peak Volume	3,562	CF
	0.03	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.06	CFS
	0.68	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SEDIMENTATION BASIN (CSOTF)					
2 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.68		1.06	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		200			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		11		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.02		2,772	
Construction Cost (CSOTF)	**$**	**16,398,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.68		1.06	= Peak Rate
Force Main Diameter (In)		6			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**866,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.06			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.68			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**444,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.68			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		14		7	
Passes		3		**18.53**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**352,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.03			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.01			= Peak Vol/DW Time
Construction Cost	**$**	**8,006,467**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		5,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**			
				TOTAL CAPITAL COST	**$ 27,520,467**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	2	
Peak Volume	3,562	CF
	0.03	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.06	CFS
	0.68	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.68		1.06	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		5		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		3		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**1,308,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.75		1.16	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		6			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**924,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.06			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.68			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**444,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.75			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		15		7	
Passes		3		**18.05**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	353,000	$	156,000	
Construction Cost (Disinfection)	**$**	**509,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		22,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST	**$ 4,647,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	2	
Peak Volume	3,562	CF
	0.03	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	1.06	CFS
	0.68	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		0.68		1.06	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**444,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		0.68		1.06	= Peak Flow x % Req Pump
Force Main Diameter (In)		6			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**866,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.06			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		200			=CFS x 200
Odor Control Flow Rate (CFM)		10			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		0.68			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		14		7	
Passes		3		**18.53**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	352,000	$	152,000	
Construction Cost (Disinfection)	**$**	**504,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		22,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST	**$ 3,278,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	4	
Peak Volume	1,581	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.99	CFS
	0.64	MGD

Capital Costs - CSO 138J001 to 138P001 Region			
CONSOLIDATION SEWERS			
4 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,600	Width of Sewershed along Riverline
Peak Flow (CFS)		0.73	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		1.47	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.20	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.93	100% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Construction Cost (Consolidation Sewers)	**$**	**1,000,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		36	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	103,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**103,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,103,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	4	
Peak Volume	1,581	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.99	CFS
	0.64	MGD

Capital Costs - CSO 138J001 to 138P001 Region				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		21		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**3,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		9,148		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**		
			TOTAL CAPITAL COST $	**3,168,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	4	
Peak Volume	1,581	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.99	CFS
	0.64	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SURFACE STORAGE TANK					
4 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.01		2,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.01		2,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		15			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		10			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.02		2,250	**Sufficient Volume**
Tank Area (SF)		0			= Length x Width
Construction Cost (Storage Tank)		**7,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		0.64		0.99	= Peak Rate
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		7.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**828,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.99			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		20			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**4,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.64			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**442,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.01			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.01			= Peak Vol/DW Time
Construction Cost	**$**	**8,002,870**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		19,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**			
				TOTAL CAPITAL COST	**$ 10,738,870**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	4	
Peak Volume	1,581	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.99	CFS
	0.64	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SUB-SURFACE STORAGE TANK					
4 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.01		2,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.01		2,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		15			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		10			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.02		2,250	**Sufficient Volume**
Tank Area (SF)		0			= Length x Width
Construction Cost (Storage Tank)		**951,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.01		0.01	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		1			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		1.7		**Check:**	**Not OK**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**290,000**	**$**	**12,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.99			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		150			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**21,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.64			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**442,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.01			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.01			= Peak Vol/DW Time
Construction Cost	**$**	**8,002,870**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		19,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**			
			TOTAL CAPITAL COST	**$**	**11,158,870**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	4	
Peak Volume	1,581	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.99	CFS
	0.64	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.64		0.99	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		1			
Construction Cost (Swirl / Vortex)	**$**	**230,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.35		0.54	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		4			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**583,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.99			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		1,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**122,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.64			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**442,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.35			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		10		5	
Passes		3		**18.38**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**345,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		1,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**2,000**			
			TOTAL CAPITAL COST	**$**	**3,140,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	4	
Peak Volume	1,581	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.99	CFS
	0.64	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SEDIMENTATION BASIN (CSOTF)					
4 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.64		0.99	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		200			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		11		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.02		2,772	
Construction Cost (CSOTF)	**$**	**16,398,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.64		0.99	= Peak Rate
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		7.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**828,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.99			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.64			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**442,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.64			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		13		7	
Passes		3		**18.40**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**351,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.01			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.01			= Peak Vol/DW Time
Construction Cost	**$**	**8,002,870**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		5,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**			
				TOTAL CAPITAL COST	**$ 27,474,870**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	4	
Peak Volume	1,581	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.99	CFS
	0.64	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
4 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.64		0.99	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		5		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		3		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**1,301,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.70		1.09	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		6			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.5		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**882,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.99			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.64			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**442,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.70			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		14		7	
Passes		3		**18.02**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	352,000	$	152,000	
Construction Cost (Disinfection)	**$**	**504,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		22,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
			TOTAL CAPITAL COST	**$**	**4,591,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	4	
Peak Volume	1,581	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.99	CFS
	0.64	MGD

Capital Costs - CSO 138J001 to 138P001 Region

SCREENING AND DISINFECTION

4 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		0.64		0.99	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**442,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		0.64		0.99	= Peak Flow x % Req Pump
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		7.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**828,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.99			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		200			=CFS x 200
Odor Control Flow Rate (CFM)		10			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		0.64			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		13		7	
Passes		3		**18.40**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	351,000	$	148,000	
Construction Cost (Disinfection)	**$**	**499,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		22,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST	**$ 3,232,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	6	
Peak Volume	1,474	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.87	CFS
	0.56	MGD

Capital Costs - CSO 138J001 to 138P001 Region

CONSOLIDATION SEWERS

6 Overflows / Year

1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,600	Width of Sewershed along Riverline
Peak Flow (CFS)		0.73	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		1.47	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.20	75% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Peak Flow (CFS)		2.93	100% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	250,000	
Construction Cost (Consolidation Sewers)	**$**	**1,000,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		36	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	103,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**103,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,103,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	6	
Peak Volume	1,474	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.87	CFS
	0.56	MGD

Capital Costs - CSO 138J001 to 138P001 Region				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		21		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**3,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		9,148		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**		
			TOTAL CAPITAL COST **$**	**3,168,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	6	
Peak Volume	1,474	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.87	CFS
	0.56	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SURFACE STORAGE TANK					
6 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.01		1,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.01		1,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		11			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		8			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.01		1,320	**Insufficient Volume**
Tank Area (SF)		0			= Length x Width
Construction Cost (Storage Tank)		**7,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		0.56		0.87	= Peak Rate
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**760,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.87			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		10			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**2,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.56			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**438,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.01			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.01			= Peak Vol/DW Time
Construction Cost	**$**	**8,002,675**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		19,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**			
			TOTAL CAPITAL COST	**$**	**10,664,675**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	6	
Peak Volume	1,474	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.87	CFS
	0.56	MGD

Capital Costs - CSO 138J001 to 138P001 Region			
SUB-SURFACE STORAGE TANK			
6 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.01	1,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.01	1,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	11		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	8		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.01	1,320	**Insufficient Volume**
Tank Area (SF)	0		= Length x Width
Construction Cost (Storage Tank)	**948,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.01	0.01	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	1		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	1.6	**Check:**	**Not OK**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**289,000**	**$ 12,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	0.87		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	2,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	100		= ACH x Volume / 60
Construction Cost (Odor Control) $	**15,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	0.56		Ref: CSO Statistics
Construction Cost (Screening) $	**438,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	0.01		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	0.01		= Peak Vol/DW Time
Construction Cost $	**8,002,675**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**38,000**		
		TOTAL CAPITAL COST $	**11,144,675**

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RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	6	
Peak Volume	1,474	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.87	CFS
	0.56	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
6 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.56		0.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		1			
Construction Cost (Swirl / Vortex)	**$**	**212,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.31		0.48	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		4			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.5		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**546,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.87			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		1,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**122,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.56			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**438,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.31			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		10		5	
Passes		3		**21.00**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**344,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		1,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**2,000**			
			TOTAL CAPITAL COST	**$**	**3,080,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	6	
Peak Volume	1,474	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.87	CFS
	0.56	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SEDIMENTATION BASIN (CSOTF)					
6 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.56		0.87	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		100			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		15		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		8		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.01		1,440	
Construction Cost (CSOTF)	**$**	**16,399,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.56		0.87	= Peak Rate
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**760,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.87			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.56			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**438,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.56			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		13		6	
Passes		3		**18.01**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**349,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.01			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.01			= Peak Vol/DW Time
Construction Cost	**$**	**8,002,675**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		5,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**			
			TOTAL CAPITAL COST	**$**	**27,390,675**

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RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	6	
Peak Volume	1,474	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.87	CFS
	0.56	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.56		0.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		5		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		3		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**1,289,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.62		0.95	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		7.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**808,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.87			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		0.56			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**438,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		0.62			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		13		6	
Passes		3		16.38	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	350,000	$	145,000	
Construction Cost (Disinfection)	**$**	**495,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		22,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
			TOTAL CAPITAL COST	**$**	**4,491,000**

RESULTS SUMMARY		
Number of Events / Year	42	
Number of Overflows / Year	6	
Peak Volume	1,474	CF
	0.01	MG
Total Volume	47,912	CF
	0.36	MG
Peak Rate	0.87	CFS
	0.56	MGD

Capital Costs - CSO 138J001 to 138P001 Region					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		0.56		0.87	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**438,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		0.56		0.87	= Peak Flow x % Req Pump
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**760,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.87			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,103,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		200			=CFS x 200
Odor Control Flow Rate (CFM)		10			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		0.56			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		13		6	
Passes		3		**18.01**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	349,000	$	145,000	
Construction Cost (Disinfection)	**$**	**494,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		22,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
			TOTAL CAPITAL COST	**$**	**3,155,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.90	$28,812	20	10.910	$314,338
	Tank O&M	No. Events / Yr	42	$26,017	50	14.484	$376,824
		Const Cost ($)	$85,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,593	20	10.910	$82,842
	Odor Control O&M	Capacity (cfm)	140	$490	20	10.910	$5,346
	Reserve / Replace	10% Gravity / 15% Pump					$8,310
			Total Annual O&M	**$63,000**		**Total PW O&M**	**$788,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.06	$2,714	20	10.910	$29,615
	Tank O&M	No. Events / Yr	42	$28,940	50	14.484	$419,152
		Const Cost ($)	$1,254,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,593	20	10.910	$82,842
	Odor Control O&M	Capacity (cfm)	1,350	$4,725	20	10.910	$51,549
	Reserve / Replace	10% Gravity / 15% Pump					$3,026
			Total Annual O&M	**$44,000**		**Total PW O&M**	**$586,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	1.90	$28,812	20	10.910	$314,338
	Sed. Basin O&M	Flow Rate (mgd)	1.90	$213	50	14.484	$3,088
	Screening O&M	Flow Rate (mgd)	1.90	$7,593	20	10.910	$82,842
	Disinfection O&M	Flow Rate (mgd)	1.90	$23,737	20	10.910	$258,965
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$9,406
			Total Annual O&M	**$62,000**		**Total PW O&M**	**$684,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	2.08	$30,706	20	10.910	$335,005
	HREP O&M	Flow Rate (mgd)	1.90	$33,922	20	10.910	$370,087
	Screening O&M	Flow Rate (mgd)	1.90	$7,593	20	10.910	$82,842
	Disinfection O&M	Flow Rate (mgd)	2.08	$25,156	20	10.910	$274,447
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$13,529
			Total Annual O&M	**$98,000**		**Total PW O&M**	**$1,078,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	1.04	$19,325	20	10.910	$210,830
	Swirl / Vortex O&M	Flow Rate (mgd)	1.90	$213	20	10.910	$2,326
	Screening O&M	Flow Rate (mgd)	1.90	$7,593	20	10.910	$82,842
	Disinfection O&M	Flow Rate (mgd)	1.04	$16,491	20	10.910	$179,916
	Odor Control O&M	Capacity (cfm)	1,450.00	$5,075	20	10.910	$55,368
	Reserve / Replace	10% Gravity / 15% Pump					$8,055
			Total Annual O&M	**$49,000**		**Total PW O&M**	**$539,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	1.90	$28,812	20	10.910	$314,338
	Screening O&M	Flow Rate (mgd)	1.90	$7,593	20	10.910	$82,842
	Disinfection O&M	Flow Rate (mgd)	1.90	$23,737	20	10.910	$258,965
	Odor Control O&M	Capacity (cfm)	30.00	$105	20	10.910	$1,146
	Reserve / Replace	10% Gravity / 15% Pump					$9,300
			Total Annual O&M	**$61,000**		**Total PW O&M**	**$667,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.85	$16,853	20	10.910	$183,862
	Tank O&M	No. Events / Yr	42	$25,882	50	14.484	$374,869
		Const Cost ($)	$31,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,506	20	10.910	$81,890
	Odor Control O&M	Capacity (cfm)	60	$210	20	10.910	$2,291
	Reserve / Replace	10% Gravity / 15% Pump					$5,361
			Total Annual O&M	**$51,000**		**Total PW O&M**	**$648,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.02	$1,467	20	10.910	$16,004
	Tank O&M	No. Events / Yr	42	$28,427	50	14.484	$411,729
		Const Cost ($)	$1,049,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,506	20	10.910	$81,890
	Odor Control O&M	Capacity (cfm)	550	$1,925	20	10.910	$21,002
	Reserve / Replace	10% Gravity / 15% Pump					$2,621
			Total Annual O&M	**$40,000**		**Total PW O&M**	**$533,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	0.85	$16,853	20	10.910	$183,862
	Sed. Basin O&M	Flow Rate (mgd)	0.85	$96	50	14.484	$1,384
	Screening O&M	Flow Rate (mgd)	0.85	$7,506	20	10.910	$81,890
	Disinfection O&M	Flow Rate (mgd)	0.85	$14,556	20	10.910	$158,807
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$6,370
			Total Annual O&M	**$40,000**		**Total PW O&M**	**$440,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	0.93	$17,961	20	10.910	$195,950
	HREP O&M	Flow Rate (mgd)	0.85	$21,158	20	10.910	$230,828
	Screening O&M	Flow Rate (mgd)	0.85	$7,506	20	10.910	$81,890
	Disinfection O&M	Flow Rate (mgd)	0.93	$15,426	20	10.910	$168,301
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$10,231
			Total Annual O&M	**$63,000**		**Total PW O&M**	**$687,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	0.47	$11,303	20	10.910	$123,318
	Swirl / Vortex O&M	Flow Rate (mgd)	0.85	$96	20	10.910	$1,042
	Screening O&M	Flow Rate (mgd)	0.85	$7,506	20	10.910	$81,890
	Disinfection O&M	Flow Rate (mgd)	0.47	$10,113	20	10.910	$110,331
	Odor Control O&M	Capacity (cfm)	1,450.00	$5,075	20	10.910	$55,368
	Reserve / Replace	10% Gravity / 15% Pump					$5,659
			Total Annual O&M	**$35,000**		**Total PW O&M**	**$378,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	0.85	$16,853	20	10.910	$183,862
	Screening O&M	Flow Rate (mgd)	0.85	$7,506	20	10.910	$81,890
	Disinfection O&M	Flow Rate (mgd)	0.85	$14,556	20	10.910	$158,807
	Odor Control O&M	Capacity (cfm)	20.00	$70	20	10.910	$764
	Reserve / Replace	10% Gravity / 15% Pump					$6,310
			Total Annual O&M	**$39,000**		**Total PW O&M**	**$432,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.68	$14,579	20	10.910	$159,056
	Tank O&M	No. Events / Yr	42	$25,850	50	14.484	$374,398
		Const Cost ($)	$18,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,492	20	10.910	$81,740
	Odor Control O&M	Capacity (cfm)	40	$140	20	10.910	$1,527
	Reserve / Replace	10% Gravity / 15% Pump					$4,760
			Total Annual O&M	**$49,000**		**Total PW O&M**	**$621,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.01	$1,050	20	10.910	$11,454
	Tank O&M	No. Events / Yr	42	$28,295	50	14.484	$409,810
		Const Cost ($)	$996,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,492	20	10.910	$81,740
	Odor Control O&M	Capacity (cfm)	400	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$2,538
			Total Annual O&M	**$39,000**		**Total PW O&M**	**$521,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 138J001 to 138P001 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	0.68	$14,579	20	10.910	$159,056
	Sed. Basin O&M	Flow Rate (mgd)	0.68	$77	50	14.484	$1,114
	Screening O&M	Flow Rate (mgd)	0.68	$7,492	20	10.910	$81,740
	Disinfection O&M	Flow Rate (mgd)	0.68	$12,754	20	10.910	$139,148
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$5,769
			Total Annual O&M	**$36,000**		**Total PW O&M**	**$394,000**

CSO 138J001 to 138P001 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	0.75	$15,538	20	10.910	$169,514
	HREP O&M	Flow Rate (mgd)	0.68	$18,624	20	10.910	$203,181
	Screening O&M	Flow Rate (mgd)	0.68	$7,492	20	10.910	$81,740
	Disinfection O&M	Flow Rate (mgd)	0.75	$13,517	20	10.910	$147,467
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$9,496
			Total Annual O&M	**$56,000**		**Total PW O&M**	**$611,000**

CSO 138J001 to 138P001 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	0.38	$9,778	20	10.910	$106,681
	Swirl / Vortex O&M	Flow Rate (mgd)	0.68	$77	20	10.910	$839
	Screening O&M	Flow Rate (mgd)	0.68	$7,492	20	10.910	$81,740
	Disinfection O&M	Flow Rate (mgd)	0.38	$8,861	20	10.910	$96,673
	Odor Control O&M	Capacity (cfm)	1,450.00	$5,075	20	10.910	$55,368
	Reserve / Replace	10% Gravity / 15% Pump					$5,267
			Total Annual O&M	**$32,000**		**Total PW O&M**	**$347,000**

CSO 138J001 to 138P001 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	0.68	$14,579	20	10.910	$159,056
	Screening O&M	Flow Rate (mgd)	0.68	$7,492	20	10.910	$81,740
	Disinfection O&M	Flow Rate (mgd)	0.68	$12,754	20	10.910	$139,148
	Odor Control O&M	Capacity (cfm)	10.00	$35	20	10.910	$382
	Reserve / Replace	10% Gravity / 15% Pump					$5,704
			Total Annual O&M	**$35,000**		**Total PW O&M**	**$386,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.64	$13,938	20	10.910	$152,065
	Tank O&M	No. Events / Yr	42	$25,822	50	14.484	$374,000
		Const Cost ($)	$7,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,489	20	10.910	$81,700
	Odor Control O&M	Capacity (cfm)	20	$70	20	10.910	$764
	Reserve / Replace	10% Gravity / 15% Pump					$4,591
			Total Annual O&M	**$48,000**		**Total PW O&M**	**$613,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.01	$610	20	10.910	$6,656
	Tank O&M	No. Events / Yr	42	$28,182	50	14.484	$408,181
		Const Cost ($)	$951,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,489	20	10.910	$81,700
	Odor Control O&M	Capacity (cfm)	150	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$2,443
			Total Annual O&M	**$37,000**		**Total PW O&M**	**$505,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	0.64	$13,938	20	10.910	$152,065
	Sed. Basin O&M	Flow Rate (mgd)	0.64	$72	50	14.484	$1,041
	Screening O&M	Flow Rate (mgd)	0.64	$7,489	20	10.910	$81,700
	Disinfection O&M	Flow Rate (mgd)	0.64	$12,242	20	10.910	$133,560
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$5,606
			Total Annual O&M	**$35,000**		**Total PW O&M**	**$382,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	0.70	$14,855	20	10.910	$162,063
	HREP O&M	Flow Rate (mgd)	0.64	$17,901	20	10.910	$195,299
	Screening O&M	Flow Rate (mgd)	0.64	$7,489	20	10.910	$81,700
	Disinfection O&M	Flow Rate (mgd)	0.70	$12,974	20	10.910	$141,545
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$9,297
			Total Annual O&M	**$54,000**		**Total PW O&M**	**$590,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	0.35	$9,349	20	10.910	$101,992
	Swirl / Vortex O&M	Flow Rate (mgd)	0.64	$72	20	10.910	$784
	Screening O&M	Flow Rate (mgd)	0.64	$7,489	20	10.910	$81,700
	Disinfection O&M	Flow Rate (mgd)	0.35	$8,505	20	10.910	$92,791
	Odor Control O&M	Capacity (cfm)	1,450.00	$5,075	20	10.910	$55,368
	Reserve / Replace	10% Gravity / 15% Pump					$5,164
			Total Annual O&M	**$31,000**		**Total PW O&M**	**$338,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	0.64	$13,938	20	10.910	$152,065
	Screening O&M	Flow Rate (mgd)	0.64	$7,489	20	10.910	$81,700
	Disinfection O&M	Flow Rate (mgd)	0.64	$12,242	20	10.910	$133,560
	Odor Control O&M	Capacity (cfm)	10.00	$35	20	10.910	$382
	Reserve / Replace	10% Gravity / 15% Pump					$5,541
			Total Annual O&M	**$34,000**		**Total PW O&M**	**$373,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.56	$12,755	20	10.910	$139,153
	Tank O&M	No. Events / Yr	42	$25,822	50	14.484	$374,000
		Const Cost ($)	$7,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,482	20	10.910	$81,628
	Odor Control O&M	Capacity (cfm)	10	$35	20	10.910	$382
	Reserve / Replace	10% Gravity / 15% Pump					$4,298
			Total Annual O&M	**$47,000**		**Total PW O&M**	**$599,000**

CSO 138J001 to 138P001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.01	$582	20	10.910	$6,351
	Tank O&M	No. Events / Yr	42	$28,175	50	14.484	$408,072
		Const Cost ($)	$948,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,482	20	10.910	$81,628
	Odor Control O&M	Capacity (cfm)	100	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$2,411
			Total Annual O&M	**$37,000**		**Total PW O&M**	**$502,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 138J001 to 138P001 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	0.56	$12,755	20	10.910	$139,153
	Sed. Basin O&M	Flow Rate (mgd)	0.56	$63	50	14.484	$912
	Screening O&M	Flow Rate (mgd)	0.56	$7,482	20	10.910	$81,628
	Disinfection O&M	Flow Rate (mgd)	0.56	$11,291	20	10.910	$123,180
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$5,282
			Total Annual O&M	**$32,000**		**Total PW O&M**	**$354,000**

CSO 138J001 to 138P001 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	0.62	$13,593	20	10.910	$148,303
	HREP O&M	Flow Rate (mgd)	0.56	$16,556	20	10.910	$180,625
	Screening O&M	Flow Rate (mgd)	0.56	$7,482	20	10.910	$81,628
	Disinfection O&M	Flow Rate (mgd)	0.62	$11,966	20	10.910	$130,544
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$8,946
			Total Annual O&M	**$50,000**		**Total PW O&M**	**$550,000**

CSO 138J001 to 138P001 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	0.31	$8,555	20	10.910	$93,332
	Swirl / Vortex O&M	Flow Rate (mgd)	0.56	$63	20	10.910	$687
	Screening O&M	Flow Rate (mgd)	0.56	$7,482	20	10.910	$81,628
	Disinfection O&M	Flow Rate (mgd)	0.31	$7,844	20	10.910	$85,579
	Odor Control O&M	Capacity (cfm)	1,450.00	$5,075	20	10.910	$55,368
	Reserve / Replace	10% Gravity / 15% Pump					$4,975
			Total Annual O&M	**$30,000**		**Total PW O&M**	**$322,000**

CSO 138J001 to 138P001 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	0.56	$12,755	20	10.910	$139,153
	Screening O&M	Flow Rate (mgd)	0.56	$7,482	20	10.910	$81,628
	Disinfection O&M	Flow Rate (mgd)	0.56	$11,291	20	10.910	$123,180
	Odor Control O&M	Capacity (cfm)	10.00	$35	20	10.910	$382
	Reserve / Replace	10% Gravity / 15% Pump					$5,247
			Total Annual O&M	**$32,000**		**Total PW O&M**	**$350,000**

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$3.2	$3,207,000	$0
1	$3.2	$3,207,000	$0
2	$3.2	$3,207,000	$0
4	$3.2	$3,207,000	$0
6	$3.2	$3,207,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$12.3	$11,684,804	$586,000
1	$11.9	$11,325,669	$533,000
2	$11.8	$11,241,467	$521,000
4	$11.7	$11,158,870	$505,000
6	$11.6	$11,144,675	$502,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$12.6	$11,784,804	$788,000
1	$11.6	$10,967,669	$648,000
2	$11.4	$10,799,467	$621,000
4	$11.4	$10,738,870	$613,000
6	$11.3	$10,664,675	$599,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$4.6	$4,022,000	$539,000
1	$3.7	$3,295,000	$378,000
2	$3.5	$3,172,000	$347,000
4	$3.5	$3,140,000	$338,000
6	$3.4	$3,080,000	$322,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$6.9	$5,788,000	$1,078,000
1	$5.5	$4,848,000	$687,000
2	$5.3	$4,647,000	$611,000
4	$5.2	$4,591,000	$590,000
6	$5.0	$4,491,000	$550,000

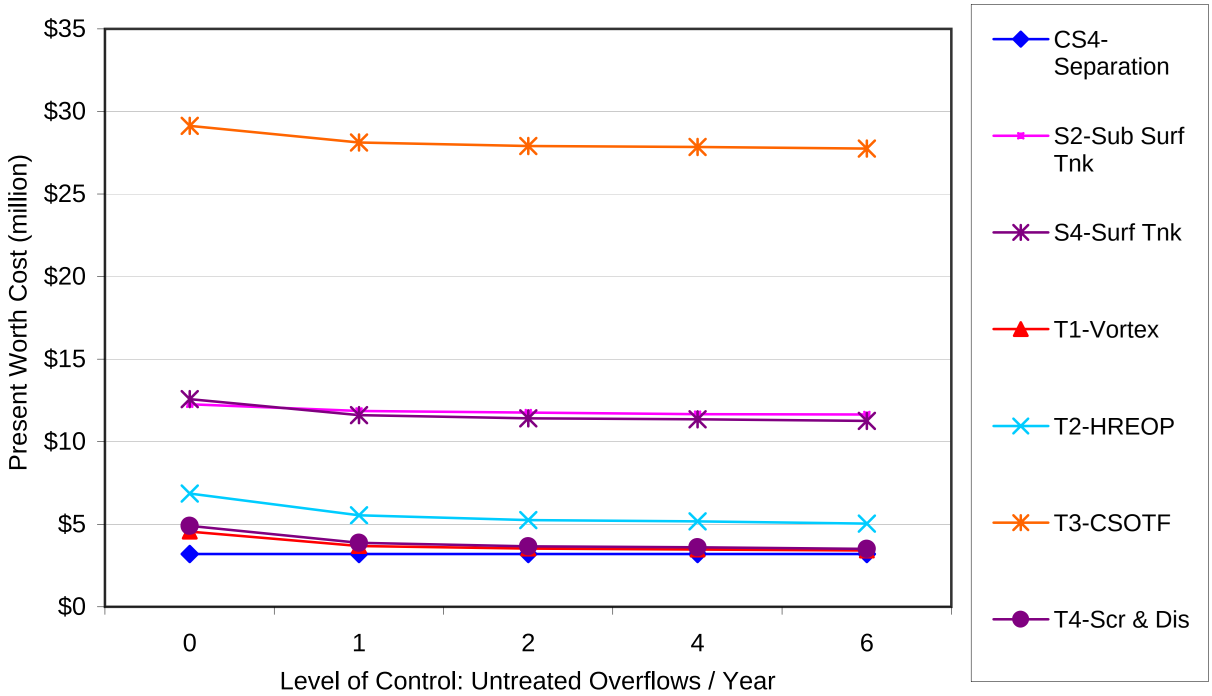
T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$29.1	$28,450,476	$684,000
1	$28.1	$27,675,669	$440,000
2	$27.9	$27,520,467	$394,000
4	$27.9	$27,474,870	$382,000
6	$27.7	$27,390,675	$354,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$4.9	$4,241,000	$667,000
1	$3.9	$3,438,000	$432,000
2	$3.7	$3,278,000	$386,000
4	$3.6	$3,232,000	$373,000
6	$3.5	$3,155,000	$350,000

Figure 3 – CSO 138J001 to 138P001 Sewershed Alternative Costs



Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	CSO 138J001 to 138P001
Structures within Region	CSO 138J001, CSO 138P001
Model ID	CSO 138J001 to 138P001.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	42
Peak Volume:	14,765 ft^3
	0.11 MG
Total Volume:	47,912 ft^3
	0.36 MG
Peak Rate:	2.93 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 2:28	2075	1/5/2005 14:30	14764.82	110.448	0	0.37	13
8/20/2005 18:25	115	8/20/2005 19:45	5877.01	43.963	1	2.93	0
11/29/2005 6:48	530	11/29/2005 11:15	3562.44	26.649	2	0.27	15
3/28/2005 9:03	755	3/28/2005 19:15	3032.09	22.682	3	0.37	12
1/3/2005 13:10	464	1/3/2005 16:15	1580.90	11.826	4	0.09	31
5/13/2005 22:30	123	5/13/2005 22:45	1568.04	11.730	5	0.94	5
7/26/2005 19:45	38	7/26/2005 20:15	1473.76	11.024	6	0.99	4
1/11/2005 8:49	559	1/11/2005 11:30	1418.54	10.611	7	0.10	30
9/16/2005 21:15	37	9/16/2005 21:30	1351.10	10.107	8	1.03	3
2/14/2005 8:58	476	2/14/2005 10:05	1174.23	8.784	9	0.06	37
10/22/2005 6:15	38	10/22/2005 6:45	1157.86	8.661	10	0.87	6
7/17/2005 16:15	28	7/17/2005 16:30	934.19	6.988	11	1.31	1
7/5/2005 16:35	44	7/5/2005 16:45	907.76	6.791	12	0.85	7
9/29/2005 5:10	51	9/29/2005 5:45	905.92	6.777	13	0.66	8
7/15/2005 17:20	43	7/15/2005 17:45	880.87	6.589	14	0.64	9
2/20/2005 19:52	152	2/20/2005 20:30	814.94	6.096	15	0.32	14
4/2/2005 6:13	256	4/2/2005 9:45	807.26	6.039	16	0.11	28
1/14/2005 0:29	213	1/14/2005 2:30	771.66	5.772	17	0.12	26
5/23/2005 16:35	24	5/23/2005 16:45	658.63	4.927	18	1.06	2
1/12/2005 1:02	96	1/12/2005 1:30	544.71	4.075	19	0.24	18
1/8/2005 4:47	191	1/8/2005 5:00	456.96	3.418	20	0.11	27
7/21/2005 14:56	53	7/21/2005 15:15	417.92	3.126	21	0.25	16
5/11/2005 22:40	83	5/11/2005 22:50	405.63	3.034	22	0.17	21
8/29/2005 12:46	51	8/29/2005 13:30	364.28	2.725	23	0.25	17
11/14/2005 22:33	300	11/15/2005 3:00	348.85	2.610	24	0.20	20
7/25/2005 16:46	21	7/25/2005 17:00	277.33	2.075	25	0.38	11
7/12/2005 19:50	22	7/12/2005 20:00	269.40	2.015	26	0.45	10
12/15/2005 13:39	427	12/15/2005 20:15	257.57	1.927	27	0.09	33
4/23/2005 3:55	28	4/23/2005 4:15	176.48	1.320	28	0.15	22
8/27/2005 15:16	18	8/27/2005 15:30	158.13	1.183	29	0.24	19
10/7/2005 10:23	26	10/7/2005 10:45	100.82	0.754	30	0.09	32
5/14/2005 9:17	30	5/14/2005 9:30	98.20	0.735	31	0.10	29
5/28/2005 9:15	18	5/28/2005 9:30	67.87	0.508	32	0.08	35

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
8/8/2005 8:25	39	8/8/2005 9:00	67.44	0.504	33	0.06	38
10/21/2005 19:06	12	10/21/2005 19:15	62.21	0.465	34	0.13	24
11/16/2005 4:11	10	11/16/2005 4:15	47.68	0.357	35	0.14	23
6/6/2005 9:56	8	6/6/2005 10:00	34.05	0.255	36	0.12	25
8/26/2005 22:38	10	8/26/2005 22:45	31.16	0.233	37	0.07	36
10/22/2005 16:22	10	10/22/2005 16:30	24.74	0.185	38	0.05	39
6/14/2005 19:11	7	6/14/2005 19:15	24.06	0.180	39	0.09	34
1/30/2005 13:53	8	1/30/2005 14:00	19.21	0.144	40	0.05	40
3/27/2005 16:54	7	3/27/2005 17:00	15.18	0.114	41	0.04	41

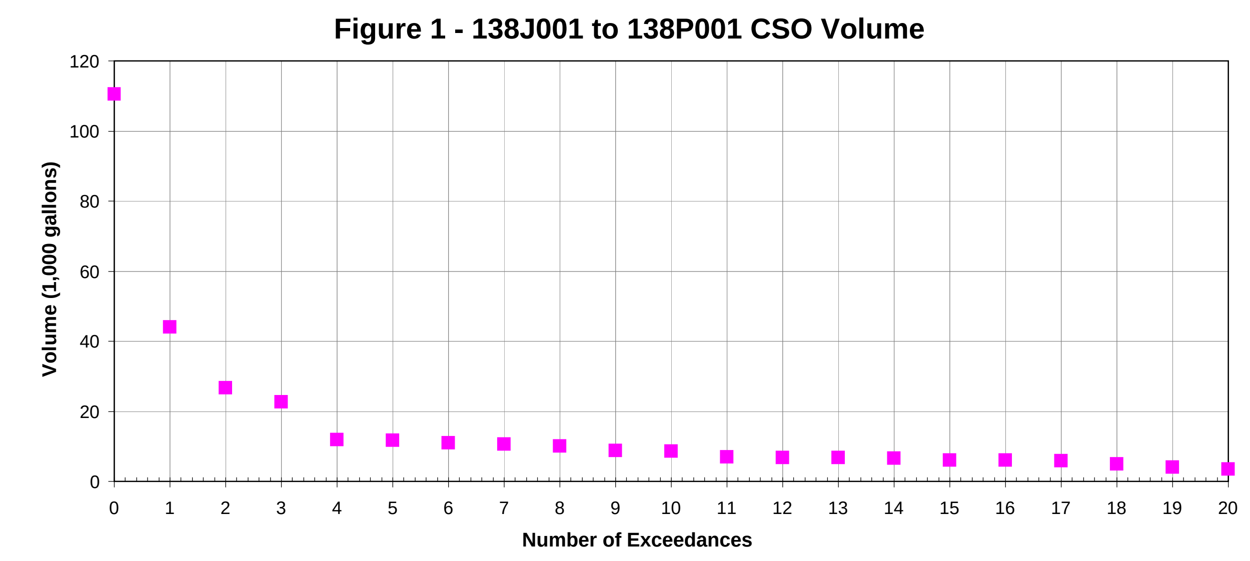
Region 1

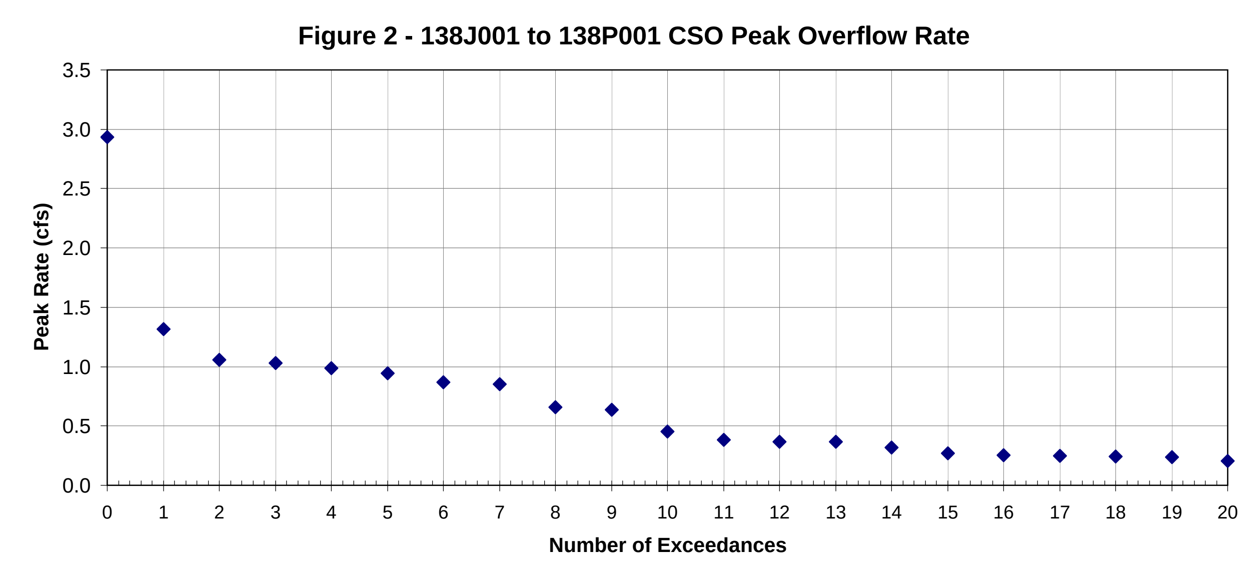
PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	CSO 138J001 to 138P001
Structures within Region	CSO 138J001, CSO 138P001
Model ID	CSO 138J001 to 138P001.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	42
Peak Volume:	14,765 ft^3
	0.11 MG
Total Volume:	47,912 ft^3
	0.36 MG
Peak Rate:	2.93 cfs





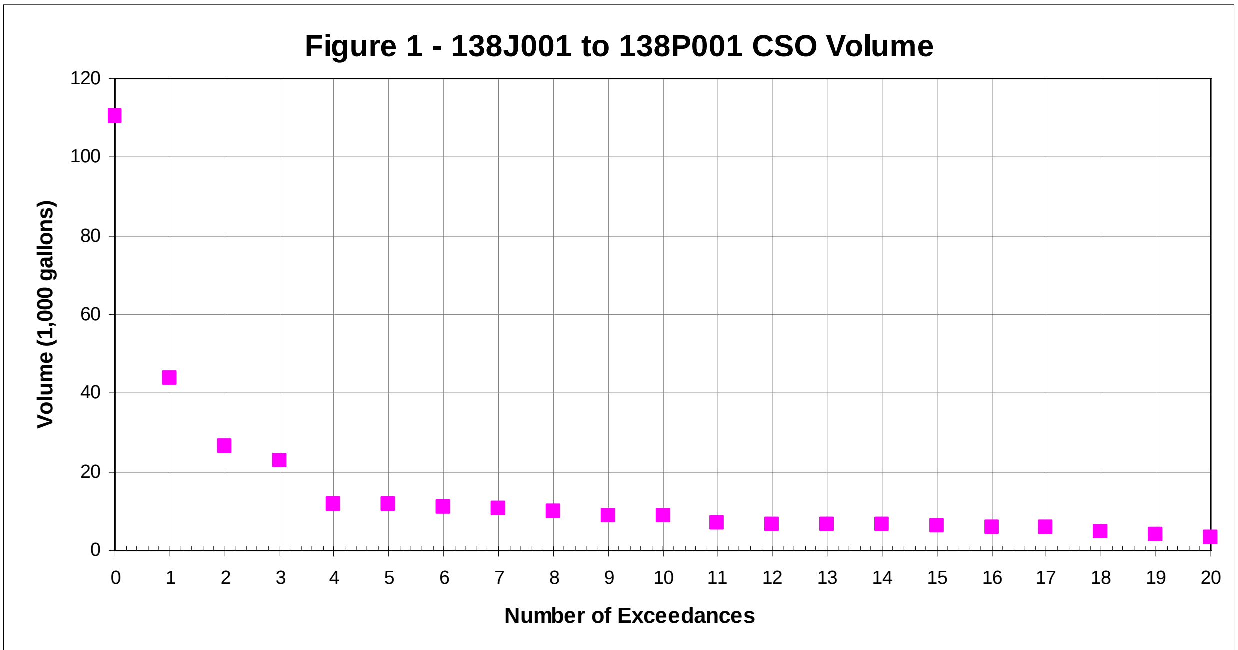
D.33.1 138J001 AND 138P001 – WEYMAN STREET SEWERSHED

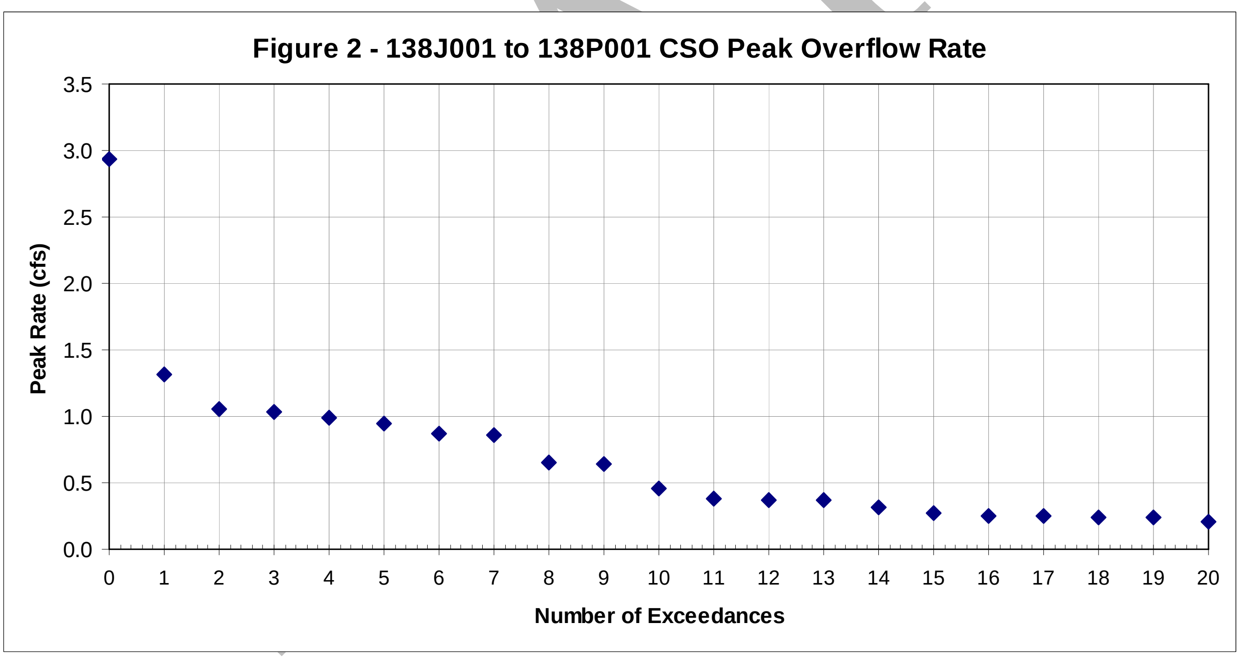
Description of Outfalls

The outfalls 138J001 and 138P001 have been consolidated into a group for evaluation. The Englert and Weyman Street Sewersheds are located in portions of Carrick and Overbrook sections in the City of Pittsburgh are located in portions of Allentown, Beltzhoover, Bon Air, Carrick, Knoxville, and Mount Washington sections in the City of Pittsburgh. The Englert and Weyman Street Sewersheds are comprised of approximately 295 manholes and 54,482 linear feet (10.3 miles) of combined, sanitary and storm sewer up to 36 inches in diameter. The outfalls are both located in the Weyman Street Sewershed. The Weyman Street Sewershed includes 77 acres of area. Flow from PWSA diversion chambers 138J001 and 138P001 is discharged to a tributary to Saw Mill Run. Neither of these outfalls has an NPDES permit number.

Attachment 1, Tributary Area Map, shows the CSO locations and the tributary areas.

The outfalls typically experience 42 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 0.11 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from both outfalls is approximately 2.93 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.





A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers. The sewers are required to convey CSOs from outfalls 138J001 to the vicinity of outfall 138P001 where a storage or treatment alternative might be located. There appears to be a limited amount of available space for potential storage facility and some types of treatment facilities in the vicinity of this outfall due to steep slopes in the undeveloped private land. Some types of treatment require much less space and could be easily located approximately 500 to the north of CSO 138P001 in an undeveloped area. Residential land is located to the east and west of the potential storage or treatment area.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4- 138J001 and 138P001: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2- 138J001 and 138P001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4- 138J001 and 138P001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1- 138J001 and 138P001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2- 138J001 and 138P001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities.   Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3- 138J001 and 138P001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4- 138J001 and 138P001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – 138J001 and 138P001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.

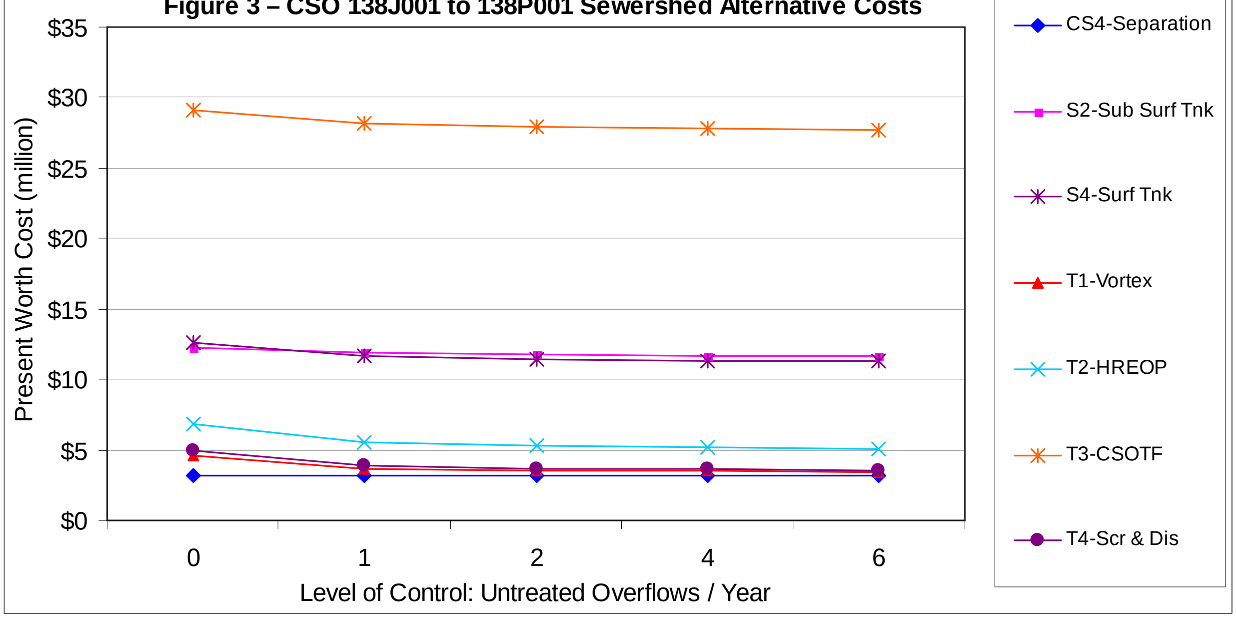


Figure 3 – CSO 138J001 to 138P001 Sewershed Alternative Costs

The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall “ranking” at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

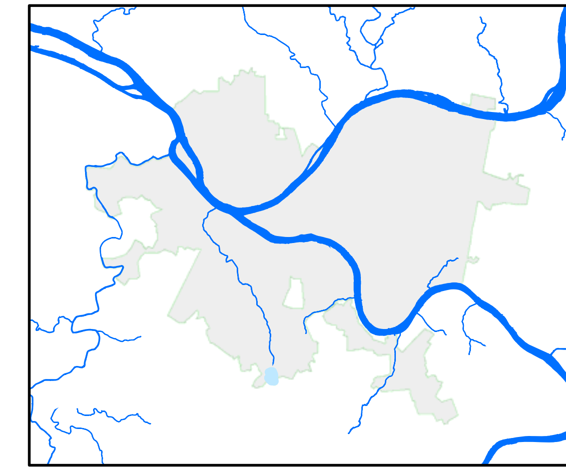
Recommendations

Based upon the above, for control levels 0 to 6, it is recommended that Alternative CS4-138J001 and 138P001: Sewer Separation be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, shows the locations of the outfalls that will be addressed with the recommended alternative. Separation sewers will be constructed throughout the sewershed. No storage or treatment facility will be needed so no facility location is identified on the map.

Significant Issues

There is very limited space in the vicinity of either of the outfalls in this group for a storage or treatment facility but construction may be limited due to steep slopes. Significant earthwork may be required due to steep slopes if storage or certain treatment alternatives are selected. For the recommended alternative, sewer separation, however, this is less of a significant issue.



Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

0 370 740 Feet

Attachment 1 CSO 138J001 to CSO 138P001 Tributary Area Map Englert & Weyman Street Sewershed

CSO Controls Alternatives

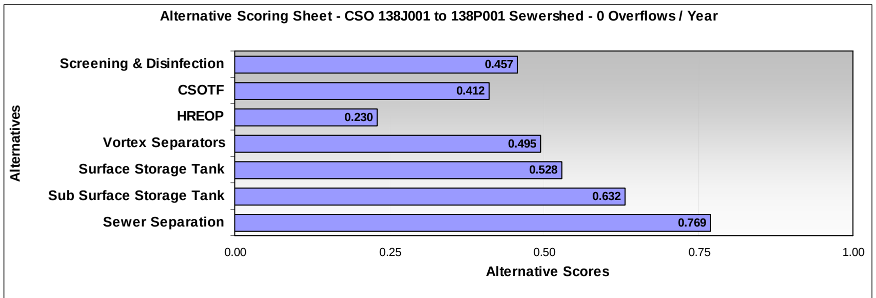
PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

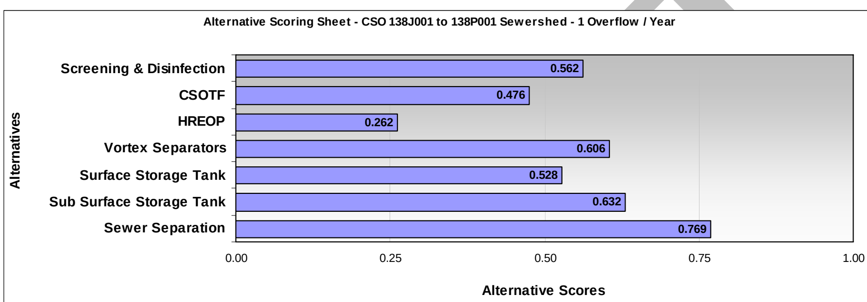
SW-D-0250.pdf

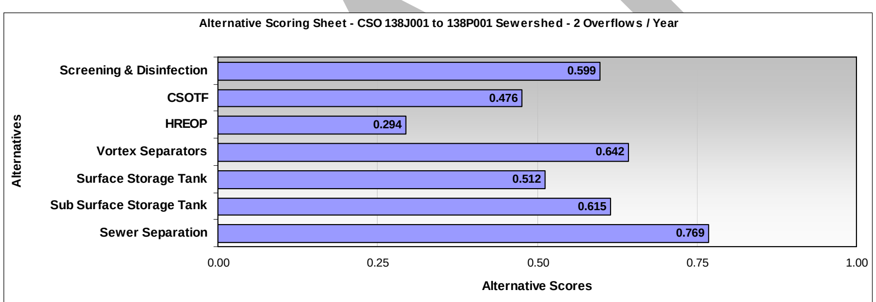
Attachment 2 - CSO Alternatives Development Worksheet

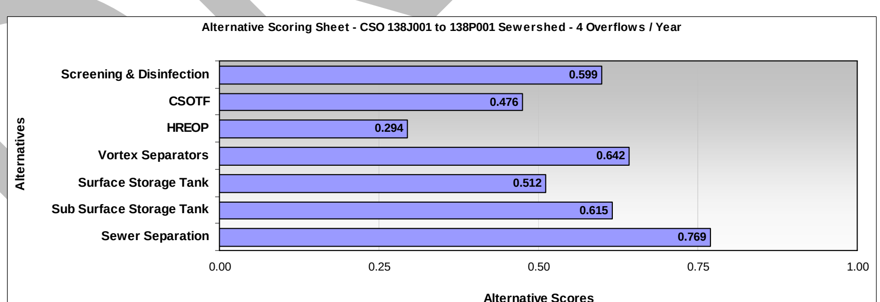
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will not be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

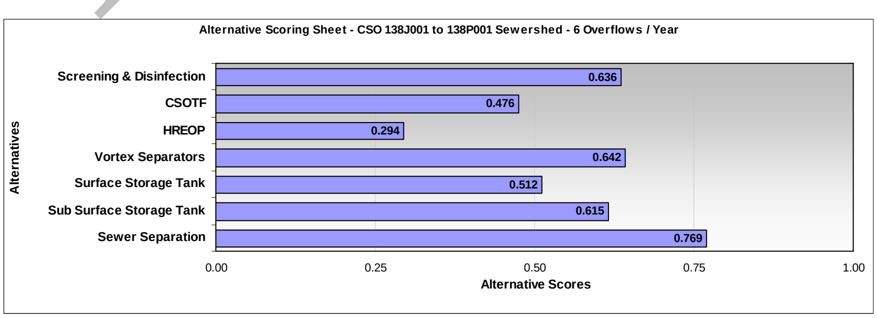
Attachment 3 – Alternative Scoring Sheet

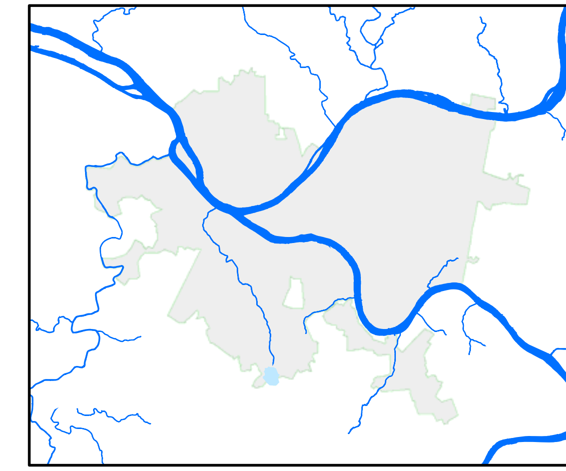












Area Overview

Legend

- Sewershed Boundary
- **ALCOSAN Interceptor**
- **Trunk Sewer**
- **ALCOSAN Diversion Structure**
- **PWSA Diversion Structure**
- **Combined Sewer Outfall**

0 370 740
Feet

Attachment 4 CSO 138J001 to CSO 138P001 Facilities Boundary Map Englert & Weyman Street Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0250.pdf

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	4	2	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.					
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative: T1-Vortex		Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative: T1-Vortex		Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T2-HREOP		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	1	1	1	1	1
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	1	1	1	1	1
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	3	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	2	1	1	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team
of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.717**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	**S4-Surf Tnk**		**Control Level:**	**0 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.732**

Alternative:	**S4-Surf Tnk**		**Control Level:**	**1 Overflow / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.627**

Alternative:	**S4-Surf Tnk**		**Control Level:**	**2 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.573**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.573**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.573**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Total Score

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.491**

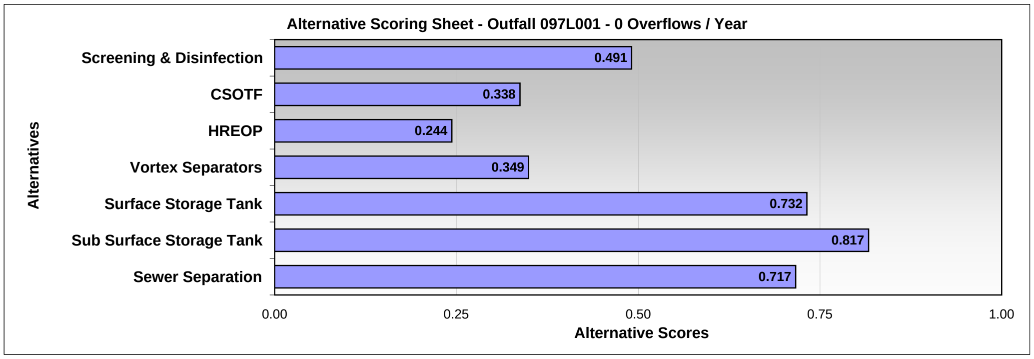
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

Total Score

Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**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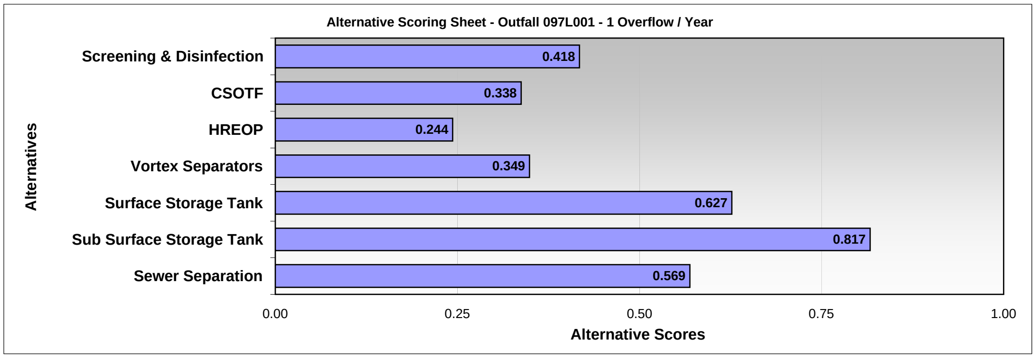
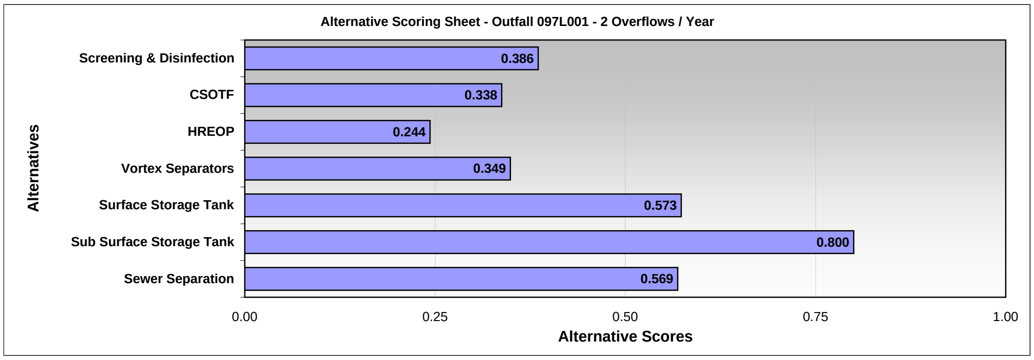
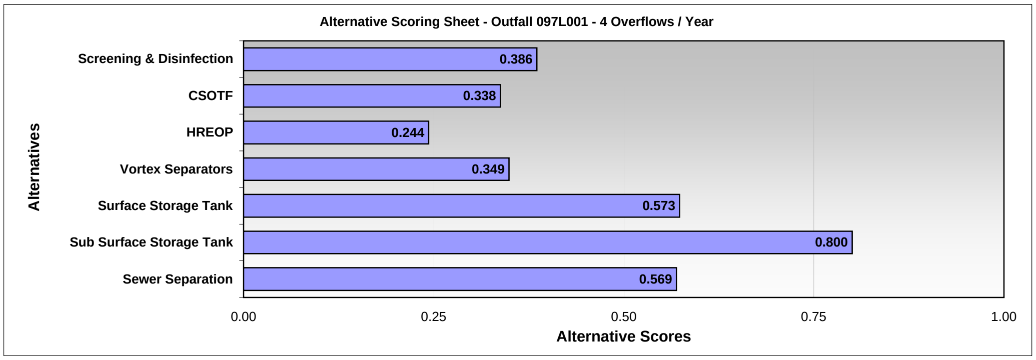
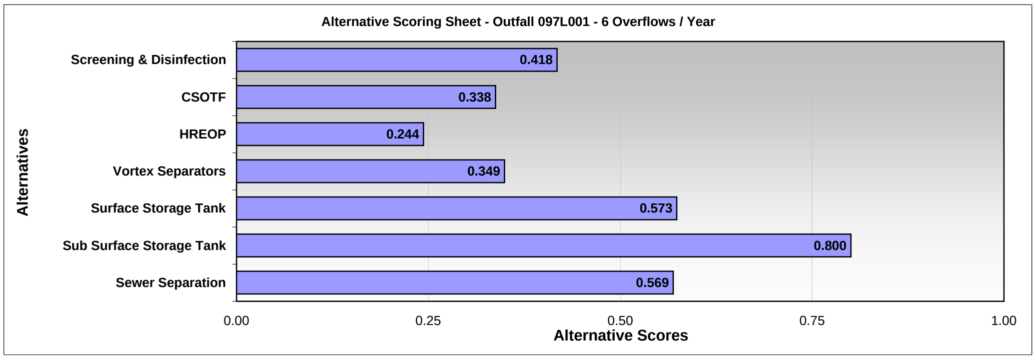
Alternatives
Screening & Disinfection
0.491
CSOTF
0.338
HREOP
0.244
Vortex Separators
0.349
Surface Storage Tank
0.732
Sub Surface Storage Tank
0.817
Sewer Separation
0.717
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 097L001 - 1 Overflow / Year
Alternatives
Screening & Disinfection
0.418
CSOTF
0.338
HREOP
0.244
Vortex Separators
0.349
Surface Storage Tank
0.627
Sub Surface Storage Tank
0.817
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 097L001 - 2 Overflows / Year
Alternatives
Screening & Disinfection
0.386
CSOTF
0.338
HREOP
0.244
Vortex Separators
0.349
Surface Storage Tank
0.573
Sub Surface Storage Tank
0.800
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 097L001 - 4 Overflows / Year
Alternatives
Screening & Disinfection
0.386
CSOTF
0.338
HREOP
0.244
Vortex Separators
0.349
Surface Storage Tank
0.573
Sub Surface Storage Tank
0.800
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 097L001 - 6 Overflows / Year
Alternatives
Screening & Disinfection
0.418
CSOTF
0.338
HREOP
0.244
Vortex Separators
0.349
Surface Storage Tank
0.573
Sub Surface Storage Tank
0.800
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	0	
Peak Volume	95,909	CF
	0.72	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	26.21	CFS
	16.94	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		51		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**7,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		22,216		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**7,733,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	0	
Peak Volume	95,909	CF
	0.72	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	26.21	CFS
	16.94	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001

SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.72	96,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.84	113,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		107		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		72		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.86	115,560	**Sufficient Volume**
Tank Area (SF)		8,000		= Length x Width
Construction Cost (Storage Tank)		**657,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		16.94	26.21	= Peak Rate
Force Main Diameter (In)		28		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,718,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		26.21		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		170,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		850		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**81,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		16.94		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,197,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		30,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST $	**5,872,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	0	
Peak Volume	95,909	CF
	0.72	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	26.21	CFS
	16.94	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001

SUB-SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank Default Value	
Sizing Basis: Peak Volume (MG / CF)	0.72	96,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.84	113,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	107		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	72		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.86	115,560	**Sufficient Volume**
Tank Area (SF)	8,000		= Length x Width
Construction Cost (Storage Tank)	**3,123,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.72	1.11	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	6		Input by Engineer
Force Main Velocity (FPS)	5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 894,000**	**$ 16,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	26.21		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe)	**$ 84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	170,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	8,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$ 490,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	16.94		Ref: CSO Statistics
Construction Cost (Screening)	**$ 1,197,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes / Detention (Min)		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$ -	$ -	
Construction Cost (Disinfection)	**$ -**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators)	**$ 39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	30,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 60,000**		
		TOTAL CAPITAL COST $	**5,903,000**

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RESULTS SUMMARY			
Number of Events / Year	53		
Number of Overflows / Year	0		
Peak Volume	95,909	CF	
	0.72	MG	
Total Volume	546,329	CF	
	4.09	MG	
Peak Rate	26.21	CFS	
	16.94	MGD	

Capital Costs - 097L001 / Sewershed CSO 097L001				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
0 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		16.94	26.21	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		2		
Construction Cost (Swirl / Vortex)	**$**	**1,701,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		18.63	28.83	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		30		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,925,000**	**$ 38,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		26.21		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		58,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		2,900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**211,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.94		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,197,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		18.63		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		68	33	
Passes / Detention (Min)		3	**15.57**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**719,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		18,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**36,000**		
			TOTAL CAPITAL COST $	**8,210,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	0	
Peak Volume	95,909	CF
	0.72	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	26.21	CFS
	16.94	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SEDIMENTATION BASIN (CSOTF)				
0 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		16.94	26.21	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		2,900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		77	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		39	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.27	36,036	
Construction Cost (CSOTF)	$	**16,374,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		16.94	26.21	= Peak Flow x % Req Pump
Force Main Diameter (In)		28		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	$	**3,718,000**	$ **36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		26.21		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	$	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		54,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,700		= ACH x Volume / 60
Construction Cost (Odor Control)	$	**199,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		16.94		Ref: CSO Statistics
Construction Cost (Screening)	$	**1,197,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		16.94		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		65	31	
Passes / Detention (Min)		3	15.38	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	$	**685,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	$	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		12,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	$	**24,000**		
			TOTAL CAPITAL COST $	**22,356,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	0	
Peak Volume	95,909	CF
	0.72	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	26.21	CFS
	16.94	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
0 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		16.94		26.21	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		200			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21		OK	Input by Engineer
Width (Ft)		11		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**3,872,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		18.63		28.83	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		30			Input by Engineer
Force Main Velocity (FPS)		5.9		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,925,000**	**$**	**38,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		26.21			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		16.94			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,197,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		18.63			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		68		33	Input by Engineer
Passes / Detention (Min)		3		15.57	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	719,000	$	600,000	
Construction Cost (Disinfection)	**$**	**1,319,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		30,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
			TOTAL CAPITAL COST	**$**	**10,570,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	0	
Peak Volume	95,909	CF
	0.72	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	26.21	CFS
	16.94	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SCREENING AND DISINFECTION				
0 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		16.94	26.21	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,197,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		16.94	26.21	= Peak Flow x % Req Pump
Force Main Diameter (In)		28		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,718,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		26.21		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		5,200		=CFS x 200
Odor Control Flow Rate (CFM)		260		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**32,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		16.94		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		65	31	
Passes / Detention (Min)		3	**15.38**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	685,000	$ 563,000	
Construction Cost (Disinfection)	**$**	**1,248,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		24,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**		
			TOTAL CAPITAL COST $	**6,402,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	1	
Peak Volume	55,626	CF
	0.42	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	23.47	CFS
	15.17	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		51		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**7,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		22,216		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**7,733,000**

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RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	1	
Peak Volume	55,626	CF
	0.42	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	23.47	CFS
	15.17	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001

SURFACE STORAGE TANK

1 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.42	56,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.49	66,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		82		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		55		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.51	67,650	**Sufficient Volume**
Tank Area (SF)		5,000		= Length x Width
Construction Cost (Storage Tank)		**363,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		15.17	23.47	= Peak Rate
Force Main Diameter (In)		27		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,502,000**	**$ 35,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		23.47		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		99,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		500		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**53,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		15.17		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,115,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		25,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**5,220,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	1	
Peak Volume	55,626	CF
	0.42	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	23.47	CFS
	15.17	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001			
SUB-SURFACE STORAGE TANK			
1 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.42	56,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.49	66,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	82		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	55		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.51	67,650	**Sufficient Volume**
Tank Area (SF)	5,000		= Length x Width
Construction Cost (Storage Tank)	**2,195,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.42	0.64	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	4		Input by Engineer
Force Main Velocity (FPS)	7.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**638,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	23.47		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	99,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	4,950		= ACH x Volume / 60
Construction Cost (Odor Control) $	**321,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	15.17		Ref: CSO Statistics
Construction Cost (Screening) $	**1,115,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	25,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**50,000**		
		TOTAL CAPITAL COST $	**4,435,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	1	
Peak Volume	55,626	CF
	0.42	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	23.47	CFS
	15.17	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
1 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		15.17		23.47	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			Not Applicable - Insufficient Volume
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		16.68		25.81	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		28			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,687,000**	**$**	**36,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		23.47			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		15.17			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,115,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		16.68			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		65		31	
Passes		3		15.61	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**680,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		16,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**32,000**			
				TOTAL CAPITAL COST $	**5,912,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	1	
Peak Volume	55,626	CF
	0.42	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	23.47	CFS
	15.17	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SEDIMENTATION BASIN (CSOTF)				
1 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		15.17	23.47	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		2,600		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		73	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		37	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.24	32,412	
Construction Cost (CSOTF)	**$**	**16,375,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		15.17	23.47	= Peak Flow x % Req Pump
Force Main Diameter (In)		27		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,502,000**	**$ 35,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		23.47		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		49,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,450		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**185,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		15.17		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,115,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		15.17		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		62	29	
Passes		3	**15.32**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**650,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		11,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**22,000**		
			TOTAL CAPITAL COST $	**21,986,000**

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RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	1	
Peak Volume	55,626	CF
	0.42	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	23.47	CFS
	15.17	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		15.17		23.47	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		180			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		20		OK	Input by Engineer
Width (Ft)		10		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**3,590,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		16.68		25.81	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		28			Input by Engineer
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,687,000**	**$**	**36,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		23.47			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		5,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		250			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**31,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		15.17			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,115,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		16.68			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		65		31	Input by Engineer
Passes		3		15.61	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	680,000	$	563,000	
Construction Cost (Disinfection)	**$**	**1,243,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		29,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**58,000**			
			TOTAL CAPITAL COST	**$**	**9,862,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	1	
Peak Volume	55,626	CF
	0.42	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	23.47	CFS
	15.17	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		15.17		23.47	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,115,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		15.17		23.47	= Peak Flow x % Req Pump
Force Main Diameter (In)		27			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,502,000**	**$**	**35,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		23.47			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,700			=CFS x 200
Odor Control Flow Rate (CFM)		240			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**30,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		15.17			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		62		29	
Passes		3		**15.32**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	650,000	$	527,000	
Construction Cost (Disinfection)	**$**	**1,177,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
			TOTAL CAPITAL COST	**$**	**6,009,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	2	
Peak Volume	39,338	CF
	0.29	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	20.85	CFS
	13.48	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		51		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**7,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		22,216		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**7,733,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	2	
Peak Volume	39,338	CF
	0.29	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	20.85	CFS
	13.48	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001					
SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.29		39,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.35		46,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		69			= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		46			= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		0.36		47,610	**Sufficient Volume**
Tank Area (SF)		3,000			= Length x Width
Construction Cost (Storage Tank)		**249,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		13.48		20.85	= Peak Rate
Force Main Diameter (In)		25			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,296,000**	**$**	**33,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		20.85			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		69,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		350			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**40,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		13.48			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,036,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		24,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
				TOTAL CAPITAL COST $	**4,804,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	2	
Peak Volume	39,338	CF
	0.29	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	20.85	CFS
	13.48	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001			
SUB-SURFACE STORAGE TANK			
2 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.29	39,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.35	46,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	69		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	46		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.36	47,610	**Sufficient Volume**
Tank Area (SF)	3,000		= Length x Width
Construction Cost (Storage Tank)	**1,820,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.29	0.46	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	4		Input by Engineer
Force Main Velocity (FPS)	5.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 535,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	20.85		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe)	**$ 63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	69,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	3,450		= ACH x Volume / 60
Construction Cost (Odor Control)	**$ 242,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	13.48		Ref: CSO Statistics
Construction Cost (Screening)	**$ 1,036,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$ -	$ -	
Construction Cost (Disinfection)	**$ -**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators)	**$ 39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	24,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 48,000**		
		TOTAL CAPITAL COST	**$ 3,797,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	2	
Peak Volume	39,338	CF
	0.29	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	20.85	CFS
	13.48	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001

SWIRL CONCENTRATOR / VORTEX SEPARATOR

2 Overflows / Year

1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	13.48	20.85	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	14.82	22.94	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	26		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**3,460,000**	**$ 34,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	20.85		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	13.48		Ref: CSO Statistics
Construction Cost (Screening) $	**1,036,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	14.82		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	61	29	
Passes	3	**15.43**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**644,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	14,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**28,000**		
		TOTAL CAPITAL COST $	**5,564,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	2	
Peak Volume	39,338	CF
	0.29	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	20.85	CFS
	13.48	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SEDIMENTATION BASIN (CSOTF)				
2 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		13.48	20.85	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		2,300		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		69	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		34	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.21	28,152	
Construction Cost (CSOTF)	**$**	**16,378,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		13.48	20.85	= Peak Flow x % Req Pump
Force Main Diameter (In)		25		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,296,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		20.85		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		42,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,100		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**164,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		13.48		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,036,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		13.48		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		58	28	
Passes		3	**15.58**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**617,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		10,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**20,000**		
			TOTAL CAPITAL COST $	**21,646,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	2	
Peak Volume	39,338	CF
	0.29	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	20.85	CFS
	13.48	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001

HIGH RATE END OF PIPE TREATMENT (HREOP)

2 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		13.48		20.85	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		160			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		19		**OK**	Input by Engineer
Width (Ft)		9		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**3,322,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		14.82		22.94	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		26			Input by Engineer
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,460,000**	**$**	**34,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		20.85			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		13.48			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,036,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		14.82			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		61		29	Input by Engineer
Passes		3		**15.43**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	644,000	$	520,000	
Construction Cost (Disinfection)	**$**	**1,164,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		28,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**			
				TOTAL CAPITAL COST $	**9,200,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	2	
Peak Volume	39,338	CF
	0.29	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	20.85	CFS
	13.48	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SCREENING AND DISINFECTION				
2 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		13.48	20.85	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,036,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		13.48	20.85	= Peak Flow x % Req Pump
Force Main Diameter (In)		25		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,296,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		20.85		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,200		=CFS x 200
Odor Control Flow Rate (CFM)		210		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**27,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		13.48		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		58	28	
Passes		3	**15.58**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	617,000	$ 493,000	
Construction Cost (Disinfection)	**$**	**1,110,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		24,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**		
			TOTAL CAPITAL COST $	**5,652,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	4	
Peak Volume	29,485	CF
	0.22	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	18.60	CFS
	12.02	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		51		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**7,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		22,216		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**7,733,000**

RESULTS SUMMARY			
Number of Events / Year	53		
Number of Overflows / Year	4		
Peak Volume	29,485	CF	
	0.22	MG	
Total Volume	546,329	CF	
	4.09	MG	
Peak Rate	18.60	CFS	
	12.02	MGD	

Capital Costs - 097L001 / Sewershed CSO 097L001				
SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.22	29,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.26	34,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		59		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		40		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.26	35,400	**Sufficient Volume**
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**182,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		12.02	18.60	= Peak Rate
Force Main Diameter (In)		24		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,973,000**	**$ 32,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		18.60		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		51,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		260		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**32,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		12.02		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**969,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		22,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**4,334,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	4	
Peak Volume	29,485	CF
	0.22	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	18.60	CFS
	12.02	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001					
SUB-SURFACE STORAGE TANK					
4 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.22		29,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.26		34,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		59			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		40			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.26		35,400	**Sufficient Volume**
Tank Area (SF)		2,000			= Length x Width
Construction Cost (Storage Tank)		**1,593,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.22		0.34	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3			Input by Engineer
Force Main Velocity (FPS)		7.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**472,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		18.60			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		51,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**191,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		12.02			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**969,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		22,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
			TOTAL CAPITAL COST	**$**	**3,385,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	4	
Peak Volume	29,485	CF
	0.22	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	18.60	CFS
	12.02	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
4 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		12.02	18.60	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		13.22	20.46	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		25		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,265,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		18.60		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		12.02		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**969,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		13.22		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		58	27	
Passes		3	**15.31**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**612,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		12,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**24,000**		
			TOTAL CAPITAL COST $	**5,265,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	4	
Peak Volume	29,485	CF
	0.22	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	18.60	CFS
	12.02	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001			
SEDIMENTATION BASIN (CSOTF)			
4 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	12.02	18.60	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	2,100		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	66	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)	33	Area OK	= Area Req'd / Length
Max Length : Width Ratio	3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)	0.20	26,136	
Construction Cost (CSOTF) $	**16,379,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)	12.02	18.60	= Peak Flow x % Req Pump
Force Main Diameter (In)	24		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,973,000**	**$ 32,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	18.60		Ref: CSO Statistics
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	39,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	1,950		= ACH x Volume / 60
Construction Cost (Odor Control) $	**154,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	12.02		Ref: CSO Statistics
Construction Cost (Screening) $	**969,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow (MGD)	12.02		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	55	26	
Passes	3	15.38	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**587,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	10,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**20,000**		
		TOTAL CAPITAL COST $	**21,216,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	4	
Peak Volume	29,485	CF
	0.22	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	18.60	CFS
	12.02	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001

HIGH RATE END OF PIPE TREATMENT (HREOP)

4 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		12.02	18.60	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		150		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		18	**OK**	Input by Engineer
Width (Ft)		9	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**3,091,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		13.22	20.46	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		25		Input by Engineer
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,265,000**	**$ 33,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		18.60		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		12.02		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**969,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		13.22		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		58	27	Input by Engineer
Passes		3	**15.31**	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	612,000	$ 486,000	
Construction Cost (Disinfection)	**$**	**1,098,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		27,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**		
			TOTAL CAPITAL COST $	**8,638,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	4	
Peak Volume	29,485	CF
	0.22	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	18.60	CFS
	12.02	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SCREENING AND DISINFECTION				
4 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		12.02	18.60	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**969,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		12.02	18.60	= Peak Flow x % Req Pump
Force Main Diameter (In)		24		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,973,000**	**$ 32,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		18.60		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,700		=CFS x 200
Odor Control Flow Rate (CFM)		190		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**25,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		12.02		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		55	26	
Passes		3	**15.38**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	587,000	$ 460,000	
Construction Cost (Disinfection)	**$**	**1,047,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		24,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**		
			TOTAL CAPITAL COST $	**5,196,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	6	
Peak Volume	21,548	CF
	0.16	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	16.91	CFS
	10.93	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		51		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**7,650,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		22,216		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**7,733,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	6	
Peak Volume	21,548	CF
	0.16	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	16.91	CFS
	10.93	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001

SURFACE STORAGE TANK

6 Overflows / Year

Parameter	Value		Reference
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.16	22,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.19	26,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	52		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	35		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.20	27,300	**Sufficient Volume**
Tank Area (SF)	2,000		= Length x Width
Construction Cost (Storage Tank)	**129,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	10.93	16.91	= Peak Rate
Force Main Diameter (In)	23		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,888,000**	**$ 31,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	16.91		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	39,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	200		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**26,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	10.93		Ref: CSO Statistics
Construction Cost (Screening) $	**918,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	22,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**44,000**		
		TOTAL CAPITAL COST $	**4,138,000**

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RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	6	
Peak Volume	21,548	CF
	0.16	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	16.91	CFS
	10.93	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SUB-SURFACE STORAGE TANK				
6 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.16	22,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.19	26,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	Sufficient Depth	Ref: Tech Parameters, Rev as Req'd
Length (Ft)		52		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		35		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.20	27,300	Sufficient Volume
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**1,410,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.16	0.25	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3		Input by Engineer
Force Main Velocity (FPS)		5.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**422,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		16.91		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		39,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,950		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**154,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		10.93		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**918,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		Typ 2, Rev as Req'd
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		No Disinfection
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		22,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**3,064,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	6	
Peak Volume	21,548	CF
	0.16	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	16.91	CFS
	10.93	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
6 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		10.93	16.91	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		12.02	18.60	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		24		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,973,000**	**$ 32,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		16.91		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		10.93		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**918,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		12.02		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		55	26	
Passes		3	**15.38**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**587,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		11,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**22,000**		
			TOTAL CAPITAL COST $	**4,894,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	6	
Peak Volume	21,548	CF
	0.16	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	16.91	CFS
	10.93	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001			
SEDIMENTATION BASIN (CSOTF)			
6 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	10.93	16.91	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	1,900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	63	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	31	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.18	23,436	
Construction Cost (CSOTF) $	**16,380,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	10.93	16.91	= Peak Flow x % Req Pump
Force Main Diameter (In)	23		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,888,000**	**$ 31,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	16.91		Ref: CSO Statistics
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	35,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	1,750		= ACH x Volume / 60
Construction Cost (Odor Control) $	**142,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	10.93		Ref: CSO Statistics
Construction Cost (Screening) $	**918,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	10.93		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	52	25	
Passes	3	**15.38**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**565,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	9,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**18,000**		
		TOTAL CAPITAL COST $	**21,044,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	6	
Peak Volume	21,548	CF
	0.16	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	16.91	CFS
	10.93	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001

HIGH RATE END OF PIPE TREATMENT (HREOP)

6 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		10.93		16.91	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		130			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		17		**OK**	Input by Engineer
Width (Ft)		9		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**2,918,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		12.02		18.60	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		24			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,973,000**	**$**	**32,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		16.91			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		10.93			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**918,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		12.02			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		55		26	Input by Engineer
Passes		3		**15.38**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	587,000	$	460,000	
Construction Cost (Disinfection)	**$**	**1,047,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		27,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**54,000**			
				TOTAL CAPITAL COST $	**8,070,000**

RESULTS SUMMARY		
Number of Events / Year	53	
Number of Overflows / Year	6	
Peak Volume	21,548	CF
	0.16	MG
Total Volume	546,329	CF
	4.09	MG
Peak Rate	16.91	CFS
	10.93	MGD

Capital Costs - 097L001 / Sewershed CSO 097L001					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		10.93		16.91	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**918,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		10.93		16.91	= Peak Flow x % Req Pump
Force Main Diameter (In)		23			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,888,000**	**$**	**31,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		16.91			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,400			=CFS x 200
Odor Control Flow Rate (CFM)		170			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**23,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		10.93			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		52		25	
Passes		3		**15.38**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	565,000	$	434,000	
Construction Cost (Disinfection)	**$**	**999,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
			TOTAL CAPITAL COST	**$**	**5,009,000**

Operation and Maintenance Costs

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	16.94	$124,475	20	10.910	$1,358,015
	Tank O&M	No. Events / Yr	53	$34,206	50	14.484	$495,421
		Const Cost ($)	$657,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	17	$8,892	20	10.910	$97,010
	Odor Control O&M	Capacity (cfm)	850	$2,975	20	10.910	$32,457
	Reserve / Replace	10% Gravity / 15% Pump					$18,646
			Total Annual O&M	**$171,000**		**Total PW O&M**	**$2,002,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.72	$15,056	20	10.910	$164,265
	Tank O&M	No. Events / Yr	53	$40,371	50	14.484	$584,713
		Const Cost ($)	$3,123,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	17	$8,892	20	10.910	$97,010
	Odor Control O&M	Capacity (cfm)	8,500	$29,750	20	10.910	$324,571
	Reserve / Replace	10% Gravity / 15% Pump					$8,236
			Total Annual O&M	**$95,000**		**Total PW O&M**	**$1,179,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	16.94	$124,475	20	10.910	$1,358,015
	Sed. Basin O&M	Flow Rate (mgd)	16.94	$1,905	50	14.484	$27,598
	Screening O&M	Flow Rate (mgd)	16.94	$8,892	20	10.910	$97,010
	Disinfection O&M	Flow Rate (mgd)	16.94	$90,137	20	10.910	$983,384
	Odor Control O&M	Capacity (cfm)	2,700.00	$9,450	20	10.910	$103,099
	Reserve / Replace	10% Gravity / 15% Pump					$20,830
			Total Annual O&M	**$235,000**		**Total PW O&M**	**$2,590,000**

Operation and Maintenance Costs

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	18.63	$132,659	20	10.910	$1,447,302
	HREP O&M	Flow Rate (mgd)	16.94	$122,996	20	10.910	$1,341,884
	Screening O&M	Flow Rate (mgd)	16.94	$8,892	20	10.910	$97,010
	Disinfection O&M	Flow Rate (mgd)	18.63	$95,525	20	10.910	$1,042,172
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$31,855
			Total Annual O&M	**$362,000**		**Total PW O&M**	**$3,972,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	18.63	$132,659	20	10.910	$1,447,302
	Swirl / Vortex O&M	Flow Rate (mgd)	16.94	$1,905	20	10.910	$20,789
	Screening O&M	Flow Rate (mgd)	16.94	$8,892	20	10.910	$97,010
	Disinfection O&M	Flow Rate (mgd)	18.63	$95,525	20	10.910	$1,042,172
	Odor Control O&M	Capacity (cfm)	2,900.00	$10,150	20	10.910	$110,736
	Reserve / Replace	10% Gravity / 15% Pump					$24,113
			Total Annual O&M	**$250,000**		**Total PW O&M**	**$2,742,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	16.94	$124,475	20	10.910	$1,358,015
	Screening O&M	Flow Rate (mgd)	16.94	$8,892	20	10.910	$97,010
	Disinfection O&M	Flow Rate (mgd)	16.94	$90,137	20	10.910	$983,384
	Odor Control O&M	Capacity (cfm)	260.00	$910	20	10.910	$9,928
	Reserve / Replace	10% Gravity / 15% Pump					$20,376
			Total Annual O&M	**$225,000**		**Total PW O&M**	**$2,469,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	15.17	$115,622	20	10.910	$1,261,429
	Tank O&M	No. Events / Yr	53	$33,471	50	14.484	$484,776
		Const Cost ($)	$363,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	15	$8,735	20	10.910	$95,295
	Odor Control O&M	Capacity (cfm)	500	$1,750	20	10.910	$19,092
	Reserve / Replace	10% Gravity / 15% Pump					$17,465
			Total Annual O&M	**$160,000**		**Total PW O&M**	**$1,878,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.42	$10,463	20	10.910	$114,152
	Tank O&M	No. Events / Yr	53	$38,051	50	14.484	$551,111
		Const Cost ($)	$2,195,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	15	$8,735	20	10.910	$95,295
	Odor Control O&M	Capacity (cfm)	4,950	$17,325	20	10.910	$189,015
	Reserve / Replace	10% Gravity / 15% Pump					$6,509
			Total Annual O&M	**$75,000**		**Total PW O&M**	**$956,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	15.17	$115,622	20	10.910	$1,261,429
	Sed. Basin O&M	Flow Rate (mgd)	15.17	$1,706	50	14.484	$24,713
	Screening O&M	Flow Rate (mgd)	15.17	$8,735	20	10.910	$95,295
	Disinfection O&M	Flow Rate (mgd)	15.17	$84,272	20	10.910	$919,403
	Odor Control O&M	Capacity (cfm)	2,450.00	$8,575	20	10.910	$93,553
	Reserve / Replace	10% Gravity / 15% Pump					$19,592
			Total Annual O&M	**$219,000**		**Total PW O&M**	**$2,414,000**

Operation and Maintenance Costs

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	16.68	$123,224	20	10.910	$1,344,365
	HREP O&M	Flow Rate (mgd)	15.17	$115,262	20	10.910	$1,257,506
	Screening O&M	Flow Rate (mgd)	15.17	$8,735	20	10.910	$95,295
	Disinfection O&M	Flow Rate (mgd)	16.68	$89,310	20	10.910	$974,367
	Odor Control O&M	Capacity (cfm)	250.00	$875	20	10.910	$9,546
	Reserve / Replace	10% Gravity / 15% Pump					$29,774
			Total Annual O&M	**$338,000**		**Total PW O&M**	**$3,711,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	16.68	$123,224	20	10.910	$1,344,365
	Swirl / Vortex O&M	Flow Rate (mgd)	15.17	$1,706	20	10.910	$18,615
	Screening O&M	Flow Rate (mgd)	15.17	$8,735	20	10.910	$95,295
	Disinfection O&M	Flow Rate (mgd)	16.68	$89,310	20	10.910	$974,367
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$19,925
			Total Annual O&M	**$223,000**		**Total PW O&M**	**$2,453,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	15.17	$115,622	20	10.910	$1,261,429
	Screening O&M	Flow Rate (mgd)	15.17	$8,735	20	10.910	$95,295
	Disinfection O&M	Flow Rate (mgd)	15.17	$84,272	20	10.910	$919,403
	Odor Control O&M	Capacity (cfm)	240.00	$840	20	10.910	$9,164
	Reserve / Replace	10% Gravity / 15% Pump					$19,171
			Total Annual O&M	**$210,000**		**Total PW O&M**	**$2,304,000**

Operation and Maintenance Costs

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	13.48	$106,838	20	10.910	$1,165,600
	Tank O&M	No. Events / Yr	53	$33,186	50	14.484	$480,648
		Const Cost ($)	$249,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	13	$8,586	20	10.910	$93,669
	Odor Control O&M	Capacity (cfm)	350	$1,225	20	10.910	$13,365
	Reserve / Replace	10% Gravity / 15% Pump					$16,374
			Total Annual O&M	**$150,000**		**Total PW O&M**	**$1,770,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.29	$8,301	20	10.910	$90,565
	Tank O&M	No. Events / Yr	53	$37,113	50	14.484	$537,532
		Const Cost ($)	$1,820,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	13	$8,586	20	10.910	$93,669
	Odor Control O&M	Capacity (cfm)	3,450	$12,075	20	10.910	$131,738
	Reserve / Replace	10% Gravity / 15% Pump					$5,659
			Total Annual O&M	**$67,000**		**Total PW O&M**	**$859,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	13.48	$106,838	20	10.910	$1,165,600
	Sed. Basin O&M	Flow Rate (mgd)	13.48	$1,516	50	14.484	$21,956
	Screening O&M	Flow Rate (mgd)	13.48	$8,586	20	10.910	$93,669
	Disinfection O&M	Flow Rate (mgd)	13.48	$78,414	20	10.910	$855,496
	Odor Control O&M	Capacity (cfm)	2,100.00	$7,350	20	10.910	$80,188
	Reserve / Replace	10% Gravity / 15% Pump					$18,390
			Total Annual O&M	**$203,000**		**Total PW O&M**	**$2,235,000**

Operation and Maintenance Costs

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	14.82	$113,863	20	10.910	$1,242,236
	HREP O&M	Flow Rate (mgd)	13.48	$107,518	20	10.910	$1,173,020
	Screening O&M	Flow Rate (mgd)	13.48	$8,586	20	10.910	$93,669
	Disinfection O&M	Flow Rate (mgd)	14.82	$83,102	20	10.910	$906,639
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$27,793
			Total Annual O&M	**$314,000**		**Total PW O&M**	**$3,451,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	14.82	$113,863	20	10.910	$1,242,236
	Swirl / Vortex O&M	Flow Rate (mgd)	13.48	$1,516	20	10.910	$16,539
	Screening O&M	Flow Rate (mgd)	13.48	$8,586	20	10.910	$93,669
	Disinfection O&M	Flow Rate (mgd)	14.82	$83,102	20	10.910	$906,639
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$18,686
			Total Annual O&M	**$208,000**		**Total PW O&M**	**$2,278,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	13.48	$106,838	20	10.910	$1,165,600
	Screening O&M	Flow Rate (mgd)	13.48	$8,586	20	10.910	$93,669
	Disinfection O&M	Flow Rate (mgd)	13.48	$78,414	20	10.910	$855,496
	Odor Control O&M	Capacity (cfm)	210.00	$735	20	10.910	$8,019
	Reserve / Replace	10% Gravity / 15% Pump					$18,017
			Total Annual O&M	**$195,000**		**Total PW O&M**	**$2,141,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	12.02	$98,984	20	10.910	$1,079,907
	Tank O&M	No. Events / Yr	53	$33,018	50	14.484	$478,222
		Const Cost ($)	$182,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	12	$8,458	20	10.910	$92,279
	Odor Control O&M	Capacity (cfm)	260	$910	20	10.910	$9,928
	Reserve / Replace	10% Gravity / 15% Pump					$14,853
			Total Annual O&M	**$142,000**		**Total PW O&M**	**$1,675,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.22	$6,847	20	10.910	$74,697
	Tank O&M	No. Events / Yr	53	$36,546	50	14.484	$529,313
		Const Cost ($)	$1,593,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	12	$8,458	20	10.910	$92,279
	Odor Control O&M	Capacity (cfm)	2,550	$8,925	20	10.910	$97,371
	Reserve / Replace	10% Gravity / 15% Pump					$5,081
			Total Annual O&M	**$61,000**		**Total PW O&M**	**$799,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	12.02	$98,984	20	10.910	$1,079,907
	Sed. Basin O&M	Flow Rate (mgd)	12.02	$1,352	50	14.484	$19,585
	Screening O&M	Flow Rate (mgd)	12.02	$8,458	20	10.910	$92,279
	Disinfection O&M	Flow Rate (mgd)	12.02	$73,140	20	10.910	$797,955
	Odor Control O&M	Capacity (cfm)	1,950.00	$6,825	20	10.910	$74,460
	Reserve / Replace	10% Gravity / 15% Pump					$16,781
			Total Annual O&M	**$189,000**		**Total PW O&M**	**$2,081,000**

Operation and Maintenance Costs

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	13.22	$105,492	20	10.910	$1,150,909
	HREP O&M	Flow Rate (mgd)	12.02	$100,529	20	10.910	$1,096,765
	Screening O&M	Flow Rate (mgd)	12.02	$8,458	20	10.910	$92,279
	Disinfection O&M	Flow Rate (mgd)	13.22	$77,513	20	10.910	$845,658
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$26,100
			Total Annual O&M	**$293,000**		**Total PW O&M**	**$3,219,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	13.22	$105,492	20	10.910	$1,150,909
	Swirl / Vortex O&M	Flow Rate (mgd)	12.02	$1,352	20	10.910	$14,753
	Screening O&M	Flow Rate (mgd)	12.02	$8,458	20	10.910	$92,279
	Disinfection O&M	Flow Rate (mgd)	13.22	$77,513	20	10.910	$845,658
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$17,622
			Total Annual O&M	**$193,000**		**Total PW O&M**	**$2,121,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	12.02	$98,984	20	10.910	$1,079,907
	Screening O&M	Flow Rate (mgd)	12.02	$8,458	20	10.910	$92,279
	Disinfection O&M	Flow Rate (mgd)	12.02	$73,140	20	10.910	$797,955
	Odor Control O&M	Capacity (cfm)	190.00	$665	20	10.910	$7,255
	Reserve / Replace	10% Gravity / 15% Pump					$16,430
			Total Annual O&M	**$182,000**		**Total PW O&M**	**$1,994,000**

Operation and Maintenance Costs

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	10.93	$92,872	20	10.910	$1,013,228
	Tank O&M	No. Events / Yr	53	$32,886	50	14.484	$476,303
		Const Cost ($)	$129,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	11	$8,363	20	10.910	$91,240
	Odor Control O&M	Capacity (cfm)	200	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$14,351
			Total Annual O&M	**$135,000**		**Total PW O&M**	**$1,603,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.16	$5,553	20	10.910	$60,578
	Tank O&M	No. Events / Yr	53	$36,088	50	14.484	$522,687
		Const Cost ($)	$1,410,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	11	$8,363	20	10.910	$91,240
	Odor Control O&M	Capacity (cfm)	1,950	$6,825	20	10.910	$74,460
	Reserve / Replace	10% Gravity / 15% Pump					$4,638
			Total Annual O&M	**$57,000**		**Total PW O&M**	**$754,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	10.93	$92,872	20	10.910	$1,013,228
	Sed. Basin O&M	Flow Rate (mgd)	10.93	$1,229	50	14.484	$17,803
	Screening O&M	Flow Rate (mgd)	10.93	$8,363	20	10.910	$91,240
	Disinfection O&M	Flow Rate (mgd)	10.93	$69,011	20	10.910	$752,903
	Odor Control O&M	Capacity (cfm)	1,750.00	$6,125	20	10.910	$66,823
	Reserve / Replace	10% Gravity / 15% Pump					$16,203
			Total Annual O&M	**$178,000**		**Total PW O&M**	**$1,958,000**

Operation and Maintenance Costs

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	12.02	$98,978	20	10.910	$1,079,845
	HREP O&M	Flow Rate (mgd)	10.93	$95,044	20	10.910	$1,036,927
	Screening O&M	Flow Rate (mgd)	10.93	$8,363	20	10.910	$91,240
	Disinfection O&M	Flow Rate (mgd)	12.02	$73,136	20	10.910	$797,913
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$24,231
			Total Annual O&M	**$277,000**		**Total PW O&M**	**$3,038,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	12.02	$98,978	20	10.910	$1,079,845
	Swirl / Vortex O&M	Flow Rate (mgd)	10.93	$1,229	20	10.910	$13,410
	Screening O&M	Flow Rate (mgd)	10.93	$8,363	20	10.910	$91,240
	Disinfection O&M	Flow Rate (mgd)	12.02	$73,136	20	10.910	$797,913
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$16,223
			Total Annual O&M	**$182,000**		**Total PW O&M**	**$1,999,000**

CSO 097L001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	10.93	$92,872	20	10.910	$1,013,228
	Screening O&M	Flow Rate (mgd)	10.93	$8,363	20	10.910	$91,240
	Disinfection O&M	Flow Rate (mgd)	10.93	$69,011	20	10.910	$752,903
	Odor Control O&M	Capacity (cfm)	170.00	$595	20	10.910	$6,491
	Reserve / Replace	10% Gravity / 15% Pump					$15,879
			Total Annual O&M	**$171,000**		**Total PW O&M**	**$1,880,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$7.7	$7,733,000	$0
1	$7.7	$7,733,000	$0
2	$7.7	$7,733,000	$0
4	$7.7	$7,733,000	$0
6	$7.7	$7,733,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$7.1	$5,903,000	$1,179,000
1	$5.4	$4,435,000	$956,000
2	$4.7	$3,797,000	$859,000
4	$4.2	$3,385,000	$799,000
6	$3.8	$3,064,000	$754,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$7.9	$5,872,000	$2,002,000
1	$7.1	$5,220,000	$1,878,000
2	$6.6	$4,804,000	$1,770,000
4	$6.0	$4,334,000	$1,675,000
6	$5.7	$4,138,000	$1,603,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$11.0	$8,210,000	$2,742,000
1	$8.4	$5,912,000	$2,453,000
2	$7.8	$5,564,000	$2,278,000
4	$7.4	$5,265,000	$2,121,000
6	$6.9	$4,894,000	$1,999,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$14.5	$10,570,000	$3,972,000
1	$13.6	$9,862,000	$3,711,000
2	$12.7	$9,200,000	$3,451,000
4	$11.9	$8,638,000	$3,219,000
6	$11.1	$8,070,000	$3,038,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$24.9	$22,356,000	$2,590,000
1	$24.4	$21,986,000	$2,414,000
2	$23.9	$21,646,000	$2,235,000
4	$23.3	$21,216,000	$2,081,000
6	$23.0	$21,044,000	$1,958,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$8.9	$6,402,000	$2,469,000
1	$8.3	$6,009,000	$2,304,000
2	$7.8	$5,652,000	$2,141,000
4	$7.2	$5,196,000	$1,994,000
6	$6.9	$5,009,000	$1,880,000

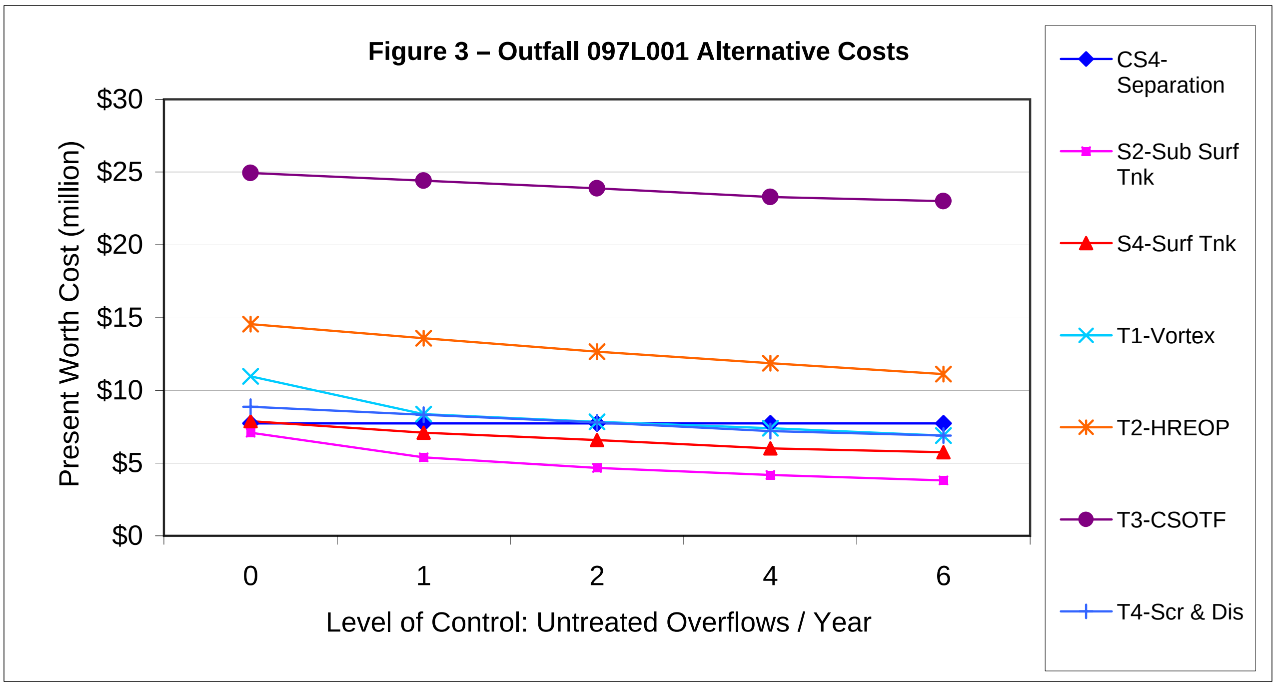


Figure 3 – Outfall 097L001 Alternative Costs
Present Worth Cost (million)
$30
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	CSO 097L001	**Results Summary**	
Location Name	Dorchester Avenue	Number of Events:	53
Model ID	DC 097L001-W.Y	Peak Volume:	95,909 ft^3
Structure Type	Outfall		0.72 MG
PWSA Sewershed	McDonoughs Run	Total Volume:	546,329 ft^3
Stream of Discharge	Saw Mill Run		4.09 MG
NPDES Permit Number	097L001	Peak Rate:	26.21 cfs
Owner	PWSA		

Model Network (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2

Model Run 2005 Baseline Conditions w/Boundary (8.8.07)

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 13:15	1368	1/5/2005 14:45	95908.79	717.446	0	3.92	16
8/20/2005 18:20	105	8/20/2005 19:00	55625.90	416.110	1	26.21	0
5/13/2005 22:30	124	5/13/2005 22:45	39338.40	294.271	2	20.85	2
7/5/2005 16:30	91	7/5/2005 16:45	30063.78	224.892	3	16.91	6
10/22/2005 3:40	225	10/22/2005 6:45	29484.80	220.561	4	23.47	1
7/26/2005 19:50	49	7/26/2005 20:15	22731.66	170.044	5	19.04	3
3/28/2005 9:12	666	3/28/2005 19:15	21547.89	161.189	6	6.89	11
11/29/2005 6:45	322	11/29/2005 7:15	18903.38	141.407	7	3.16	21
5/11/2005 22:35	97	5/11/2005 22:45	17594.56	131.616	8	17.44	5
7/17/2005 16:15	43	7/17/2005 16:30	14667.66	109.721	9	18.60	4
9/16/2005 21:25	42	9/16/2005 21:45	13618.51	101.873	10	13.81	7
11/14/2005 22:01	378	11/15/2005 4:00	13528.37	101.199	11	3.59	19
1/5/2005 2:31	283	1/5/2005 5:00	13511.01	101.069	12	1.97	32
7/15/2005 17:35	45	7/15/2005 17:45	13416.85	100.365	13	9.03	8
1/11/2005 8:45	563	1/11/2005 10:15	13069.61	97.767	14	2.02	31
4/23/2005 3:42	63	4/23/2005 4:00	12172.00	91.053	15	6.01	13
2/9/2005 15:31	107	2/9/2005 16:45	9625.45	72.003	16	5.87	14
1/14/2005 0:15	173	1/14/2005 2:20	9230.74	69.051	17	1.77	34
1/3/2005 13:06	458	1/3/2005 13:45	8570.27	64.110	18	1.09	38
9/29/2005 5:20	49	9/29/2005 5:45	7793.05	58.296	19	6.97	10
1/8/2005 4:36	94	1/8/2005 5:30	7774.48	58.157	20	2.56	25
8/29/2005 12:55	59	8/29/2005 13:30	7690.63	57.530	21	7.81	9
7/21/2005 14:45	74	7/21/2005 15:15	7180.74	53.716	22	3.63	18
2/20/2005 19:45	69	2/20/2005 20:30	6190.71	46.310	23	3.73	17
11/16/2005 4:05	43	11/16/2005 4:15	5074.05	37.956	24	6.07	12
1/12/2005 0:55	59	1/12/2005 1:30	5028.06	37.612	25	2.55	26
8/27/2005 15:10	37	8/27/2005 15:30	4936.17	36.925	26	4.72	15
4/2/2005 6:20	216	4/2/2005 6:45	4549.64	34.034	27	1.85	33
5/28/2005 8:35	77	5/28/2005 9:30	4194.69	31.378	28	1.75	35
9/26/2005 5:35	260	9/26/2005 5:45	4154.15	31.075	29	2.84	23
10/7/2005 10:20	49	10/7/2005 10:45	3831.15	28.659	30	2.48	27
10/21/2005 19:00	49	10/21/2005 19:15	3074.87	23.002	31	3.05	22
12/15/2005 13:40	413	12/15/2005 14:00	2961.40	22.153	32	1.74	36

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
2/14/2005 7:06	777	2/14/2005 9:50	2608.27	19.511	33	0.62	40
7/25/2005 16:50	29	7/25/2005 17:00	2538.54	18.990	34	3.51	20
5/14/2005 9:10	35	5/14/2005 9:30	2317.53	17.336	35	2.27	28
8/8/2005 8:55	30	8/8/2005 9:00	2092.71	15.655	36	2.04	30
7/12/2005 19:55	29	7/12/2005 20:00	2089.41	15.630	37	2.25	29
10/22/2005 16:08	45	10/22/2005 16:30	1942.12	14.528	38	1.59	37
5/23/2005 16:35	24	5/23/2005 16:45	1562.82	11.691	39	2.76	24
3/27/2005 16:55	54	3/27/2005 17:00	742.46	5.554	40	0.67	39
11/1/2005 16:06	33	11/1/2005 16:30	605.90	4.532	41	0.56	41
10/25/2005 2:16	31	10/25/2005 2:30	499.61	3.737	42	0.56	42
6/3/2005 8:55	24	6/3/2005 9:00	474.72	3.551	43	0.50	44
5/20/2005 6:10	24	5/20/2005 6:15	462.85	3.462	44	0.52	43
4/22/2005 17:55	36	4/22/2005 18:00	307.25	2.298	45	0.48	45
3/23/2005 12:26	26	3/23/2005 12:45	297.53	2.226	46	0.32	47
10/25/2005 17:51	29	10/25/2005 18:00	262.50	1.964	47	0.21	50
6/14/2005 19:10	17	6/14/2005 19:20	181.49	1.358	48	0.30	48
5/7/2005 13:25	13	5/7/2005 13:30	125.16	0.936	49	0.33	46
10/21/2005 7:40	12	10/21/2005 7:45	93.09	0.696	50	0.26	49
4/27/2005 0:41	11	4/27/2005 0:45	53.49	0.400	51	0.14	51
4/30/2005 5:53	9	4/30/2005 6:00	27.84	0.208	52	0.07	52

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	CSO 097L001
Location Name	Dorchester Avenue
Model ID	DC 097L001-W.Y
Structure Type	Outfall
PWSA Sewershed	McDonoughs Run
Stream of Discharge	Saw Mill Run
NPDES Permit Number	097L001
Owner	PWSA
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	53
Peak Volume:	95,909 ft^3
	0.72 MG
Total Volume:	546,329 ft^3
	4.09 MG
Peak Rate:	26.21 cfs

Figure 1 - Outfall 097L001 CSO Volume

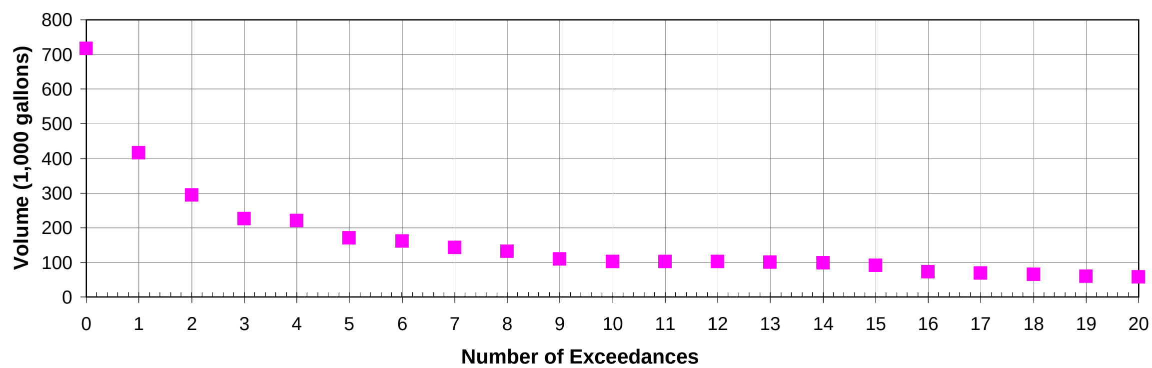
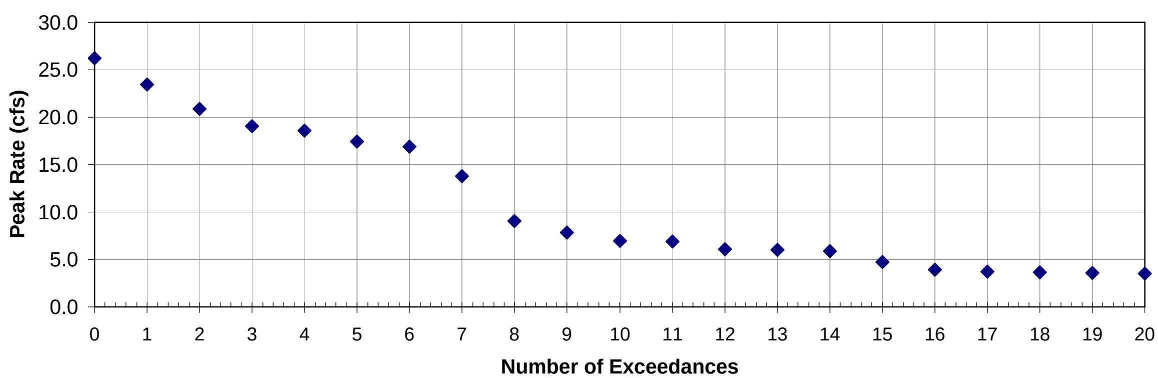


Figure 2 - Outfall 097L001 CSO Peak Flow Rate



D.34.1 CSO097L001 – MCDONOUGHS RUN SEWERSHED – NPDES# 097L001

Description of Outfall

Outfall 097L001 conveys overflows from the PWSA diversion chamber 097L001 to McDonough's Run. The McDonoughs Run Sewershed is located in portions of the Brookline section in the City of Pittsburgh and in portions of Baldwin Township, Dormont Borough and the Municipality of Mount Lebanon. The outfall is located along McDonough's Run off Queensboro Avenue in the Brookline section of the City of Pittsburgh. This sewershed includes approximately 1,068 acres of residential, business and commercial users. The tributary sewershed is called the McDonough's Run Sewershed and is 51 acres, or 4.78% of total service area. The McDonoughs Run Sewershed is comprised of approximately 409 manholes and 105,281 linear feet (19.9 miles) of mostly combined sewer up to 54 inches in diameter.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 097L001 typically experiences 53 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 097L001 is approximately 0.72 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 097L001 is approximately 26.21 CFS. *Figure 1 – Outfall 097L001 CSO Volume* and *Figure 2 – Outfall 097L001 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

Figure 1 - Outfall 097L001 CSO Volume

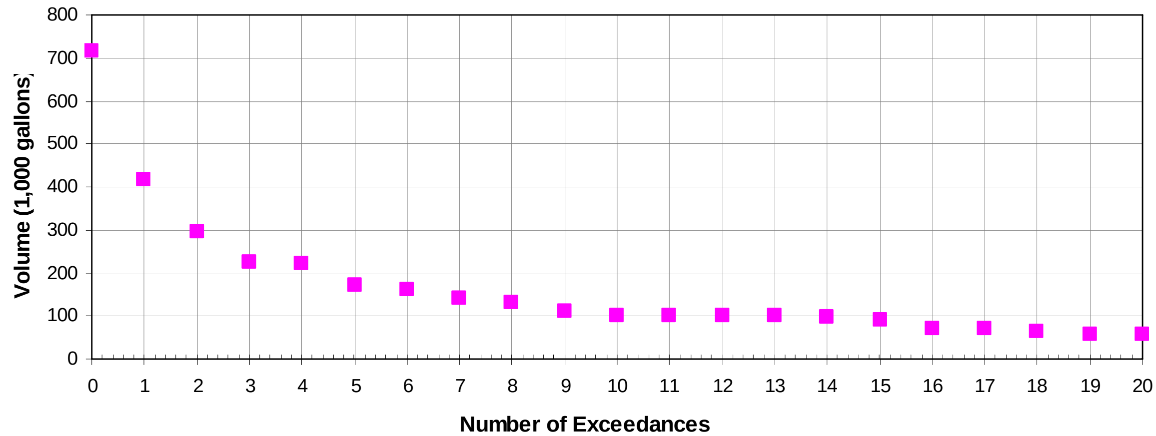
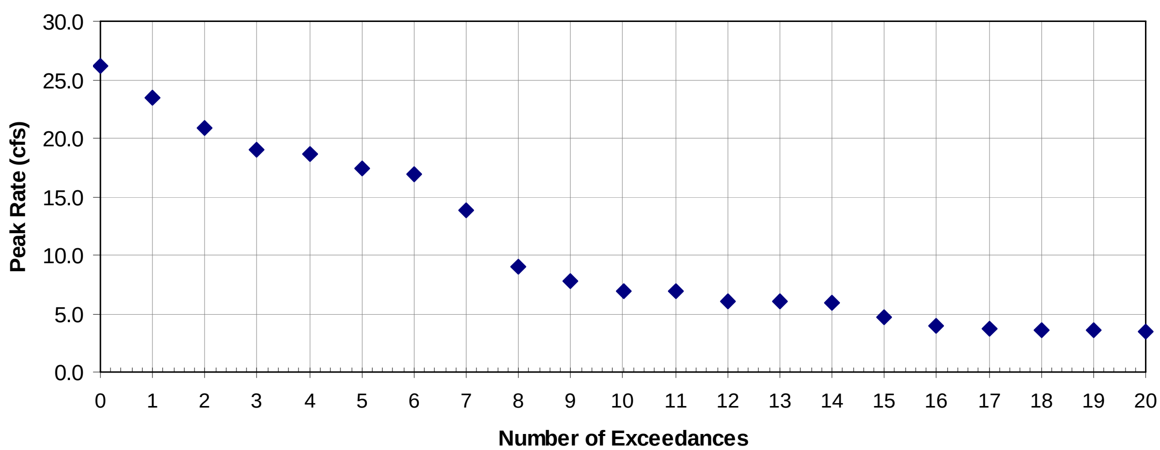


Figure 2 - Outfall 097L001 CSO Peak Flow Rate



Limited space appears to be available for storage or treatment facilities adjacent to the outfall, southeast of the end of Queensboro Avenue. The site is generally bounded by steep slopes to the south, west and east and residential development to the north.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 097L001. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-097L001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-097L001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-097L001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-097L001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-097L001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-097L001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

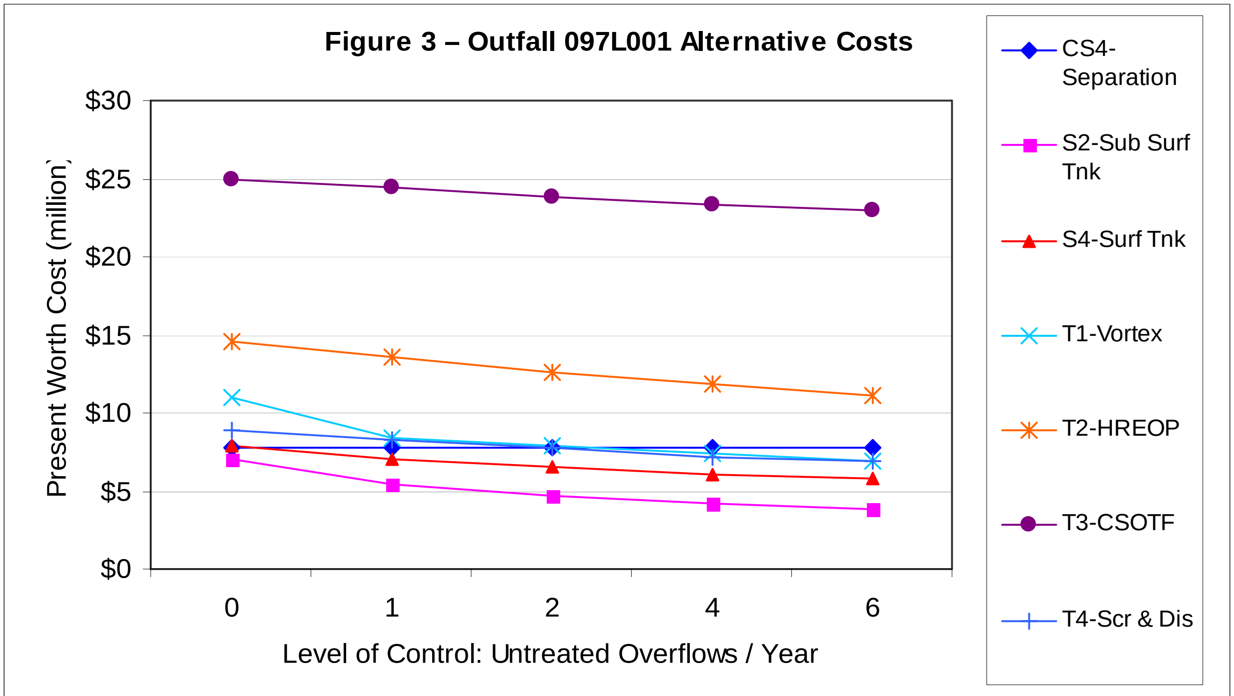
T4-097L001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 097L001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

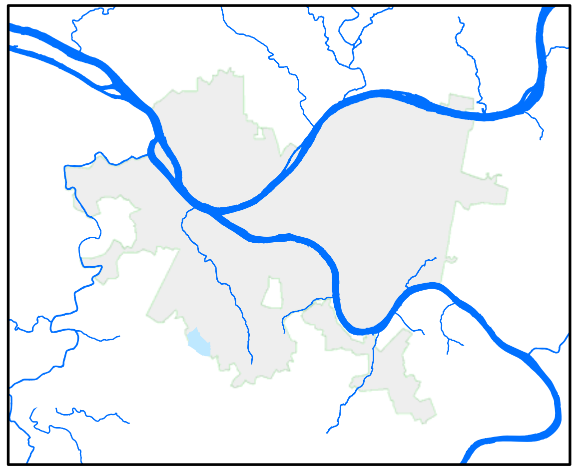
Recommendations

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-097L001: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

It appears that space is available at the location described above to construct said facilities.



Area Overview

Legend

- Sewershed Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

300 0 300
Feet

Attachment 1
CSO 097L001
Tributary Area Map
McDonoughs Run
Sewershed

CSO Controls Alternatives

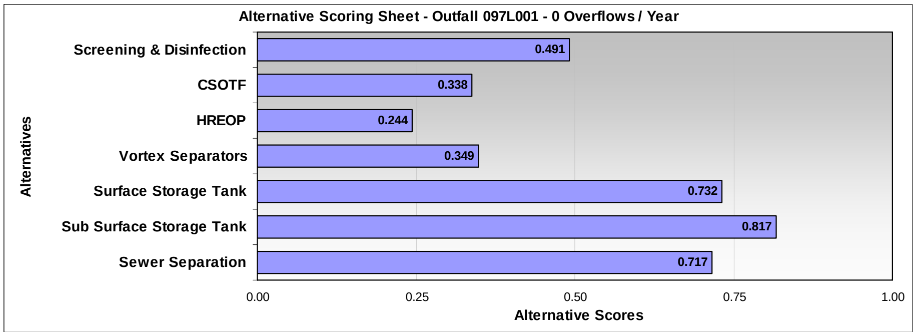
PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

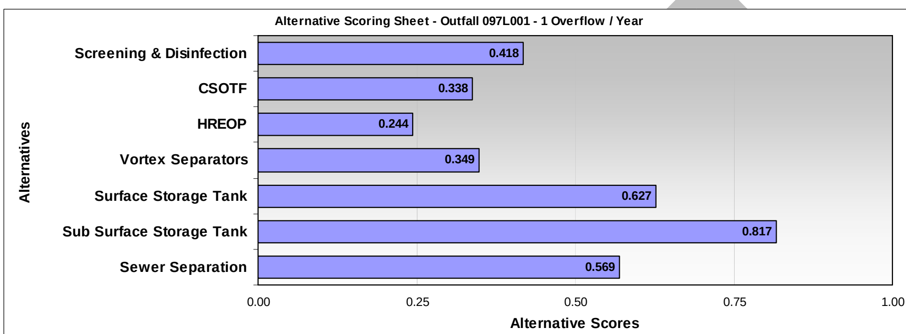
SW-D-0252.pdf

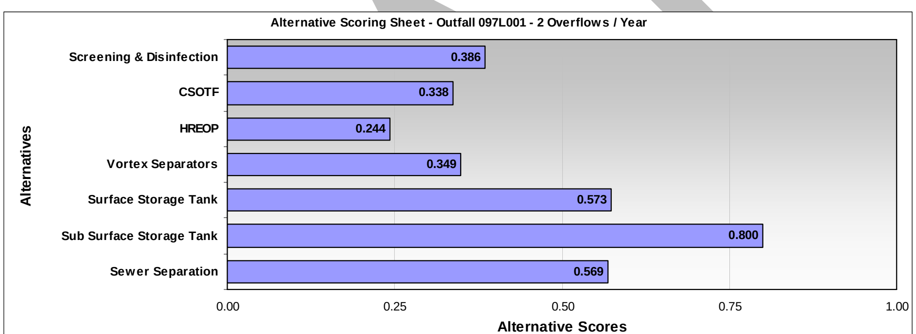
Attachment 2 - CSO Alternatives Development Worksheet

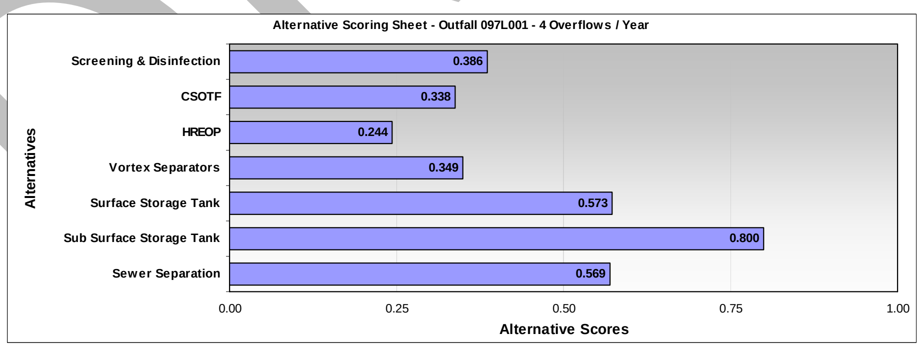
Technology	Considered Y or N	Comments
<u>Source Control:</u>		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
<u>Collection System Controls:</u>		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	A relief sewer will not be evaluated.
Sewer separation	Y	Sewer separation within the 51 acres of combined sewer area tributary to this outfall will be evaluated.
<u>Storage:</u>		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
<u>Treatment:</u>		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

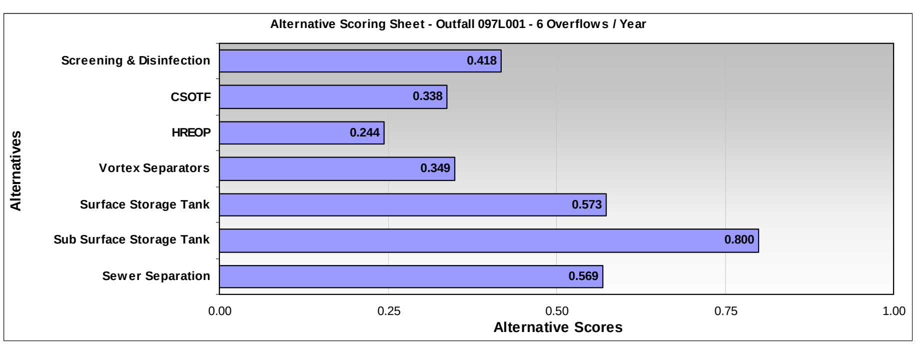
Attachment 3 – Alternative Scoring Sheet

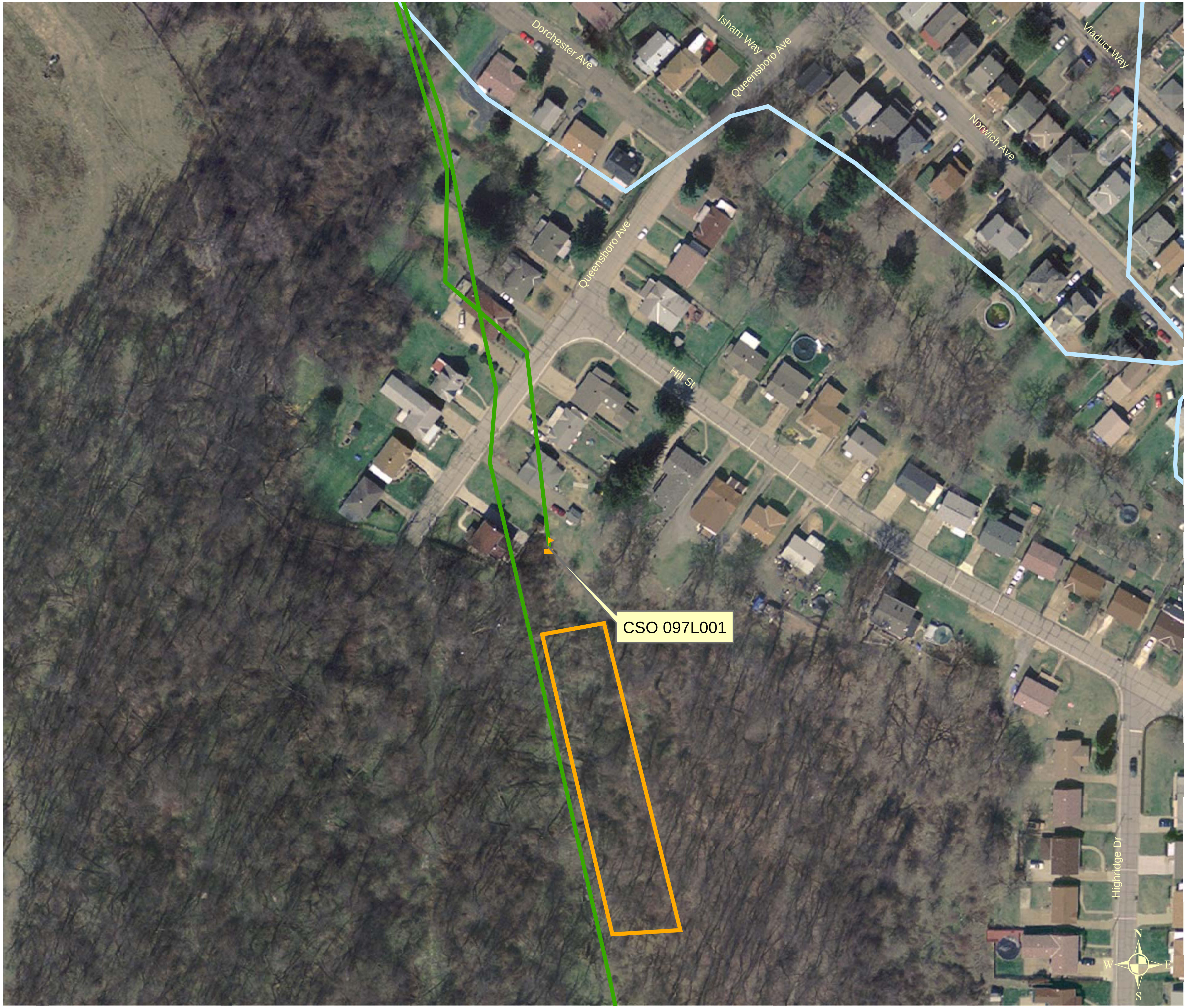


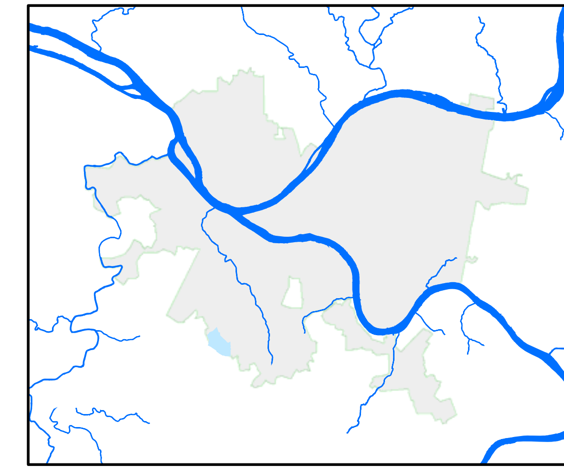












Area Overview

Legend

- Sewershed Boundary
- Facilities Boundary
- Trunk Sewer
- Combined Sewer Outfall

100 0 100
Feet

Attachment 4
CSO 097L001
Facilities Boundary Map
McDonoughs Run Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0252.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	2	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	1	1	1	1	1
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.					
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.	4	4	4	4	4
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	5	5	5	5	5
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	1	2	3	3
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	3	3	3	3	3
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	2	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	2	2	2	2	2
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	2	2	2	2	2
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	4	4	4	4
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	3	3	3	3	3
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	2	2	2	2	2
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	2	2	2	2	2
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	2	2	2	2	2
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	2	2	2	2	2
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	2	2	2	2	2
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.					
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.	3	3	3	3	3
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	4	2	3	3	3
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	2	2	2	2	2
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.659**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.622**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.622**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.622**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.622**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.779**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.632**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.652**

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.689**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.689**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.565**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.528**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.512**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.512**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.512**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.578**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.542**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.542**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.542**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.542**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.348**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.348**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.348**

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.348**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.348**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.471**

Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.398**

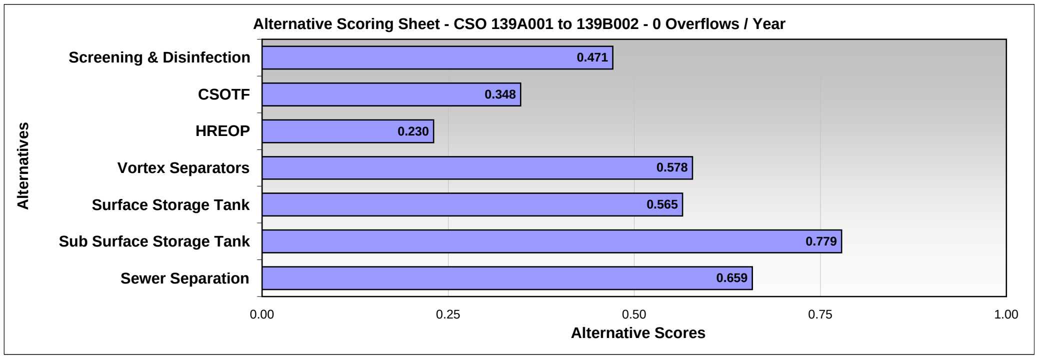
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.434**

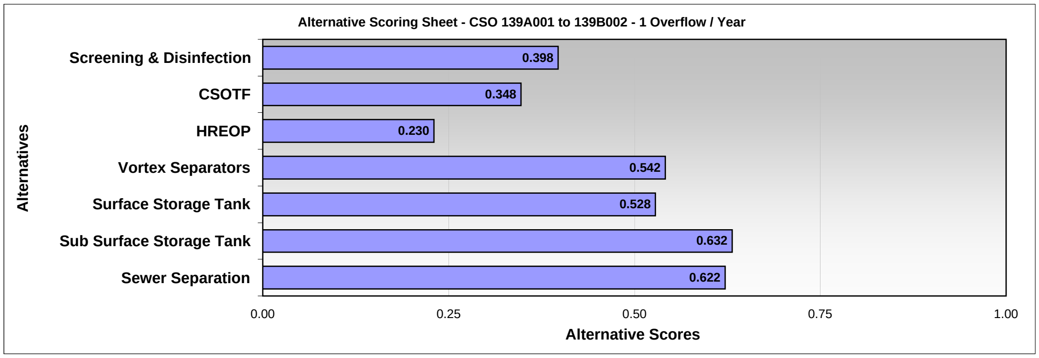
Total Score

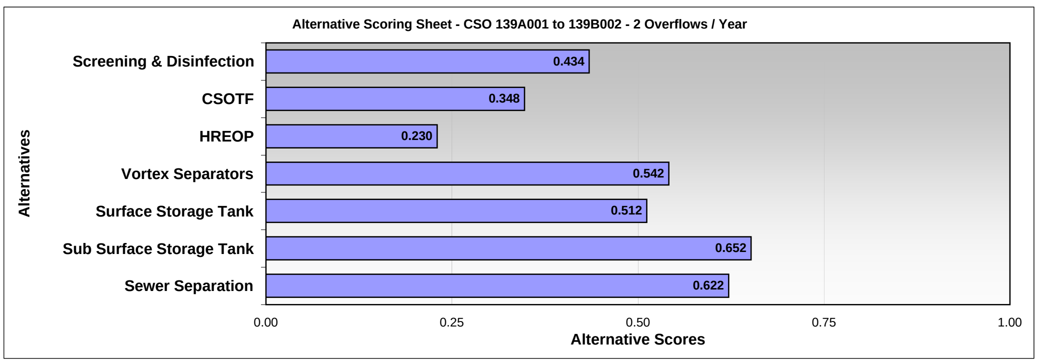
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.434**

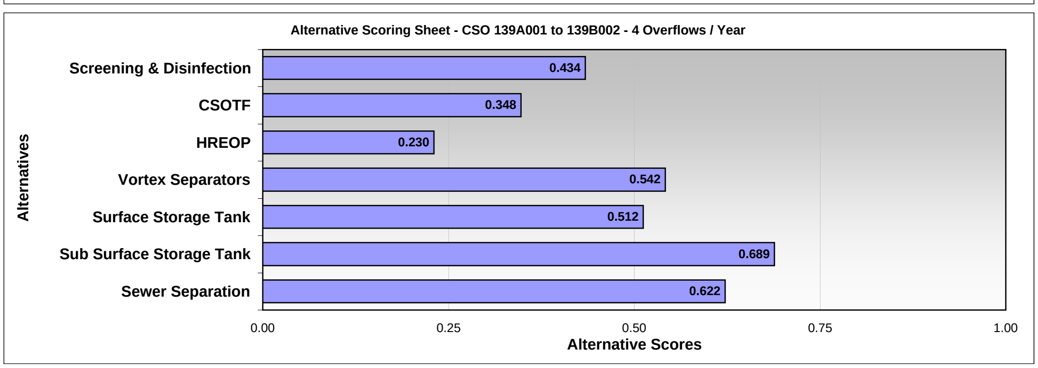
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.434**

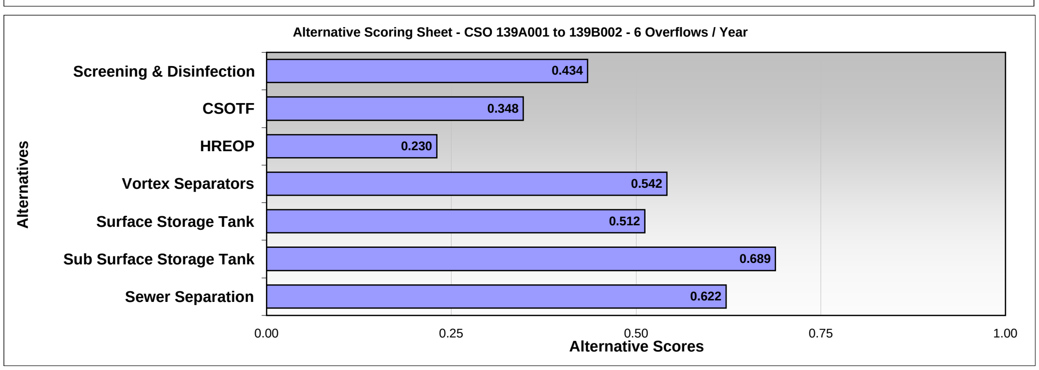
Alternative Scoring Sheet











RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	0	
Peak Volume	413,047	CF
	3.09	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	179.47	CFS
	115.99	MGD

Capital Costs - CSO 139A001 to 139B002 Region

CONSOLIDATION SEWERS

0 Overflows / Year

1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,325	Input by Engineer
Peak Flow (CFS)		44.87	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	277,000	
Peak Flow (CFS)		89.73	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	415,000	
Peak Flow (CFS)		134.60	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	529,000	
Peak Flow (CFS)		179.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	659,000	
Construction Cost (Consolidation Sewers)	**$**	**1,880,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections			Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,995,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	0	
Peak Volume	413,047	CF
	3.09	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	179.47	CFS
	115.99	MGD

Capital Costs - CSO 139A001 to 139B002 Region				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		298		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**44,700,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		129,809		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**260,000**		
			TOTAL CAPITAL COST	**$ 44,999,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	0	
Peak Volume	413,047	CF
	3.09	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	179.47	CFS
	115.99	MGD

Capital Costs - CSO 139A001 to 139B002 Region			
SURFACE STORAGE TANK			
0 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	3.09	413,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	3.63	486,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	221		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	148		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	3.67	490,620	**Sufficient Volume**
Tank Area (SF)	33,000		= Length x Width
Construction Cost (Storage Tank)	**3,224,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	2		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	115.99	179.47	= Peak Rate
Force Main Diameter (In)	74		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 15,802,000**	**$ 90,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	179.47		Ref: Technical Parameters
Diameter (In)	90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)			Input by Engineer
Depth (Ft)			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$ -**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	729,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	3,650		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$ 252,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	115.99		Ref: CSO Statistics
Construction Cost (Screening)	**$ 5,782,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	3.09		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	1.54		= Peak Vol/DW Time
Construction Cost	**$ 8,750,030**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$ 299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	65,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 130,000**		
		TOTAL CAPITAL COST	**$ 36,324,030**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	0	
Peak Volume	413,047	CF
	3.09	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	179.47	CFS
	115.99	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SUB-SURFACE STORAGE TANK					
0 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.09		413,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.63		486,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		Sufficient Depth	Ref: Tech Par, Rev as Req'd
Length (Ft)		221			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		148			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.67		490,620	Sufficient Volume
Tank Area (SF)		33,000			= Length x Width
Construction Cost (Storage Tank)		**10,429,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		1.54		2.39	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		9			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.4		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,626,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		179.47			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		729,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		36,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,533,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		115.99			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,782,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		3.09			Ref: CSO Statistics
Dewatering Time (Days)		2			Typ 2, Rev as Req'd
Dewatering Pumping Rate (MGD)		1.54			= Peak Vol/DW Time
Construction Cost	**$**	**8,750,030**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		65,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**130,000**			
				TOTAL CAPITAL COST	**$ 30,563,030**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	0	
Peak Volume	413,047	CF
	3.09	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	179.47	CFS
	115.99	MGD

Capital Costs - CSO 139A001 to 139B002 Region						
SWIRL CONCENTRATOR / VORTEX SEPARATOR						
0 Overflows / Year						
1. Swirl Concentrator / Vortex Separator Parameters						
Sizing Basis: Peak Flow (MGD / CFS)		115.99		179.47		Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01		Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**		Input by Engineer
Number of Units Required @ Given Loading Rate		13				
Construction Cost (Swirl / Vortex)	**$**	**5,511,000**				
2. Dewatering Pump Station / Force Main Parameters						
Volume Requiring Pumping (%)		100%				Ref: Technical Parameters
Underflow Rate (%)		10%				Ref: Technical Parameters
Dewatering Time (Days)		2				**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		63.79		98.71		= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		55				DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**		**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100				Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,434,000**	**$**	**66,000**		
3. Consolidation and/or Outfall Pipe Parameters						
Peak Flow (CFS)		179.47				Ref: Technical Parameters
Diameter (In)		90				<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)						Input by Engineer
Depth (Ft)						Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**		Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters						
Air Changes / Hour (ACH)		3				Ref: Technical Parameters
Volume of Ventilated Space (CF)		375,000				= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		18,750				= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**910,000**				
5. Screening Parameters						
Screening Required (Yes = 1; No = 2)		1				**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		115.99				Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,782,000**				
6. Disinfection Parameters						
Disinfection Required (Yes = 1; No = 2)		1				**Typ 1, Rev as Req'd**
Peak Flow (MGD)		63.79				Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		125		60		
Passes / Detention (Min)		5		**15.20**		Ref: Tech Param-15 min minimum
				OK Detn Time		
Construction Cost (Disinfection)	**$**	**1,499,000**				
7. Regulator / Vortex Drop Parameters						
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**		Input by Engineer
Number Regulators		1				Input by Engineer
New Vortex Drop Shaft		1				**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**				
8. Land Acquisition Parameters						
Land Required - Swirl / Vortex (SF)		120,000				= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2				Ref: Technical Parameters
Land Acquisition Cost	**$**	**240,000**				
				TOTAL CAPITAL COST	**$**	**25,736,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	0	
Peak Volume	413,047	CF
	3.09	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	179.47	CFS
	115.99	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SEDIMENTATION BASIN (CSOTF)					
0 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		115.99		179.47	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		19,400			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		198		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		99		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		1.76		235,224	
Construction Cost (CSOTF)	**$**	**16,710,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		115.99		179.47	= Peak Rate
Force Main Diameter (In)		74			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,802,000**	**$**	**90,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		179.47			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		353,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		17,650			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**868,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		115.99			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,782,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		115.99			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		169		81	
Passes / Detention (Min)		7		15.25	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,147,000**			
7. Stored Volume Treatment					
Volume Requiring Treatment (MG)		1.76			Sed Basin Volume
Dewatering Time (Days)		2			Typ 2, Rev as Req'd
Dewatering Pumping Rate (MGD)		0.88			= Peak Vol/DW Time
Construction Cost	**$**	**8,427,081**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
9. Land Acquisition Parameters					
Land Required - CSOTF (SF)		52,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**104,000**			
				TOTAL CAPITAL COST	**$ 52,224,081**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	0	
Peak Volume	413,047	CF
	3.09	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	179.47	CFS
	115.99	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
0 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		115.99		179.47	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,370			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		53		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		27		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**20,640,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		127.58		197.42	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		78			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**17,217,000**	**$**	**96,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		179.47			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		34,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,700			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**139,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		115.99			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,782,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		127.58			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		177		85	
Passes / Detention (Min)		7		15.24	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,254,000	$	2,837,000	
Construction Cost (Disinfection)	**$**	**5,091,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		76,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**152,000**			
			TOTAL CAPITAL COST	**$**	**51,411,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	0	
Peak Volume	413,047	CF
	3.09	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	179.47	CFS
	115.99	MGD

Capital Costs - CSO 139A001 to 139B002 Region

SCREENING AND DISINFECTION

0 Overflows / Year

Parameter		Value			Reference
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		115.99		179.47	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,782,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		115.99		179.47	= Peak Flow x % Req Pump
Force Main Diameter (In)		74			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,802,000**	**$**	**90,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		179.47			Ref: CSO Statistics
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		35,900			=CFS x 200
Odor Control Flow Rate (CFM)		1,800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**145,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		115.99			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		169		81	
Passes / Detention (Min)		7		**15.25**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,147,000	$	2,647,000	
Construction Cost (Disinfection)	**$**	**4,794,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		35,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**			
				TOTAL CAPITAL COST	**$ 28,977,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	1	
Peak Volume	372,974	CF
	2.79	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	119.89	CFS
	77.48	MGD

Capital Costs - CSO 139A001 to 139B002 Region			
CONSOLIDATION SEWERS			
1 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,325	Width of Sewershed along Riverline
Peak Flow (CFS)		44.87	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	277,000	
Peak Flow (CFS)		89.73	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	415,000	
Peak Flow (CFS)		134.60	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	529,000	
Peak Flow (CFS)		179.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	659,000	
Construction Cost (Consolidation Sewers)	**$**	**1,880,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,995,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	1	
Peak Volume	372,974	CF
	2.79	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	119.89	CFS
	77.48	MGD

Capital Costs - CSO 139A001 to 139B002 Region				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		298		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**44,700,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		129,809		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**260,000**		
			TOTAL CAPITAL COST	**$ 44,960,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	1	
Peak Volume	372,974	CF
	2.79	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	119.89	CFS
	77.48	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.79		373,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.28		439,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		211			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		141			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.34		446,265	**Sufficient Volume**
Tank Area (SF)		30,000			= Length x Width
Construction Cost (Storage Tank)		**2,885,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		77.48		119.89	= Peak Rate
Force Main Diameter (In)		61			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,105,000**	**$**	**73,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		119.89			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		659,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,300			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**233,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		77.48			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,000,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		2.79			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.39			= Peak Vol/DW Time
Construction Cost	**$**	**8,677,247**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		61,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**122,000**			
				TOTAL CAPITAL COST	**$ 29,389,247**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	1	
Peak Volume	372,974	CF
	2.79	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	119.89	CFS
	77.48	MGD

Capital Costs - CSO 139A001 to 139B002 Region

SUB-SURFACE STORAGE TANK

1 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.79	373,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.28	439,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		211		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		141		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.34	446,265	**Sufficient Volume**
Tank Area (SF)		30,000		= Length x Width
Construction Cost (Storage Tank)		**9,506,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.39	2.16	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		8		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,470,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		119.89		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		659,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		32,950		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,416,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		77.48		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,000,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.79		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.39		= Peak Vol/DW Time
Construction Cost	**$**	**8,677,247**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		61,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**122,000**		
			TOTAL CAPITAL COST	**$ 27,503,247**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	1	
Peak Volume	372,974	CF
	2.79	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	119.89	CFS
	77.48	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
1 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		77.48		119.89	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		9			
Construction Cost (Swirl / Vortex)	**$**	**4,307,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		42.62		65.94	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		45			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,851,000**	**$**	**54,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		119.89			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		260,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		13,000			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**683,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		77.48			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,000,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		42.62			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		103		49	
Passes		3		**15.31**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,158,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		80,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**160,000**			
			TOTAL CAPITAL COST	**$**	**19,507,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	1	
Peak Volume	372,974	CF
	2.79	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	119.89	CFS
	77.48	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SEDIMENTATION BASIN (CSOTF)					
1 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		77.48		119.89	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		13,000			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		162		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		81		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.18		157,464	
Construction Cost (CSOTF)	**$**	**16,481,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		77.48		119.89	= Peak Rate
Force Main Diameter (In)		61			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,105,000**	**$**	**73,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		119.89			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		236,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**633,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		77.48			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,000,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		77.48			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		138		66	
Passes		5		**15.19**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,695,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		2.79			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.39			= Peak Vol/DW Time
Construction Cost	**$**	**8,677,247**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		36,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**72,000**			
			TOTAL CAPITAL COST	**$**	**45,030,247**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	1	
Peak Volume	372,974	CF
	2.79	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	119.89	CFS
	77.48	MGD

Capital Costs - CSO 139A001 to 139B002 Region				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
1 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		77.48	119.89	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		920		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		44	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		22	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**13,889,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		85.23	131.88	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		63		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**12,050,000**	**$ 76,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		119.89		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		23,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,150		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**102,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		77.48		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,000,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		85.23		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		145	69	
Passes		5	**15.17**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,798,000	$ 1,924,000	
Construction Cost (Disinfection)	**$**	**3,722,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		58,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**116,000**		
			TOTAL CAPITAL COST	**$ 36,249,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	1	
Peak Volume	372,974	CF
	2.79	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	119.89	CFS
	77.48	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		77.48		119.89	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,000,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		77.48		119.89	= Peak Flow x % Req Pump
Force Main Diameter (In)		61			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,105,000**	**$**	**73,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		119.89			Ref: CSO Statistics
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		24,000			=CFS x 200
Odor Control Flow Rate (CFM)		1,200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**106,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		77.48			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		138		66	
Passes		5		**15.19**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,695,000	$	1,795,000	
Construction Cost (Disinfection)	**$**	**3,490,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		31,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**62,000**			
				TOTAL CAPITAL COST	**$ 21,130,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	2	
Peak Volume	235,206	CF
	1.76	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	94.46	CFS
	61.05	MGD

Capital Costs - CSO 139A001 to 139B002 Region			
CONSOLIDATION SEWERS			
2 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,325	Width of Sewershed along Riverline
Peak Flow (CFS)		44.87	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	277,000	
Peak Flow (CFS)		89.73	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	415,000	
Peak Flow (CFS)		134.60	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	529,000	
Peak Flow (CFS)		179.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	659,000	
Construction Cost (Consolidation Sewers)	**$**	**1,880,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,995,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	2	
Peak Volume	235,206	CF
	1.76	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	94.46	CFS
	61.05	MGD

Capital Costs - CSO 139A001 to 139B002 Region				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		298		Typ 0, Rev as Req'd
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**44,700,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		129,809		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**260,000**		
			TOTAL CAPITAL COST $	**44,960,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	2	
Peak Volume	235,206	CF
	1.76	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	94.46	CFS
	61.05	MGD

Capital Costs - CSO 139A001 to 139B002 Region

SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.76	235,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.07	276,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		167		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		112		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.10	280,560	**Sufficient Volume**
Tank Area (SF)		19,000		= Length x Width
Construction Cost (Storage Tank)		**1,745,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		61.05	94.46	= Peak Rate
Force Main Diameter (In)		54		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,099,000**	**$ 64,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		94.46		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		414,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,070		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**162,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		61.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.76		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.88		= Peak Vol/DW Time
Construction Cost	**$**	**8,427,049**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		45,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**90,000**		
			TOTAL CAPITAL COST	**$ 25,120,049**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	2	
Peak Volume	235,206	CF
	1.76	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	94.46	CFS
	61.05	MGD

Capital Costs - CSO 139A001 to 139B002 Region

SUB-SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.76	235,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.07	276,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		167		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		112		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.10	280,560	**Sufficient Volume**
Tank Area (SF)		19,000		= Length x Width
Construction Cost (Storage Tank)		**6,332,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.88	1.36	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		6		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,032,000**	**$ 16,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		94.46		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		414,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		20,700		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**984,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		61.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.76		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.88		= Peak Vol/DW Time
Construction Cost	**$**	**8,427,049**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		45,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**90,000**		
			TOTAL CAPITAL COST	**$ 22,414,049**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	2	
Peak Volume	235,206	CF
	1.76	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	94.46	CFS
	61.05	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
2 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		61.05		94.46	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		7			
Construction Cost (Swirl / Vortex)	**$**	**3,723,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		33.58		51.95	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		40			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,748,000**	**$**	**48,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		94.46			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		202,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		10,100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**561,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		61.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		33.58			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		91		44	
Passes		3		**15.41**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**999,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		63,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**126,000**			
			TOTAL CAPITAL COST	**$**	**16,738,000**

Captial Costs

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	2	
Peak Volume	235,206	CF
	1.76	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	94.46	CFS
	61.05	MGD

Capital Costs - CSO 139A001 to 139B002 Region				
SEDIMENTATION BASIN (CSOTF)				
2 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		61.05	94.46	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10,200		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		144	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		72	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.93	124,416	
Construction Cost (CSOTF)	**$**	**16,422,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		61.05	94.46	= Peak Rate
Force Main Diameter (In)		54		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,099,000**	**$ 64,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		94.46		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		187,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		9,350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**528,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		61.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		61.05		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		123	59	
Passes		5	**15.36**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,457,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.76		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.88		= Peak Vol/DW Time
Construction Cost	**$**	**8,427,049**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		30,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST	**$ 41,590,049**

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RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	2	
Peak Volume	235,206	CF
	1.76	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	94.46	CFS
	61.05	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		61.05		94.46	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		720			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		39		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		19		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**11,098,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		67.15		103.91	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		56			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,844,000**	**$**	**67,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		94.46			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		18,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		900			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**84,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		61.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		67.15			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		129		61	
Passes		5		**15.15**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,549,000	$	1,618,000	
Construction Cost (Disinfection)	**$**	**3,167,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		50,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**100,000**			
				TOTAL CAPITAL COST	**$ 29,893,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	2	
Peak Volume	235,206	CF
	1.76	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	94.46	CFS
	61.05	MGD

Capital Costs - CSO 139A001 to 139B002 Region

SCREENING AND DISINFECTION

2 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		61.05		94.46	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		61.05		94.46	= Peak Flow x % Req Pump
Force Main Diameter (In)		54			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,099,000**	**$**	**64,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		94.46			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		18,900			=CFS x 200
Odor Control Flow Rate (CFM)		950			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**88,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		61.05			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		123		59	
Passes		5		**15.36**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,457,000	$	1,525,000	
Construction Cost (Disinfection)	**$**	**2,982,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		29,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**58,000**			
				TOTAL CAPITAL COST	**$ 17,824,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	4	
Peak Volume	157,499	CF
	1.18	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	82.32	CFS
	53.20	MGD

Capital Costs - CSO 139A001 to 139B002 Region			
CONSOLIDATION SEWERS			
4 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,325	Width of Sewershed along Riverline
Peak Flow (CFS)		44.87	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	277,000	
Peak Flow (CFS)		89.73	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	415,000	
Peak Flow (CFS)		134.60	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	529,000	
Peak Flow (CFS)		179.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	659,000	
Construction Cost (Consolidation Sewers)	**$**	**1,880,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,995,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	4	
Peak Volume	157,499	CF
	1.18	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	82.32	CFS
	53.20	MGD

Capital Costs - CSO 139A001 to 139B002 Region				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		298		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**44,700,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		129,809		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**260,000**		
			TOTAL CAPITAL COST $	**44,960,000**

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RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	4	
Peak Volume	157,499	CF
	1.18	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	82.32	CFS
	53.20	MGD

Capital Costs - CSO 139A001 to 139B002 Region

SURFACE STORAGE TANK

4 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.18		157,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.39		185,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		137			= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		92			= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		1.41		189,060	**Sufficient Volume**
Tank Area (SF)		13,000			= Length x Width
Construction Cost (Storage Tank)		**1,127,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		53.20		82.32	= Peak Rate
Force Main Diameter (In)		50			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,142,000**	**$**	**60,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		82.32			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		278,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,390			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**118,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		53.20			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,875,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		1.18			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.59			= Peak Vol/DW Time
Construction Cost	**$**	**8,285,947**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		37,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**74,000**			
			TOTAL CAPITAL COST	**$**	**22,975,947**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	4	
Peak Volume	157,499	CF
	1.18	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	82.32	CFS
	53.20	MGD

Capital Costs - CSO 139A001 to 139B002 Region				
SUB-SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.18	157,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.39	185,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		137		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		92		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.41	189,060	**Sufficient Volume**
Tank Area (SF)		13,000		= Length x Width
Construction Cost (Storage Tank)		**4,542,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.59	0.91	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		5		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**785,000**	**$ 15,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		82.32		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		278,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		13,900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**720,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		53.20		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,875,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.18		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.59		= Peak Vol/DW Time
Construction Cost	**$**	**8,285,947**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		37,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**74,000**		
			TOTAL CAPITAL COST	**$ 19,590,947**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	4	
Peak Volume	157,499	CF
	1.18	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	82.32	CFS
	53.20	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		53.20		82.32	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		6			
Construction Cost (Swirl / Vortex)	**$**	**3,423,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		29.26		45.28	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		37			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,221,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		82.32			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		173,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		8,650			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**496,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		53.20			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,875,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		29.26			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		85		41	
Passes		3		**15.39**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**921,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		55,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**110,000**			
			TOTAL CAPITAL COST	**$**	**15,385,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	4	
Peak Volume	157,499	CF
	1.18	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	82.32	CFS
	53.20	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SEDIMENTATION BASIN (CSOTF)					
4 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		53.20		82.32	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		8,900			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		134		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		67		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.81		107,736	
Construction Cost (CSOTF)	**$**	**16,400,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		53.20		82.32	= Peak Rate
Force Main Diameter (In)		50			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,142,000**	**$**	**60,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		82.32			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		162,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**472,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		53.20			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,875,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		53.20			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		115		55	
Passes		5		**15.37**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,334,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		1.18			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.59			= Peak Vol/DW Time
Construction Cost	**$**	**8,285,947**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		26,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST	**$ 39,914,947**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	4	
Peak Volume	157,499	CF
	1.18	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	82.32	CFS
	53.20	MGD

Capital Costs - CSO 139A001 to 139B002 Region						
HIGH RATE END OF PIPE TREATMENT (HREOP)						
4 Overflows / Year						
1. High Rate End of Pipe Treatment (HREOP) Parameters						
Sizing Basis: Peak Flow (MGD / CFS)		53.20		82.32	Ref: CSO Statistics	
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters	
Surface Area Req'd at Peak Flow (SF)		630			= (MGD x 1,000,000) / (6,000 GPD / SF)	
Length (Ft)		36		**OK**	=(Surf Area x 2)$^{1/2}$	
Width (Ft)		19		**Area OK**	= Area Req'd / Length	
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters	
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**	
Construction Cost (HREOP)	**$**	**9,784,000**				
2. Dewatering Pump Station / Force Main Parameters						
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters	
Underflow Rate (%)		10%			Ref: Technical Parameters	
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**	
Dewatering Pumping Rate (MGD / CFS)		58.52		90.55	= Peak Flow / DW Time x % Req Pump	
Force Main Diameter (In)		53			DW Pump Rate / 2 FPS	
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**	
Force Main Length (Ft)		100			Input by Engineer	
Construction Cost (PS / Force Main)	**$**	**8,791,000**	**$**	**63,000**		
3. Consolidation and/or Outfall Pipe Parameters						
Peak Flow (CFS)		82.32			Ref: Technical Parameters	
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"	
Length (Ft)		-			Input by Engineer	
Depth (Ft)		-			Input by Engineer	
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls	
4. Odor Control Parameters						
Air Changes / Hour (ACH)		3			Ref: Technical Parameters	
Volume of Ventilated Space (CF)		16,000			=Required Storage Vol x 2	
Odor Control Flow Rate (CFM)		800			= ACH x Volume / 60	
Construction Cost (Odor Control)	**$**	**77,000**				
5. Screening Parameters						
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**	
Peak Flow, into facility (MGD)		53.20			Ref: CSO Statistics	
Construction Cost (Screening)	**$**	**2,875,000**				
6. Disinfection Parameters						
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**	
Peak Flow (MGD)		58.52			Ref: Peak flow of PS	
Cl_2 Contact Tank Length / Width (Ft)		120		58		
Passes		5		**15.37**	Ref: Tech Param-15 min minimum	
				OK Detn Time		
Construction Cost (Disinfection / CC Tank)	$	1,418,000	$	1,480,000		
Construction Cost (Disinfection)	**$**	**2,898,000**				
7. Regulator / Vortex Drop Parameters						
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer	
Number Regulators		1			Input by Engineer	
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**	
Construction Cost (Regulators/Vortex)	**$**	**299,000**				
8. Land Acquisition Parameters						
Land Required - HREOP (SF)		46,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560	
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters	
Land Acquisition Cost	**$**	**92,000**				
			TOTAL CAPITAL COST		**$**	**26,874,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	4	
Peak Volume	157,499	CF
	1.18	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	82.32	CFS
	53.20	MGD

Capital Costs - CSO 139A001 to 139B002 Region

SCREENING AND DISINFECTION

4 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		53.20		82.32	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,875,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		53.20		82.32	= Peak Flow x % Req Pump
Force Main Diameter (In)		50			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,142,000**	**$**	**60,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		82.32			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		16,500			=CFS x 200
Odor Control Flow Rate (CFM)		830			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**79,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		53.20			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		115		55	
Passes		5		**15.37**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,334,000	$	1,387,000	
Construction Cost (Disinfection)	**$**	**2,721,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		28,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**			
				TOTAL CAPITAL COST	**$ 16,227,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	6	
Peak Volume	125,671	CF
	0.94	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	78.87	CFS
	50.97	MGD

Capital Costs - CSO 139A001 to 139B002 Region			
CONSOLIDATION SEWERS			
6 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,325	Width of Sewershed along Riverline
Peak Flow (CFS)		44.87	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	277,000	
Peak Flow (CFS)		89.73	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	415,000	
Peak Flow (CFS)		134.60	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	529,000	
Peak Flow (CFS)		179.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		331	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	659,000	
Construction Cost (Consolidation Sewers)	**$**	**1,880,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 1,995,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	6	
Peak Volume	125,671	CF
	0.94	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	78.87	CFS
	50.97	MGD

Capital Costs - CSO 139A001 to 139B002 Region				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		298		Typ 0, Rev as Req'd
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**44,700,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		129,809		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**260,000**		
			TOTAL CAPITAL COST	**$ 44,960,000**

Captial Costs

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	6	
Peak Volume	125,671	CF
	0.94	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	78.87	CFS
	50.97	MGD

Capital Costs - CSO 139A001 to 139B002 Region

SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.94	126,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		1.11	148,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		123		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		82		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		1.13	151,290	**Sufficient Volume**
Tank Area (SF)		10,000		= Length x Width
Construction Cost (Storage Tank)		**881,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		50.97	78.87	= Peak Rate
Force Main Diameter (In)		49		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,870,000**	**$ 58,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		78.87		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		222,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,110		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**99,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		50.97		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,772,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.94		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.47		= Peak Vol/DW Time
Construction Cost	**$**	**8,228,156**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		33,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**		
			TOTAL CAPITAL COST	**$ 22,268,156**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	6	
Peak Volume	125,671	CF
	0.94	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	78.87	CFS
	50.97	MGD

Capital Costs - CSO 139A001 to 139B002 Region			
SUB-SURFACE STORAGE TANK			
6 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.94	126,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	1.11	148,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	123		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	82		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	1.13	151,290	**Sufficient Volume**
Tank Area (SF)	10,000		= Length x Width
Construction Cost (Storage Tank)	**3,809,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.47	0.73	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	5		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**684,000**	**$ 15,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	78.87		Ref: Technical Parameters
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	222,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	11,100		= ACH x Volume / 60
Construction Cost (Odor Control) $	**604,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	50.97		Ref: CSO Statistics
Construction Cost (Screening) $	**2,772,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	0.94		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	0.47		= Peak Vol/DW Time
Construction Cost $	**8,228,156**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	33,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**66,000**		
		TOTAL CAPITAL COST	**$ 18,472,156**

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RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	6	
Peak Volume	125,671	CF
	0.94	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	78.87	CFS
	50.97	MGD

Capital Costs - CSO 139A001 to 139B002 Region				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
6 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		50.97	78.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		6		
Construction Cost (Swirl / Vortex)	**$**	**3,335,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		28.03	43.38	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		36		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,072,000**	**$ 44,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		78.87		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		173,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		8,650		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**496,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		50.97		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,772,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		28.03		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		83	40	
Passes		3	**15.31**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**898,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		53,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**106,000**		
			TOTAL CAPITAL COST	**$ 15,017,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	6	
Peak Volume	125,671	CF
	0.94	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	78.87	CFS
	50.97	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
SEDIMENTATION BASIN (CSOTF)					
6 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		50.97		78.87	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		8,500			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		131		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		66		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.78		103,752	
Construction Cost (CSOTF)	**$**	**16,396,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		50.97		78.87	= Peak Rate
Force Main Diameter (In)		49			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,870,000**	**$**	**58,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		78.87			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		156,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		7,800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**458,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		50.97			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,772,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		50.97			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		112		54	
Passes		5		**15.34**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,298,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.94			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.47			= Peak Vol/DW Time
Construction Cost	**$**	**8,228,156**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		26,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST	**$ 39,426,156**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	6	
Peak Volume	125,671	CF
	0.94	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	78.87	CFS
	50.97	MGD

Capital Costs - CSO 139A001 to 139B002 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		50.97		78.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		600			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		36		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		18		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**9,413,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		56.07		86.76	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		51			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,492,000**	**$**	**61,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		78.87			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		16,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**77,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		50.97			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,772,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		56.07			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		118		56	
Passes		5		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,380,000	$	1,431,000	
Construction Cost (Disinfection)	**$**	**2,811,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		45,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**90,000**			
				TOTAL CAPITAL COST	**$ 26,010,000**

RESULTS SUMMARY		
Number of Events / Year	80	
Number of Overflows / Year	6	
Peak Volume	125,671	CF
	0.94	MG
Total Volume	3,283,956	CF
	24.56	MG
Peak Rate	78.87	CFS
	50.97	MGD

Capital Costs - CSO 139A001 to 139B002 Region

SCREENING AND DISINFECTION

6 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		50.97		78.87	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,772,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		50.97		78.87	= Peak Flow x % Req Pump
Force Main Diameter (In)		49			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**7,870,000**	**$**	**58,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		78.87			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**1,995,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		15,800			=CFS x 200
Odor Control Flow Rate (CFM)		790			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**76,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		50.97			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		112		54	
Passes		5		**15.34**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,298,000	$	1,343,000	
Construction Cost (Disinfection)	**$**	**2,641,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		28,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**			
			TOTAL CAPITAL COST	**$**	**15,767,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	115.99	$450,109	20	10.910	$4,910,664
	Tank O&M	No. Events / Yr	80	$57,212	50	14.484	$828,635
		Const Cost ($)	$3,224,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	116	$19,505	20	10.910	$212,803
	Odor Control O&M	Capacity (cfm)	3,650	$12,775	20	10.910	$139,374
	Reserve / Replace	10% Gravity / 15% Pump					$80,885
			Total Annual O&M	**$540,000**		**Total PW O&M**	**$6,172,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.54	$25,135	20	10.910	$274,218
	Tank O&M	No. Events / Yr	80	$75,225	50	14.484	$1,089,521
		Const Cost ($)	$10,429,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	116	$19,505	20	10.910	$212,803
	Odor Control O&M	Capacity (cfm)	36,450	$127,575	20	10.910	$1,391,835
	Reserve / Replace	10% Gravity / 15% Pump					$26,531
			Total Annual O&M	**$248,000**		**Total PW O&M**	**$2,995,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	115.99	$450,109	20	10.910	$4,910,664
	Sed. Basin O&M	Flow Rate (mgd)	115.99	$13,048	50	14.484	$188,988
	Screening O&M	Flow Rate (mgd)	115.99	$19,505	20	10.910	$212,803
	Disinfection O&M	Flow Rate (mgd)	115.99	$291,019	20	10.910	$3,175,003
	Odor Control O&M	Capacity (cfm)	17,650.00	$61,775	20	10.910	$673,961
	Reserve / Replace	10% Gravity / 15% Pump					$88,400
			Total Annual O&M	**$836,000**		**Total PW O&M**	**$9,250,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	127.58	$479,703	20	10.910	$5,233,529
	HREP O&M	Flow Rate (mgd)	115.99	$381,315	20	10.910	$4,160,121
	Screening O&M	Flow Rate (mgd)	115.99	$19,505	20	10.910	$212,803
	Disinfection O&M	Flow Rate (mgd)	127.58	$308,417	20	10.910	$3,364,811
	Odor Control O&M	Capacity (cfm)	1,700.00	$5,950	20	10.910	$64,914
	Reserve / Replace	10% Gravity / 15% Pump					$148,622
			Total Annual O&M	**$1,195,000**		**Total PW O&M**	**$13,185,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	63.79	$301,894	20	10.910	$3,293,643
	Swirl / Vortex O&M	Flow Rate (mgd)	115.99	$13,048	20	10.910	$142,358
	Screening O&M	Flow Rate (mgd)	115.99	$19,505	20	10.910	$212,803
	Disinfection O&M	Flow Rate (mgd)	63.79	$202,186	20	10.910	$2,205,836
	Odor Control O&M	Capacity (cfm)	18,750.00	$65,625	20	10.910	$715,965
	Reserve / Replace	10% Gravity / 15% Pump					$68,265
			Total Annual O&M	**$603,000**		**Total PW O&M**	**$6,639,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	115.99	$450,109	20	10.910	$4,910,664
	Screening O&M	Flow Rate (mgd)	115.99	$19,505	20	10.910	$212,803
	Disinfection O&M	Flow Rate (mgd)	115.99	$291,019	20	10.910	$3,175,003
	Odor Control O&M	Capacity (cfm)	1,800.00	$6,300	20	10.910	$68,733
	Reserve / Replace	10% Gravity / 15% Pump					$86,433
			Total Annual O&M	**$767,000**		**Total PW O&M**	**$8,454,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	77.48	$343,773	20	10.910	$3,750,547
	Tank O&M	No. Events / Yr	80	$56,365	50	14.484	$816,360
		Const Cost ($)	$2,885,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	77	$14,954	20	10.910	$163,151
	Odor Control O&M	Capacity (cfm)	3,300	$11,550	20	10.910	$126,010
	Reserve / Replace	10% Gravity / 15% Pump					$56,822
			Total Annual O&M	**$427,000**		**Total PW O&M**	**$4,913,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.39	$23,478	20	10.910	$256,145
	Tank O&M	No. Events / Yr	80	$72,917	50	14.484	$1,056,100
		Const Cost ($)	$9,506,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	77	$14,954	20	10.910	$163,151
	Odor Control O&M	Capacity (cfm)	32,950	$115,325	20	10.910	$1,258,189
	Reserve / Replace	10% Gravity / 15% Pump					$20,729
			Total Annual O&M	**$227,000**		**Total PW O&M**	**$2,754,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	77.48	$343,773	20	10.910	$3,750,547
	Sed. Basin O&M	Flow Rate (mgd)	77.48	$8,717	50	14.484	$126,253
	Screening O&M	Flow Rate (mgd)	77.48	$14,954	20	10.910	$163,151
	Disinfection O&M	Flow Rate (mgd)	77.48	$227,612	20	10.910	$2,483,233
	Odor Control O&M	Capacity (cfm)	11,800.00	$41,300	20	10.910	$450,580
	Reserve / Replace	10% Gravity / 15% Pump					$62,521
			Total Annual O&M	**$637,000**		**Total PW O&M**	**$7,036,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	85.23	$366,376	20	10.910	$3,997,138
	HREP O&M	Flow Rate (mgd)	77.48	$300,783	20	10.910	$3,281,525
	Screening O&M	Flow Rate (mgd)	77.48	$14,954	20	10.910	$163,151
	Disinfection O&M	Flow Rate (mgd)	85.23	$241,219	20	10.910	$2,631,685
	Odor Control O&M	Capacity (cfm)	1,150.00	$4,025	20	10.910	$43,913
	Reserve / Replace	10% Gravity / 15% Pump					$102,990
			Total Annual O&M	**$928,000**		**Total PW O&M**	**$10,220,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	42.62	$230,573	20	10.910	$2,515,538
	Swirl / Vortex O&M	Flow Rate (mgd)	77.48	$8,717	20	10.910	$95,102
	Screening O&M	Flow Rate (mgd)	77.48	$14,954	20	10.910	$163,151
	Disinfection O&M	Flow Rate (mgd)	42.62	$158,134	20	10.910	$1,725,228
	Odor Control O&M	Capacity (cfm)	13,000.00	$45,500	20	10.910	$496,402
	Reserve / Replace	10% Gravity / 15% Pump					$49,697
			Total Annual O&M	**$458,000**		**Total PW O&M**	**$5,045,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	77.48	$343,773	20	10.910	$3,750,547
	Screening O&M	Flow Rate (mgd)	77.48	$14,954	20	10.910	$163,151
	Disinfection O&M	Flow Rate (mgd)	77.48	$227,612	20	10.910	$2,483,233
	Odor Control O&M	Capacity (cfm)	1,200.00	$4,200	20	10.910	$45,822
	Reserve / Replace	10% Gravity / 15% Pump					$61,087
			Total Annual O&M	**$591,000**		**Total PW O&M**	**$6,504,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	61.05	$293,154	20	10.910	$3,198,297
	Tank O&M	No. Events / Yr	80	$53,515	50	14.484	$775,082
		Const Cost ($)	$1,745,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	61	$13,176	20	10.910	$143,753
	Odor Control O&M	Capacity (cfm)	2,070	$7,245	20	10.910	$79,043
	Reserve / Replace	10% Gravity / 15% Pump					$46,375
			Total Annual O&M	**$368,000**		**Total PW O&M**	**$4,243,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.88	$17,254	20	10.910	$188,240
	Tank O&M	No. Events / Yr	80	$64,982	50	14.484	$941,173
		Const Cost ($)	$6,332,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	61	$13,176	20	10.910	$143,753
	Odor Control O&M	Capacity (cfm)	20,700	$72,450	20	10.910	$790,425
	Reserve / Replace	10% Gravity / 15% Pump					$15,697
			Total Annual O&M	**$168,000**		**Total PW O&M**	**$2,079,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 139A001 to 139B002 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	61.05	$293,154	20	10.910	$3,198,297
	Sed. Basin O&M	Flow Rate (mgd)	61.05	$6,868	50	14.484	$99,472
	Screening O&M	Flow Rate (mgd)	61.05	$13,176	20	10.910	$143,753
	Disinfection O&M	Flow Rate (mgd)	61.05	$196,842	20	10.910	$2,147,535
	Odor Control O&M	Capacity (cfm)	9,350.00	$32,725	20	10.910	$357,028
	Reserve / Replace	10% Gravity / 15% Pump					$51,333
			Total Annual O&M	**$543,000**		**Total PW O&M**	**$5,997,000**

CSO 139A001 to 139B002 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	67.15	$312,429	20	10.910	$3,408,578
	HREP O&M	Flow Rate (mgd)	61.05	$261,433	20	10.910	$2,852,221
	Screening O&M	Flow Rate (mgd)	61.05	$13,176	20	10.910	$143,753
	Disinfection O&M	Flow Rate (mgd)	67.15	$208,610	20	10.910	$2,275,918
	Odor Control O&M	Capacity (cfm)	900.00	$3,150	20	10.910	$34,366
	Reserve / Replace	10% Gravity / 15% Pump					$83,602
			Total Annual O&M	**$799,000**		**Total PW O&M**	**$8,798,000**

CSO 139A001 to 139B002 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	33.58	$196,622	20	10.910	$2,145,137
	Swirl / Vortex O&M	Flow Rate (mgd)	61.05	$6,868	20	10.910	$74,929
	Screening O&M	Flow Rate (mgd)	61.05	$13,176	20	10.910	$143,753
	Disinfection O&M	Flow Rate (mgd)	33.58	$136,756	20	10.910	$1,492,001
	Odor Control O&M	Capacity (cfm)	10,100.00	$35,350	20	10.910	$385,666
	Reserve / Replace	10% Gravity / 15% Pump					$41,568
			Total Annual O&M	**$389,000**		**Total PW O&M**	**$4,283,000**

CSO 139A001 to 139B002 Region	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	61.05	$293,154	20	10.910	$3,198,297
	Screening O&M	Flow Rate (mgd)	61.05	$13,176	20	10.910	$143,753
	Disinfection O&M	Flow Rate (mgd)	61.05	$196,842	20	10.910	$2,147,535
	Odor Control O&M	Capacity (cfm)	950.00	$3,325	20	10.910	$36,276
	Reserve / Replace	10% Gravity / 15% Pump					$50,136
			Total Annual O&M	**$507,000**		**Total PW O&M**	**$5,576,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	53.20	$267,405	20	10.910	$2,917,376
	Tank O&M	No. Events / Yr	80	$51,970	50	14.484	$752,705
		Const Cost ($)	$1,127,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	53	$12,362	20	10.910	$134,870
	Odor Control O&M	Capacity (cfm)	1,390	$4,865	20	10.910	$53,077
	Reserve / Replace	10% Gravity / 15% Pump					$41,360
			Total Annual O&M	**$337,000**		**Total PW O&M**	**$3,899,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.59	$13,199	20	10.910	$143,995
	Tank O&M	No. Events / Yr	80	$60,507	50	14.484	$876,359
		Const Cost ($)	$4,542,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	53	$12,362	20	10.910	$134,870
	Odor Control O&M	Capacity (cfm)	13,900	$48,650	20	10.910	$530,769
	Reserve / Replace	10% Gravity / 15% Pump					$12,981
			Total Annual O&M	**$135,000**		**Total PW O&M**	**$1,699,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	53.20	$267,405	20	10.910	$2,917,376
	Sed. Basin O&M	Flow Rate (mgd)	53.20	$5,985	50	14.484	$86,684
	Screening O&M	Flow Rate (mgd)	53.20	$12,362	20	10.910	$134,870
	Disinfection O&M	Flow Rate (mgd)	53.20	$181,014	20	10.910	$1,974,848
	Odor Control O&M	Capacity (cfm)	8,100.00	$28,350	20	10.910	$309,297
	Reserve / Replace	10% Gravity / 15% Pump					$45,952
			Total Annual O&M	**$496,000**		**Total PW O&M**	**$5,469,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	58.52	$284,987	20	10.910	$3,109,187
	HREP O&M	Flow Rate (mgd)	53.20	$241,110	20	10.910	$2,630,497
	Screening O&M	Flow Rate (mgd)	53.20	$12,362	20	10.910	$134,870
	Disinfection O&M	Flow Rate (mgd)	58.52	$191,835	20	10.910	$2,092,908
	Odor Control O&M	Capacity (cfm)	800.00	$2,800	20	10.910	$30,548
	Reserve / Replace	10% Gravity / 15% Pump					$74,366
			Total Annual O&M	**$734,000**		**Total PW O&M**	**$8,072,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	29.26	$179,352	20	10.910	$1,956,720
	Swirl / Vortex O&M	Flow Rate (mgd)	53.20	$5,985	20	10.910	$65,296
	Screening O&M	Flow Rate (mgd)	53.20	$12,362	20	10.910	$134,870
	Disinfection O&M	Flow Rate (mgd)	29.26	$125,759	20	10.910	$1,372,027
	Odor Control O&M	Capacity (cfm)	8,650.00	$30,275	20	10.910	$330,298
	Reserve / Replace	10% Gravity / 15% Pump					$37,631
			Total Annual O&M	**$354,000**		**Total PW O&M**	**$3,897,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	53.20	$267,405	20	10.910	$2,917,376
	Screening O&M	Flow Rate (mgd)	53.20	$12,362	20	10.910	$134,870
	Disinfection O&M	Flow Rate (mgd)	53.20	$181,014	20	10.910	$1,974,848
	Odor Control O&M	Capacity (cfm)	830.00	$2,905	20	10.910	$31,693
	Reserve / Replace	10% Gravity / 15% Pump					$44,883
			Total Annual O&M	**$464,000**		**Total PW O&M**	**$5,104,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	50.97	$259,866	20	10.910	$2,835,118
	Tank O&M	No. Events / Yr	80	$51,355	50	14.484	$743,798
		Const Cost ($)	$881,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	51	$12,135	20	10.910	$132,391
	Odor Control O&M	Capacity (cfm)	1,110	$3,885	20	10.910	$42,385
	Reserve / Replace	10% Gravity / 15% Pump					$39,919
			Total Annual O&M	**$328,000**		**Total PW O&M**	**$3,794,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.47	$11,351	20	10.910	$123,836
	Tank O&M	No. Events / Yr	80	$58,675	50	14.484	$849,818
		Const Cost ($)	$3,809,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	51	$12,135	20	10.910	$132,391
	Odor Control O&M	Capacity (cfm)	11,100	$38,850	20	10.910	$423,851
	Reserve / Replace	10% Gravity / 15% Pump					$11,973
			Total Annual O&M	**$122,000**		**Total PW O&M**	**$1,542,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	50.97	$259,866	20	10.910	$2,835,118
	Sed. Basin O&M	Flow Rate (mgd)	50.97	$5,734	50	14.484	$83,052
	Screening O&M	Flow Rate (mgd)	50.97	$12,135	20	10.910	$132,391
	Disinfection O&M	Flow Rate (mgd)	50.97	$176,354	20	10.910	$1,924,011
	Odor Control O&M	Capacity (cfm)	7,800.00	$27,300	20	10.910	$297,841
	Reserve / Replace	10% Gravity / 15% Pump					$44,426
			Total Annual O&M	**$482,000**		**Total PW O&M**	**$5,317,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	56.07	$276,951	20	10.910	$3,021,521
	HREP O&M	Flow Rate (mgd)	50.97	$235,116	20	10.910	$2,565,097
	Screening O&M	Flow Rate (mgd)	50.97	$12,135	20	10.910	$132,391
	Disinfection O&M	Flow Rate (mgd)	56.07	$186,897	20	10.910	$2,039,031
	Odor Control O&M	Capacity (cfm)	800.00	$2,800	20	10.910	$30,548
	Reserve / Replace	10% Gravity / 15% Pump					$71,754
			Total Annual O&M	**$714,000**		**Total PW O&M**	**$7,860,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	28.03	$174,295	20	10.910	$1,901,549
	Swirl / Vortex O&M	Flow Rate (mgd)	50.97	$5,734	20	10.910	$62,560
	Screening O&M	Flow Rate (mgd)	50.97	$12,135	20	10.910	$132,391
	Disinfection O&M	Flow Rate (mgd)	28.03	$122,522	20	10.910	$1,336,708
	Odor Control O&M	Capacity (cfm)	8,650.00	$30,275	20	10.910	$330,298
	Reserve / Replace	10% Gravity / 15% Pump					$36,561
			Total Annual O&M	**$345,000**		**Total PW O&M**	**$3,800,000**

CSO 139A001 to 139B002 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	50.97	$259,866	20	10.910	$2,835,118
	Screening O&M	Flow Rate (mgd)	50.97	$12,135	20	10.910	$132,391
	Disinfection O&M	Flow Rate (mgd)	50.97	$176,354	20	10.910	$1,924,011
	Odor Control O&M	Capacity (cfm)	790.00	$2,765	20	10.910	$30,166
	Reserve / Replace	10% Gravity / 15% Pump					$43,387
			Total Annual O&M	**$452,000**		**Total PW O&M**	**$4,965,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$45.0	$44,999,000	$0
1	$45.0	$44,999,000	$0
2	$45.0	$44,999,000	$0
4	$45.0	$44,999,000	$0
6	$45.0	$44,999,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$33.6	$30,563,030	$2,995,000
1	$30.3	$27,503,247	$2,754,000
2	$24.5	$22,414,049	$2,079,000
4	$21.3	$19,590,947	$1,699,000
6	$20.0	$18,472,156	$1,542,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$42.5	$36,324,030	$6,172,000
1	$34.3	$29,389,247	$4,913,000
2	$29.4	$25,120,049	$4,243,000
4	$26.9	$22,975,947	$3,899,000
6	$26.1	$22,268,156	$3,794,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$32.4	$25,736,000	$6,639,000
1	$24.6	$19,507,000	$5,045,000
2	$21.0	$16,738,000	$4,283,000
4	$19.3	$15,385,000	$3,897,000
6	$18.8	$15,017,000	$3,800,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$64.6	$51,411,000	$13,185,000
1	$46.5	$36,249,000	$10,220,000
2	$38.7	$29,893,000	$8,798,000
4	$34.9	$26,874,000	$8,072,000
6	$33.9	$26,010,000	$7,860,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$61.5	$52,224,081	$9,250,000
1	$52.1	$45,030,247	$7,036,000
2	$47.6	$41,590,049	$5,997,000
4	$45.4	$39,914,947	$5,469,000
6	$44.7	$39,426,156	$5,317,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$37.4	$28,977,000	$8,454,000
1	$27.6	$21,130,000	$6,504,000
2	$23.4	$17,824,000	$5,576,000
4	$21.3	$16,227,000	$5,104,000
6	$20.7	$15,767,000	$4,965,000

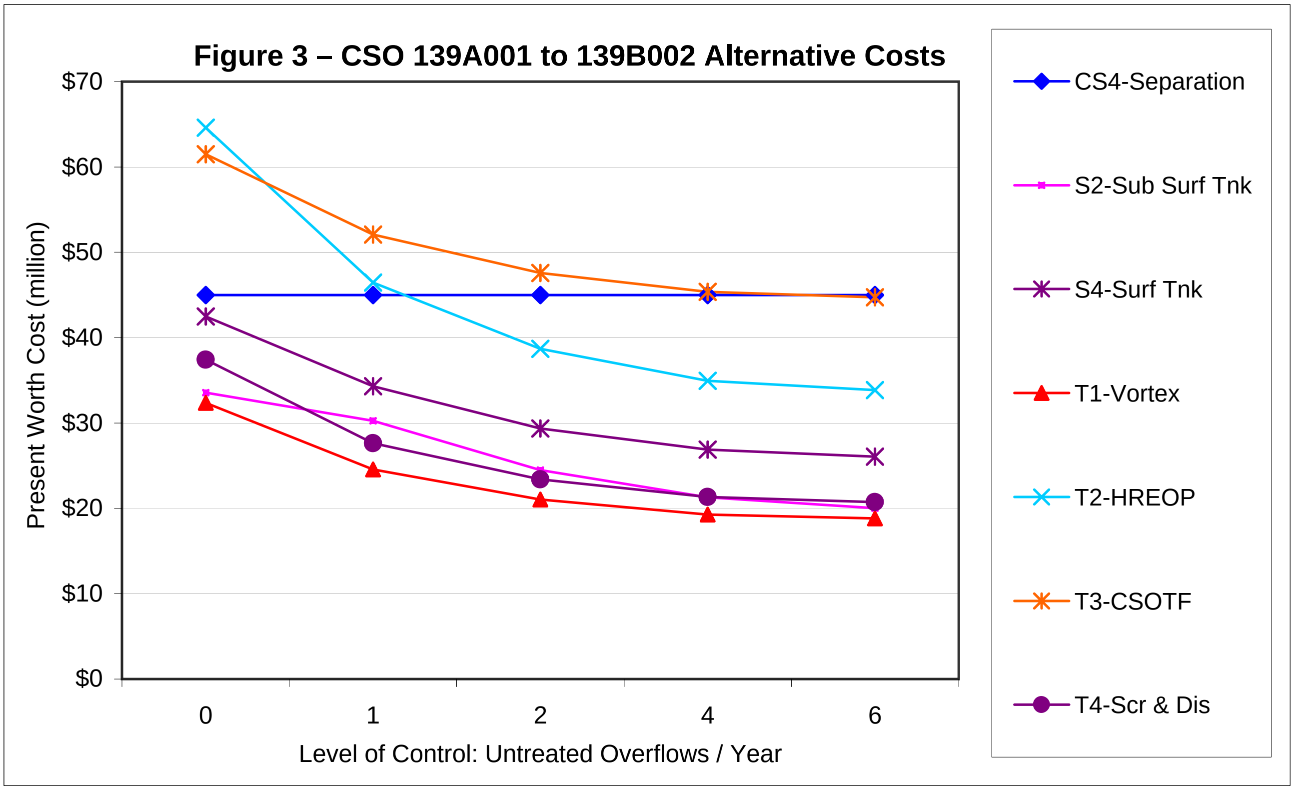


Figure 3 – CSO 139A001 to 139B002 Alternative Costs
$70
$60
$50
$40
$30
$20
$10
$0
Present Worth Cost (million)
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	CSO 139A001 to 139B002
Structures within Region	CSO 139A001, CSO 139B001, and CSO 139B002
Model ID	CSO 139A001 to 139B002.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	80
Peak Volume:	413,047 ft^3
	3.09 MG
Total Volume:	3,283,956 ft^3
	24.57 MG
Peak Rate:	179.47 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 1:20	2554	1/6/2005 10:30	413047.05	3089.798	0	15.92	24
8/20/2005 18:15	124	8/20/2005 19:00	372974.46	2790.035	1	179.47	0
5/13/2005 22:30	135	5/13/2005 22:45	235206.37	1759.461	2	94.46	2
10/21/2005 18:55	1349	10/22/2005 6:45	195237.49	1460.474	3	119.89	1
7/5/2005 16:30	115	7/5/2005 16:45	157499.38	1178.174	4	82.32	4
3/28/2005 8:55	686	3/28/2005 19:15	129551.90	969.113	5	28.29	15
11/29/2005 6:35	453	11/29/2005 7:00	125671.04	940.082	6	17.52	22
7/26/2005 19:45	54	7/26/2005 20:15	112021.71	837.978	7	89.77	3
1/11/2005 8:35	1044	1/12/2005 1:15	104530.80	781.943	8	13.50	27
11/14/2005 21:40	584	11/15/2005 3:00	99196.77	742.041	9	17.50	23
5/11/2005 22:30	107	5/11/2005 22:45	90502.18	677.002	10	78.87	6
9/16/2005 21:15	52	9/16/2005 21:45	76810.02	574.577	11	61.38	7
7/15/2005 17:15	64	7/15/2005 17:45	70450.70	527.006	12	49.77	8
7/17/2005 16:15	72	7/17/2005 16:30	65486.18	489.869	13	80.69	5
8/29/2005 11:15	164	8/29/2005 13:30	59992.38	448.773	14	49.15	9
4/23/2005 3:35	71	4/23/2005 4:00	58636.87	438.633	15	29.06	14
2/9/2005 15:00	148	2/9/2005 16:45	52259.21	390.925	16	24.39	17
7/21/2005 14:35	85	7/21/2005 15:15	48721.59	364.462	17	20.62	19
9/29/2005 5:05	127	9/29/2005 5:45	48504.32	362.837	18	32.07	12
1/3/2005 8:00	1093	1/3/2005 13:45	47831.55	357.804	19	5.61	45
1/13/2005 22:45	274	1/14/2005 2:20	43211.68	323.245	20	7.40	40
1/8/2005 1:32	392	1/8/2005 5:30	40412.59	302.306	21	11.75	29
2/20/2005 15:33	674	2/20/2005 20:30	40216.69	300.841	22	19.07	21
12/15/2005 8:42	730	12/15/2005 14:00	38140.27	285.308	23	11.56	31
2/14/2005 4:36	1053	2/14/2005 9:45	37678.86	281.857	24	3.79	55
4/1/2005 19:15	998	4/2/2005 6:45	37558.04	280.953	25	8.92	37
11/16/2005 4:00	483	11/16/2005 4:15	36636.55	274.060	26	41.53	10
8/27/2005 15:00	49	8/27/2005 15:30	34274.59	256.391	27	24.04	18
5/28/2005 8:15	104	5/28/2005 9:30	33942.33	253.906	28	10.35	33
9/26/2005 5:25	284	9/26/2005 5:45	33845.41	253.181	29	14.72	25
10/25/2005 1:06	1267	10/25/2005 2:30	27596.46	206.435	30	5.10	48
10/7/2005 8:35	175	10/7/2005 10:45	25627.05	191.703	31	13.44	28
7/12/2005 19:45	44	7/12/2005 20:00	24461.42	182.984	32	32.46	11

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
7/25/2005 13:30	234	7/25/2005 17:00	23579.36	176.385	33	29.51	13
8/8/2005 8:20	73	8/8/2005 9:00	21410.17	160.159	34	19.89	20
5/23/2005 16:30	33	5/23/2005 16:45	16846.87	126.023	35	24.96	16
3/27/2005 16:40	89	3/27/2005 17:00	16267.39	121.688	36	10.19	34
5/14/2005 6:56	178	5/14/2005 9:30	15696.60	117.418	37	11.18	32
4/22/2005 15:50	187	4/22/2005 18:00	15455.36	115.614	38	7.19	41
3/23/2005 2:20	212	3/23/2005 2:45	13104.23	98.026	39	4.72	51
5/20/2005 2:05	467	5/20/2005 6:15	12714.87	95.114	40	6.41	44
3/23/2005 12:00	143	3/23/2005 12:30	12192.40	91.205	41	4.62	52
6/3/2005 6:30	193	6/3/2005 9:00	10967.16	82.040	42	8.65	38
11/1/2005 15:06	163	11/1/2005 16:30	9922.70	74.227	43	4.87	49
6/14/2005 19:05	40	6/14/2005 19:15	9481.87	70.929	44	13.87	26
4/30/2005 5:16	98	4/30/2005 5:35	8683.30	64.955	45	3.92	54
8/26/2005 19:55	439	8/26/2005 22:45	8571.22	64.117	46	7.86	39
10/21/2005 7:15	55	10/21/2005 7:45	8279.59	61.935	47	5.36	46
1/30/2005 13:41	66	1/30/2005 14:00	6862.65	51.336	48	6.50	43
5/7/2005 13:15	39	5/7/2005 13:30	6620.30	49.523	49	8.96	36
6/11/2005 17:35	30	6/11/2005 17:45	5782.22	43.254	50	8.97	35
6/6/2005 9:50	25	6/6/2005 10:00	5272.05	39.438	51	11.67	30
4/27/2005 0:10	61	4/27/2005 0:45	4546.08	34.007	52	4.55	53
2/16/2005 7:40	193	2/16/2005 8:00	4374.73	32.725	53	2.94	57
12/25/2005 10:57	153	12/25/2005 12:45	4158.64	31.109	54	2.67	58
5/30/2005 19:50	44	5/30/2005 20:00	4093.78	30.624	55	6.78	42
5/14/2005 16:31	48	5/14/2005 17:00	3412.50	25.527	56	4.73	50
10/24/2005 11:40	401	10/24/2005 14:15	3262.82	24.408	57	0.95	65
6/16/2005 13:00	29	6/16/2005 13:15	2785.26	20.835	58	5.19	47
8/5/2005 11:15	36	8/5/2005 11:30	2428.43	18.166	59	3.61	56
11/8/2005 14:40	58	11/8/2005 15:00	2032.67	15.205	60	2.39	59
4/3/2005 1:50	284	4/3/2005 2:00	1387.10	10.376	61	1.53	61
5/28/2005 17:47	62	5/28/2005 18:30	889.20	6.652	62	1.05	64
7/12/2005 12:20	23	7/12/2005 12:30	842.54	6.303	63	1.18	62
6/22/2005 5:25	18	6/22/2005 5:30	684.09	5.117	64	1.12	63
6/29/2005 20:40	15	6/29/2005 20:45	659.36	4.932	65	1.83	60
4/25/2005 6:30	64	4/25/2005 6:45	519.16	3.884	66	0.20	70
10/24/2005 2:22	48	10/24/2005 2:45	381.75	2.856	67	0.25	69
4/20/2005 20:35	84	4/20/2005 20:40	357.32	2.673	68	0.30	67
11/24/2005 8:00	222	11/24/2005 8:15	325.35	2.434	69	0.15	74
3/7/2005 21:55	44	3/7/2005 22:00	290.65	2.174	70	0.15	73
11/23/2005 19:31	52	11/23/2005 20:10	252.28	1.887	71	0.16	72
8/16/2005 7:56	29	8/16/2005 8:10	199.57	1.493	72	0.16	71
12/26/2005 11:40	22	12/26/2005 11:45	169.02	1.264	73	0.27	68
1/26/2005 3:25	27	1/26/2005 3:45	130.49	0.976	74	0.11	76
9/23/2005 3:00	9	9/23/2005 3:05	122.41	0.916	75	0.41	66
12/16/2005 14:35	19	12/16/2005 14:40	99.04	0.741	76	0.12	75
3/20/2005 7:01	13	3/20/2005 7:05	51.53	0.385	77	0.10	77
10/26/2005 10:55	12	10/26/2005 11:00	40.09	0.300	78	0.08	78
11/9/2005 5:13	8	11/9/2005 5:15	16.33	0.122	79	0.04	79

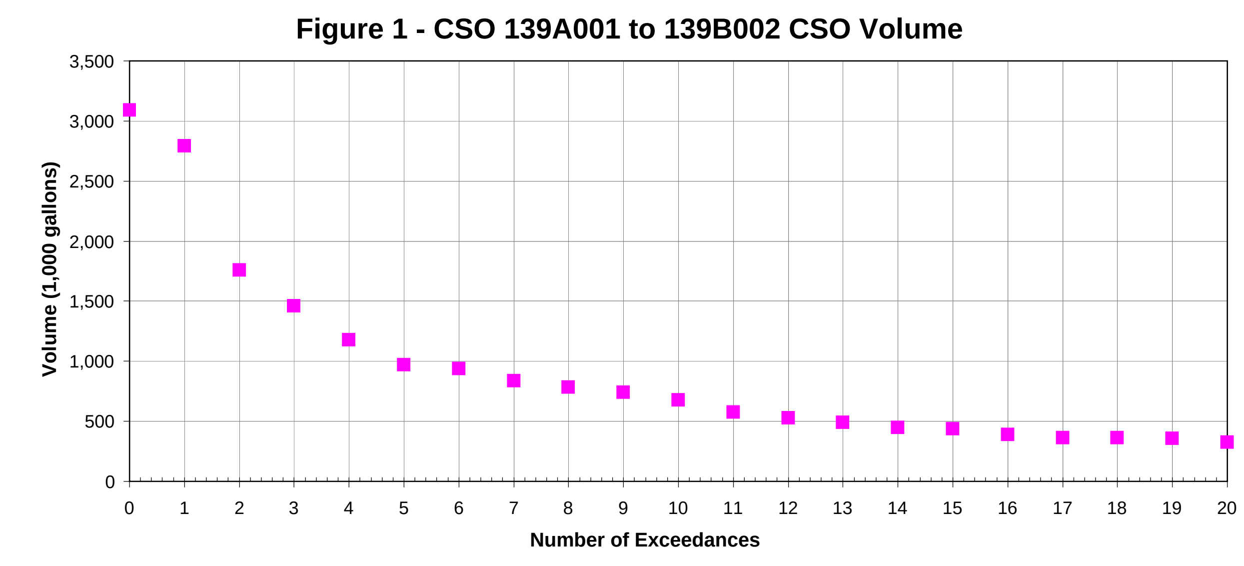
Region 1

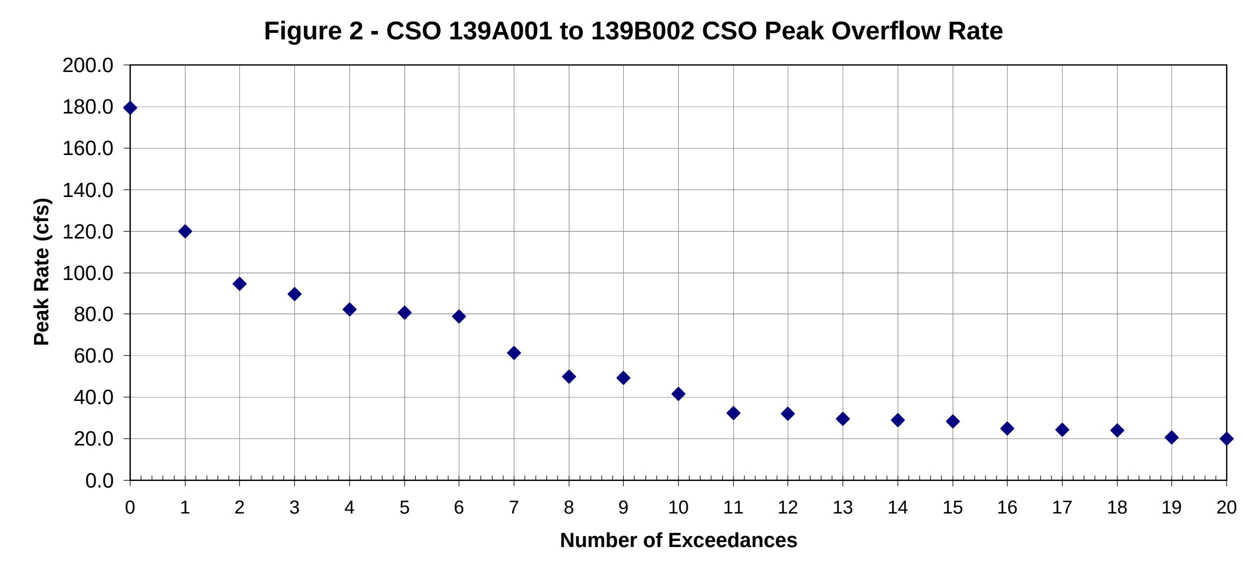
PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	CSO 139A001 to 139B002
Structures within Region	CSO 139A001, CSO 139B001, and CSO 139B002
Model ID	CSO 139A001 to 139B002.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	80
Peak Volume:	413,047 ft^3
	3.09 MG
Total Volume:	3,283,956 ft^3
	24.57 MG
Peak Rate:	179.47 cfs





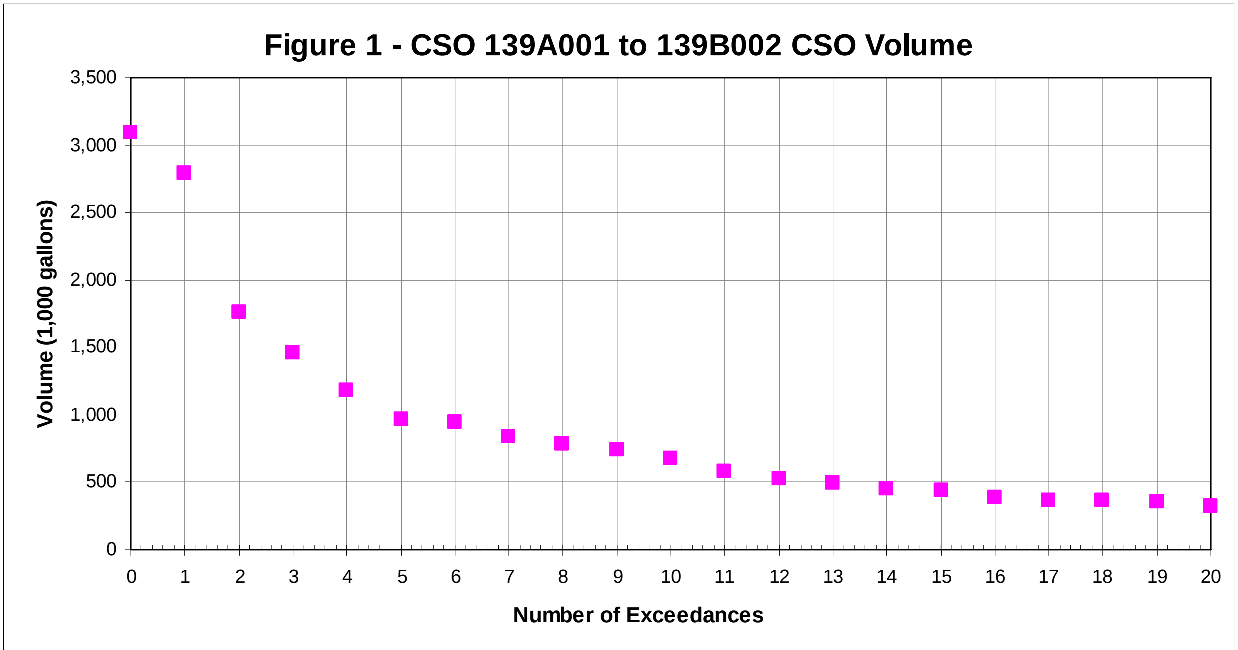
D.34.2 139A001 TO 139B002 – McDONOUGHS RUN SEWERSHED – NPDES# 139A001, 139B001, 139B002

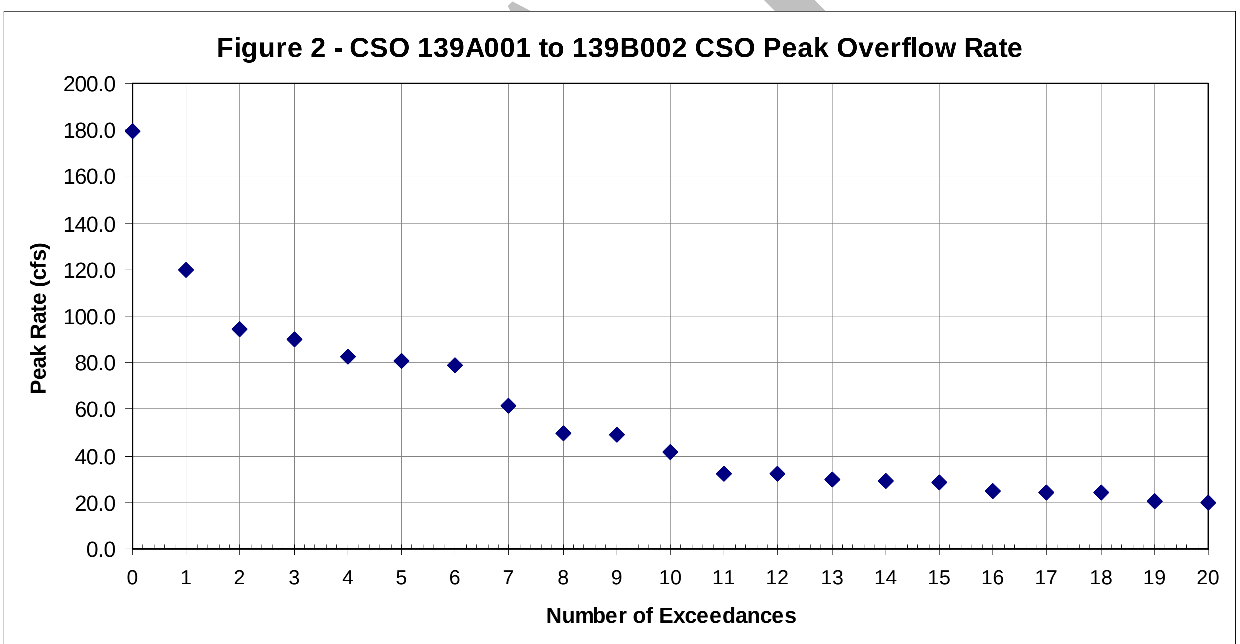
Description of Outfalls

The McDonoughs Run Sewershed is located in portions of the Brookline section in the City of Pittsburgh and in portions of Baldwin Township, Dormont Borough and the Municipality of Mount Lebanon. It consists of approximately 1,068 acres of combined sewers that contribute flow to six (6) PWSA outfalls. Outfalls CSO139A001, CSO139B001, CSO139B002 have been consolidated into a group for evaluation. These outfalls currently convey overflows from each of the respective PWSA diversion chambers to McDonough's Run and subsequently to Saw Mill Run. The CSO139A001 tributary area consists of 228 acres of combined sewers, the CSO139B001 tributary area consists of 18 acres of combined sewers, and the CSO139B002 tributary area consists of 52 acres of combined sewers. The McDonoughs Run Sewershed is comprised of approximately 409 manholes and 105,281 linear feet (19.9 miles) of mostly combined sewer up to 54 inches in diameter. This consolidation includes 320 acres of the McDonough's Run Sewershed.

Attachment 1, Tributary Area Map, shows the CSO locations and the tributary areas.

Outfalls 139A001 to 139B002 typically experience 80 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 3.09 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from the outfalls is approximately 179.47 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.





A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers. The sewers are required to convey CSOs from outfalls 139B002, and 139B001 to the vicinity of the diversion chamber 139A001. Space is extremely limited in the vicinity of the intersection of McNeilly Road and Sussex Avenue. The site is generally bounded by McNeilly Road and private development to the north and McDonough's Run and steep slopes to the south, east and west. The largest CSO volume and flow rate is from outfall 139A001, which is upstream of the other outfalls in this group of consolidated outfalls. Space is also limited at the other outfall locations in this consolidation.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4-139A001 to 139B002: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-139A001 to 139B002: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-139A001 to 139B002: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-139A001 to 139B002: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-139A001 to 139B002: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-139A001 to 139B002: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

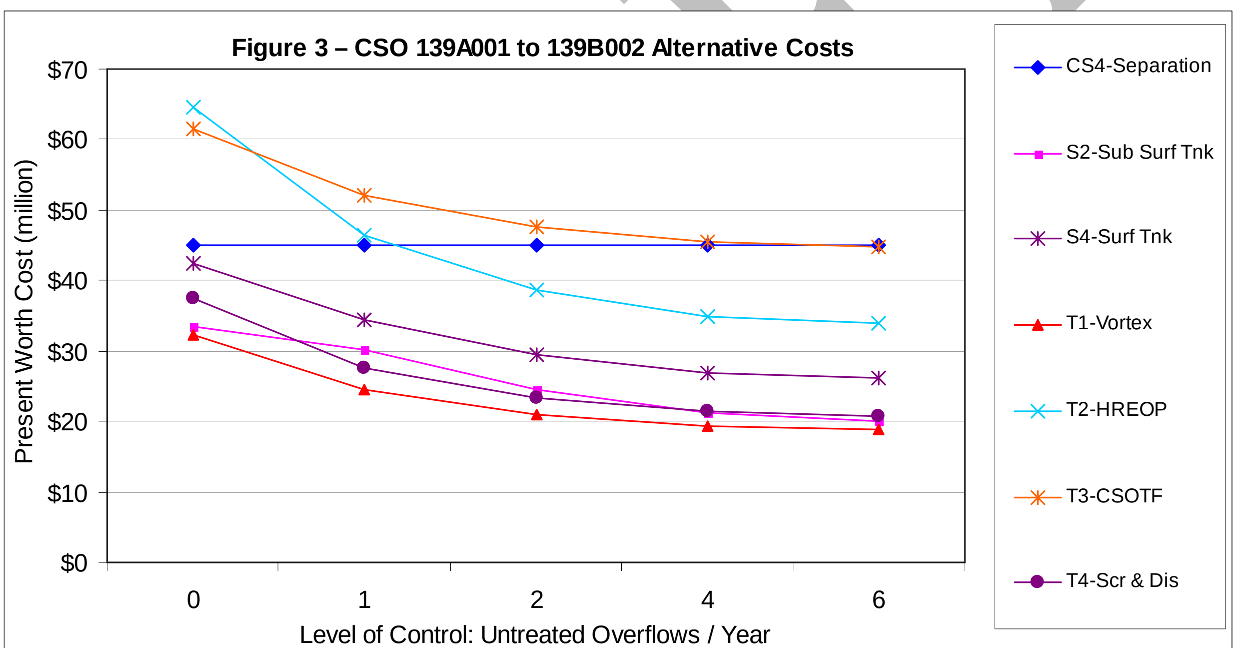
T4-139A001 to 139B002: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure3 – 139A001 to 139B002 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

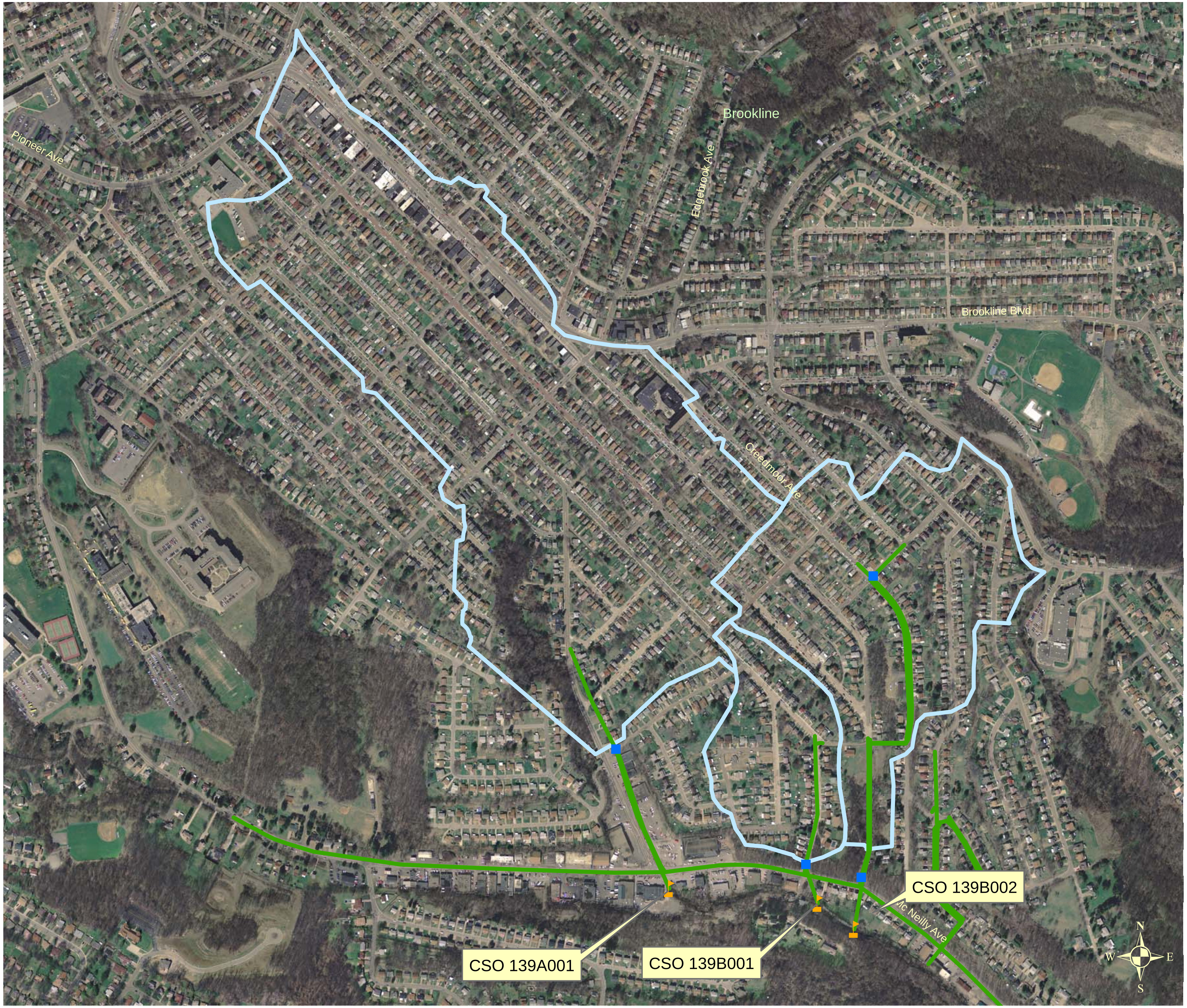
Recommendations

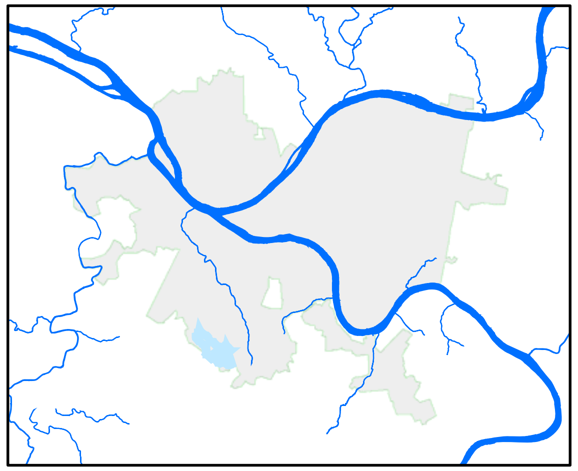
Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-139A001 to 139B002: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Space is limited for a treatment or storage facility at any of the control levels without property acquisition. In addition, the flows would have to be pumped to the potential site. There does not appear to be space near the outfalls or diversion chambers for treatment or storage facilities due to steep slopes.





Area Overview

Legend

- Sewershed Boudnary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

500 0 500 Feet

Attachment 1
CSO 139A001 to CSO 139B002
Tributary Area Map
McDonoughs Run Sewershed

CSO Controls Alternatives

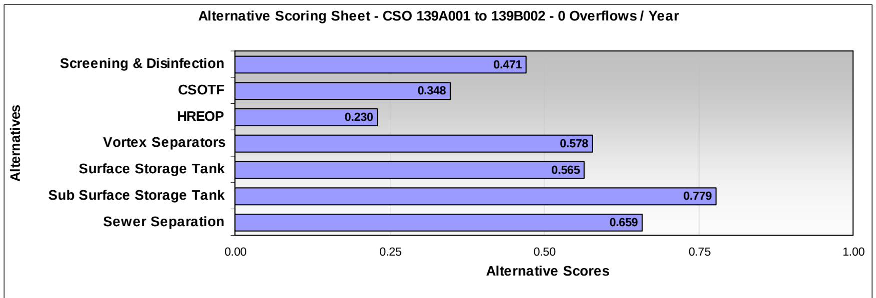
PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

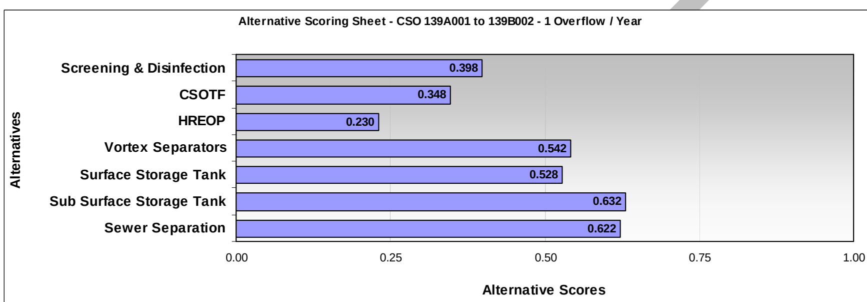
SW-D-0254.pdf

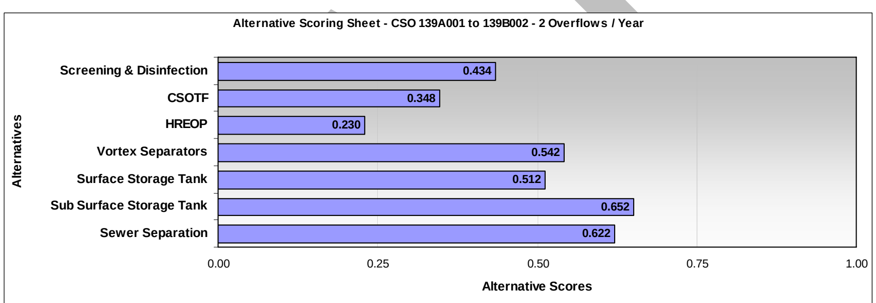
Attachment 2 - CSO Alternatives Development Worksheet

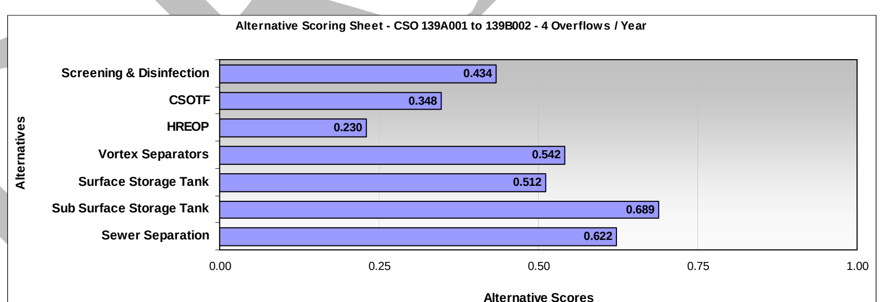
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will not be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

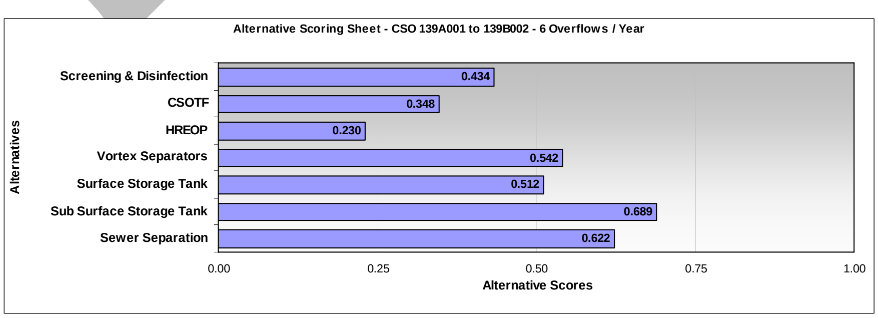
Attachment 3 – Alternative Scoring Sheet

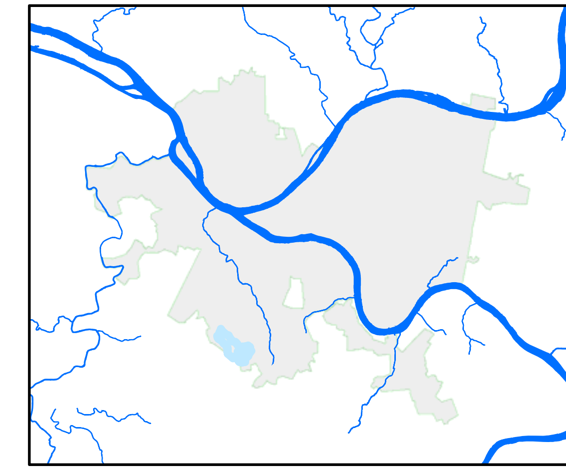












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

0 390 780 Feet

Attachment 4 CSO 139A001 to CSO 139B002 Facilities Boundary Map McDonoughs Run Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0254.pdf

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	5	5	4	2
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	4	4	3	2
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	4	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.					
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.	1	1	1	1	1
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.614**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.825**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.808**

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.771**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.698**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.600**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.678**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.662**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.625**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.588**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.487**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Total Score

Alternative:	**T3-CSOTF**		**Control Level:**	**0 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.377**

Alternative:	**T3-CSOTF**		**Control Level:**	**1 Overflow / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	**T3-CSOTF**		**Control Level:**	**2 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Total Score

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.590**

Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

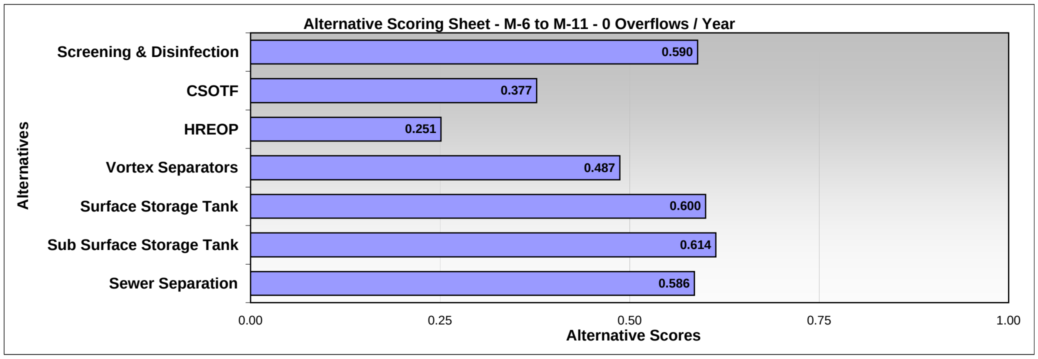
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

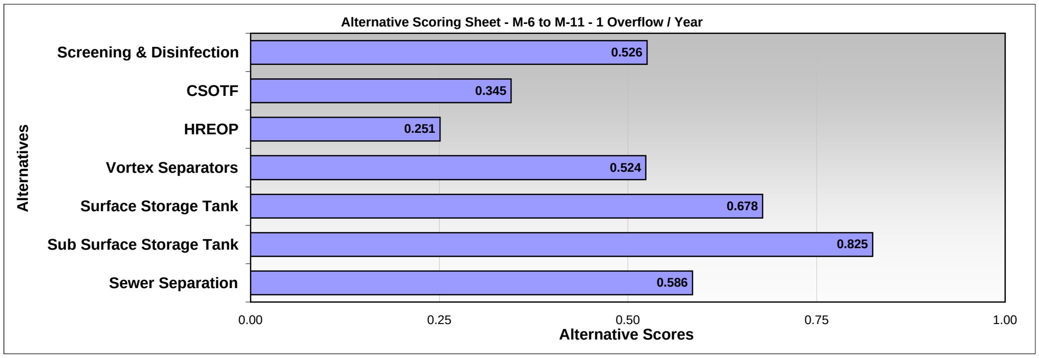
Total Score

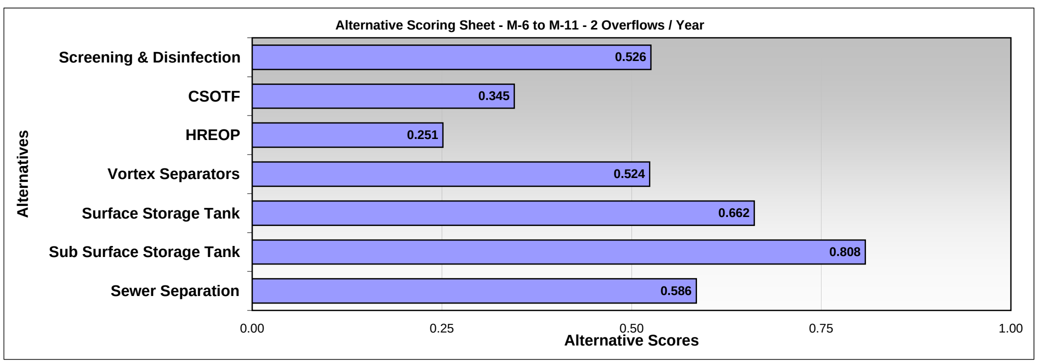
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

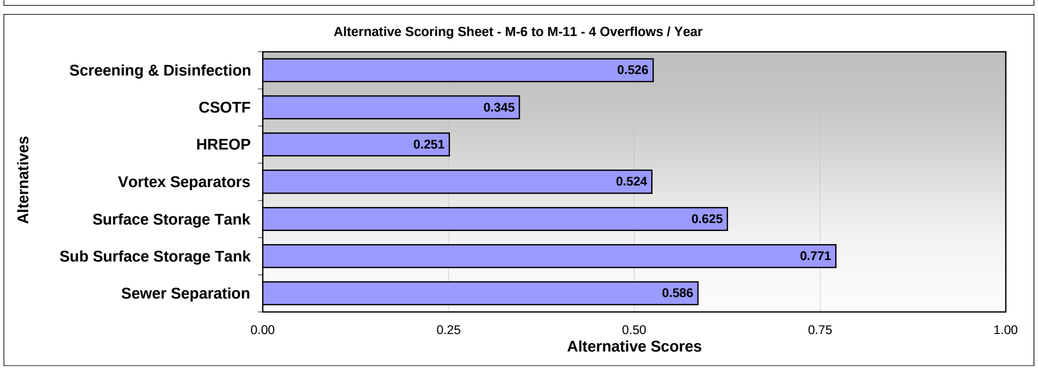
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

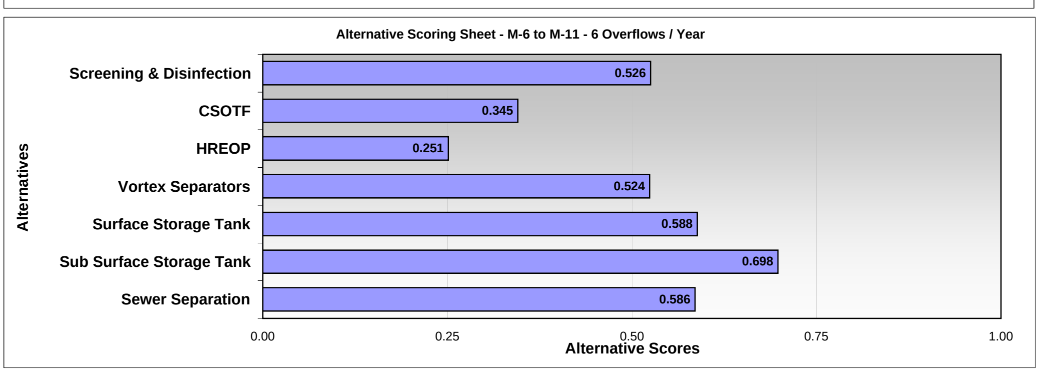
Alternative Scoring Sheet











RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	1,923,122	CF
	14.38	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	244.46	CFS
	157.99	MGD

#N/A			
CONSOLIDATION SEWERS			
0 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,490	Input by Engineer
Peak Flow (CFS)		61.12	25% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	780,000	
Peak Flow (CFS)		122.23	50% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	993,000	
Peak Flow (CFS)		183.35	75% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,239,000	
Peak Flow (CFS)		244.46	100% of Peak Flow Rate
Diameter (In)		96	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,375,000	
Construction Cost (Consolidation Sewers)	**$**	**4,387,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections			Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		96	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	156,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**156,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 4,543,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	1,923,122	CF
	14.38	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	244.46	CFS
	157.99	MGD

#N/A				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		-		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		469		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**93,800,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		204,296		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**409,000**		
			TOTAL CAPITAL COST	**$ 94,209,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	1,923,122	CF
	14.38	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	244.46	CFS
	157.99	MGD

	#N/A			
	SURFACE STORAGE TANK			
	0 Overflows / Year			
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		14.38	1,923,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		16.92	2,262,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		477		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		318		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		17.02	2,275,290	**Sufficient Volume**
Tank Area (SF)		152,000		= Length x Width
Construction Cost (Storage Tank)		**17,239,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		157.99	244.46	= Peak Rate
Force Main Diameter (In)		86		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**20,926,000**	**$ 107,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		244.46		Ref: Technical Parameters
Diameter (In)		96		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,393,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		16,970		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**842,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		157.99		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**7,727,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		14.38		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		7.19		= Peak Vol/DW Time
Construction Cost	**$**	**11,495,556**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		234,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**468,000**		
			TOTAL CAPITAL COST	**$ 63,646,556**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	1,923,122	CF
	14.38	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	244.46	CFS
	157.99	MGD

#N/A				
SUB-SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		14.38	1,923,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		16.92	2,262,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		477		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		318		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		17.02	2,275,290	**Sufficient Volume**
Tank Area (SF)		152,000		= Length x Width
Construction Cost (Storage Tank)		**45,215,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		14.38	22.26	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		26		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,407,000**	**$ 34,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		244.46		Ref: Technical Parameters
Diameter (In)		96		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,393,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		169,650		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**5,115,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		157.99		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**7,727,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		14.38		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		7.19		= Peak Vol/DW Time
Construction Cost	**$**	**11,495,556**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		234,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**468,000**		
			TOTAL CAPITAL COST	**$ 78,303,556**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	1,923,122	CF
	14.38	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	244.46	CFS
	157.99	MGD

		#N/A		
		SWIRL CONCENTRATOR / VORTEX SEPARATOR		
		0 Overflows / Year		
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		157.99	244.46	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		17		
Construction Cost (Swirl / Vortex)	**$**	**6,656,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		173.79	268.91	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		91		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**22,854,000**	**$ 115,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		244.46		Ref: Technical Parameters
Diameter (In)		96		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		490,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		24,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,123,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		157.99		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**7,727,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		173.79		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		206	99	
Passes / Detention (Min)		7	**15.17**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,546,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		164,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**328,000**		
			TOTAL CAPITAL COST	**$ 46,191,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	1,923,122	CF
	14.38	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	244.46	CFS
	157.99	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
0 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		157.99	244.46	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		26,400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		231	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		115	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		2.38	318,780	
Construction Cost (CSOTF)	**$**	**17,096,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		157.99	244.46	= Peak Rate
Force Main Diameter (In)		86		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**20,926,000**	**$ 107,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		244.46		Ref: Technical Parameters
Diameter (In)		96		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		478,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		23,900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,101,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		157.99		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**7,727,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		157.99		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		197	94	
Passes / Detention (Min)		7	**15.15**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,470,000**		
7. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.38		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.19		= Peak Vol/DW Time
Construction Cost	**$**	**8,578,820**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
9. Land Acquisition Parameters				
Land Required - CSOTF (SF)		69,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**138,000**		
			TOTAL CAPITAL COST	**$ 62,985,820**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	1,923,122	CF
	14.38	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	244.46	CFS
	157.99	MGD

#N/A					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
0 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		157.99		244.46	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,860			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		62		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		31		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**28,344,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		173.79		268.91	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		91			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**22,854,000**	**$**	**115,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		244.46			Ref: Technical Parameters
Diameter (In)		96			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		46,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		2,300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**176,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		157.99			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**7,727,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		173.79			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		206		99	
Passes / Detention (Min)		7		15.17	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,546,000	$	3,572,000	
Construction Cost (Disinfection)	**$**	**6,118,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		95,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**190,000**			
			TOTAL CAPITAL COST	**$**	**70,366,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	0	
Peak Volume	1,923,122	CF
	14.38	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	244.46	CFS
	157.99	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		0 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		157.99		244.46	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**7,727,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		157.99		244.46	= Peak Flow x % Req Pump
Force Main Diameter (In)		86			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**20,926,000**	**$**	**107,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		244.46			Ref: CSO Statistics
Diameter (In)		96			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		48,900			=CFS x 200
Odor Control Flow Rate (CFM)		2,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**185,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		157.99			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		197		94	
Passes / Detention (Min)		7		**15.15**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,470,000	$	3,320,000	
Construction Cost (Disinfection)	**$**	**5,790,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		39,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**78,000**			
				TOTAL CAPITAL COST	**$ 39,655,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	586,835	CF
	4.39	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	192.19	CFS
	124.21	MGD

#N/A			
CONSOLIDATION SEWERS			
1 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,490	Width of Sewershed along Riverline
Peak Flow (CFS)		61.12	25% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	780,000	
Peak Flow (CFS)		122.23	50% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	993,000	
Peak Flow (CFS)		183.35	75% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,239,000	
Peak Flow (CFS)		244.46	100% of Peak Flow Rate
Diameter (In)		96	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,375,000	
Construction Cost (Consolidation Sewers)	**$**	**4,387,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		96	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	156,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**156,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 4,543,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	586,835	CF
	4.39	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	192.19	CFS
	124.21	MGD

		#N/A		
		SEWER SEPARATION		
		1 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		Typ 0, Rev as Req'd
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		469		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**93,800,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		204,296		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**409,000**		
			TOTAL CAPITAL COST $	**94,209,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	586,835	CF
	4.39	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	192.19	CFS
	124.21	MGD

#N/A

SURFACE STORAGE TANK

1 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.39		587,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		5.16		691,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		264			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		176			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		5.21		696,960	**Sufficient Volume**
Tank Area (SF)		46,000			= Length x Width
Construction Cost (Storage Tank)		**4,728,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		124.21		192.19	= Peak Rate
Force Main Diameter (In)		77			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**16,805,000**	**$**	**94,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		192.19			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,037,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		5,190			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**333,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		124.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**6,163,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		4.39			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.19			= Peak Vol/DW Time
Construction Cost	**$**	**9,065,723**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		85,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**170,000**			
				TOTAL CAPITAL COST	**$ 42,200,723**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	586,835	CF
	4.39	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	192.19	CFS
	124.21	MGD

#N/A					
SUB-SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.39		587,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		5.16		691,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		264			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		176			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		5.21		696,960	**Sufficient Volume**
Tank Area (SF)		46,000			= Length x Width
Construction Cost (Storage Tank)		**14,432,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		4.39		6.79	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		14			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,111,000**	**$**	**23,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		192.19			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,037,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		51,850			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,020,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		124.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**6,163,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		4.39			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.19			= Peak Vol/DW Time
Construction Cost	**$**	**9,065,723**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		85,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**170,000**			
				TOTAL CAPITAL COST	**$ 38,826,723**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	586,835	CF
	4.39	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	192.19	CFS
	124.21	MGD

	#N/A		
	SWIRL CONCENTRATOR / VORTEX SEPARATOR		
	1 Overflows / Year		
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	124.21	192.19	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	-		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	136.63	211.41	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	80		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**18,320,000**	**$ 99,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	192.19		Ref: Technical Parameters
Diameter (In)	90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	124.21		Ref: CSO Statistics
Construction Cost (Screening) $	**6,163,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	136.63		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	183	88	
Passes	7	**15.24**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**2,328,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	129,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**258,000**		
		TOTAL CAPITAL COST $	**32,010,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	586,835	CF
	4.39	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	192.19	CFS
	124.21	MGD

#N/A					
SEDIMENTATION BASIN (CSOTF)					
1 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		124.21		192.19	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		20,800			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		205		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		102		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.88		250,920	
Construction Cost (CSOTF)	**$**	**16,771,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		124.21		192.19	= Peak Rate
Force Main Diameter (In)		77			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**16,805,000**	**$**	**94,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		192.19			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		376,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		18,800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**912,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		124.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**6,163,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		124.21			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		175		83	
Passes		7		**15.12**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,224,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		4.39			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.19			= Peak Vol/DW Time
Construction Cost	**$**	**9,065,723**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		55,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**110,000**			
				TOTAL CAPITAL COST	**$ 56,986,723**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	586,835	CF
	4.39	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	192.19	CFS
	124.21	MGD

#N/A					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		124.21		192.19	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,470			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		55		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		28		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**22,120,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		136.63		211.41	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		80			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**18,320,000**	**$**	**99,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		192.19			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		37,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,850			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**148,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		124.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**6,163,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		136.63			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		183		88	
Passes		7		**15.24**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,328,000	$	2,984,000	
Construction Cost (Disinfection)	**$**	**5,312,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		80,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**160,000**			
			TOTAL CAPITAL COST	**$**	**57,164,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	1	
Peak Volume	586,835	CF
	4.39	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	192.19	CFS
	124.21	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		1 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		124.21		192.19	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**6,163,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		124.21		192.19	= Peak Flow x % Req Pump
Force Main Diameter (In)		77			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**16,805,000**	**$**	**94,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		192.19			Ref: CSO Statistics
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		38,400			=CFS x 200
Odor Control Flow Rate (CFM)		1,920			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**153,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		124.21			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		175		83	
Passes		7		**15.12**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,224,000	$	2,769,000	
Construction Cost (Disinfection)	**$**	**4,993,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		36,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**72,000**			
			TOTAL CAPITAL COST	**$**	**33,122,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	510,370	CF
	3.82	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	165.33	CFS
	106.85	MGD

#N/A			
CONSOLIDATION SEWERS			
2 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,490	Width of Sewershed along Riverline
Peak Flow (CFS)		61.12	25% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	780,000	
Peak Flow (CFS)		122.23	50% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	993,000	
Peak Flow (CFS)		183.35	75% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,239,000	
Peak Flow (CFS)		244.46	100% of Peak Flow Rate
Diameter (In)		96	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,375,000	
Construction Cost (Consolidation Sewers)	**$**	**4,387,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		96	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	156,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**156,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 4,543,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	510,370	CF
	3.82	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	165.33	CFS
	106.85	MGD

		#N/A		
		SEWER SEPARATION		
		2 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		469		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**93,800,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		204,296		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**409,000**		
			TOTAL CAPITAL COST	**$ 94,209,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	510,370	CF
	3.82	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	165.33	CFS
	106.85	MGD

		#N/A		
		SURFACE STORAGE TANK		
		2 Overflows / Year		
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.82	510,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.49	600,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		246		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		164		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		4.53	605,160	**Sufficient Volume**
Tank Area (SF)		40,000		= Length x Width
Construction Cost (Storage Tank)		**4,061,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		106.85	165.33	= Peak Rate
Force Main Diameter (In)		71		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,687,000**	**$ 86,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		165.33		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		900,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,500		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**298,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		106.85		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,359,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.82		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.91		= Peak Vol/DW Time
Construction Cost	**$**	**8,926,813**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		76,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**152,000**		
			TOTAL CAPITAL COST	**$ 38,411,813**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	510,370	CF
	3.82	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	165.33	CFS
	106.85	MGD

#N/A

SUB-SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.82		510,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.49		600,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		246			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		164			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.53		605,160	**Sufficient Volume**
Tank Area (SF)		40,000			= Length x Width
Construction Cost (Storage Tank)		**12,671,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.82		5.91	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		13			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,020,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		165.33			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		900,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		45,000			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,808,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		106.85			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,359,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		3.82			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.91			= Peak Vol/DW Time
Construction Cost	**$**	**8,926,813**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		76,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**152,000**			
				TOTAL CAPITAL COST	**$ 35,800,813**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	510,370	CF
	3.82	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	165.33	CFS
	106.85	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
2 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		106.85		165.33	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		117.53		181.86	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		75			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,990,000**	**$**	**92,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		165.33			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		106.85			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,359,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		117.53			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		170		81	
Passes		7		**15.14**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,162,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		111,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**222,000**			
			TOTAL CAPITAL COST	**$**	**28,667,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	510,370	CF
	3.82	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	165.33	CFS
	106.85	MGD

#N/A

SEDIMENTATION BASIN (CSOTF)

2 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		106.85	165.33	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		17,900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		190	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		95	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.62	216,600	
Construction Cost (CSOTF)	**$**	**16,644,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		106.85	165.33	= Peak Rate
Force Main Diameter (In)		71		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,687,000**	**$ 86,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		165.33		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		325,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		16,250		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**814,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		106.85		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,359,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		106.85		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		162	78	
Passes		7	**15.29**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,053,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.82		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.91		= Peak Vol/DW Time
Construction Cost	**$**	**8,926,813**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		48,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**96,000**		
			TOTAL CAPITAL COST	**$ 53,507,813**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	2	
Peak Volume	510,370	CF
	3.82	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	165.33	CFS
	106.85	MGD

		#N/A			
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		106.85		165.33	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,260			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		51		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		26		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**19,011,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		117.53		181.86	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		75			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,990,000**	**$**	**92,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		165.33			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,600			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**132,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		106.85			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,359,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		117.53			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		170		81	
Passes		7		**15.14**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,162,000	$	2,660,000	
Construction Cost (Disinfection)	**$**	**4,822,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		71,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**142,000**			
				TOTAL CAPITAL COST	**$ 50,390,000**

RESULTS SUMMARY			
Number of Events / Year	66		
Number of Overflows / Year	2		
Peak Volume	510,370	CF	
	3.82	MG	
Total Volume	8,912,713	CF	
	66.67	MG	
Peak Rate	165.33	CFS	
	106.85	MGD	

		#N/A			
		SCREENING AND DISINFECTION			
		2 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		106.85		165.33	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,359,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		106.85		165.33	= Peak Flow x % Req Pump
Force Main Diameter (In)		71			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,687,000**	**$**	**86,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		165.33			Ref: CSO Statistics
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		33,100			=CFS x 200
Odor Control Flow Rate (CFM)		1,660			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**136,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		106.85			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		162		78	
Passes		7		**15.29**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,053,000	$	2,495,000	
Construction Cost (Disinfection)	**$**	**4,548,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		34,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**			
				TOTAL CAPITAL COST	**$ 29,726,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	459,364	CF
	3.44	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	133.17	CFS
	86.06	MGD

#N/A			
CONSOLIDATION SEWERS			
4 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,490	Width of Sewershed along Riverline
Peak Flow (CFS)		61.12	25% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	780,000	
Peak Flow (CFS)		122.23	50% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	993,000	
Peak Flow (CFS)		183.35	75% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,239,000	
Peak Flow (CFS)		244.46	100% of Peak Flow Rate
Diameter (In)		96	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,375,000	
Construction Cost (Consolidation Sewers)	**$**	**4,387,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		96	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	156,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**156,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 4,543,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	459,364	CF
	3.44	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	133.17	CFS
	86.06	MGD

		#N/A		
		SEWER SEPARATION		
		4 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		Typ 0, Rev as Req'd
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		469		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**93,800,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		204,296		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**409,000**		
			TOTAL CAPITAL COST **$**	**94,209,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	459,364	CF
	3.44	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	133.17	CFS
	86.06	MGD

#N/A				
SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.44	459,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.04	540,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		233		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		156		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		4.08	545,220	**Sufficient Volume**
Tank Area (SF)		36,000		= Length x Width
Construction Cost (Storage Tank)		**3,620,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		86.06	133.17	= Peak Rate
Force Main Diameter (In)		64		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**12,151,000**	**$ 77,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		133.17		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		810,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,050		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**274,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		86.06		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,397,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.44		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.72		= Peak Vol/DW Time
Construction Cost	**$**	**8,834,161**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		70,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**140,000**		
			TOTAL CAPITAL COST	**$ 34,335,161**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	459,364	CF
	3.44	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	133.17	CFS
	86.06	MGD

	#N/A			
	SUB-SURFACE STORAGE TANK			
	4 Overflows / Year			
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.44	459,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.04	540,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		233		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		156		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.08	545,220	**Sufficient Volume**
Tank Area (SF)		36,000		= Length x Width
Construction Cost (Storage Tank)		**11,496,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.44	5.32	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		13		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,958,000**	**$ 22,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		133.17		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		810,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		40,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,665,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		86.06		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,397,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.44		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.72		= Peak Vol/DW Time
Construction Cost	**$**	**8,834,161**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		70,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**140,000**		
			TOTAL CAPITAL COST	**$ 33,354,161**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	459,364	CF
	3.44	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	133.17	CFS
	86.06	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		86.06		133.17	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		94.67		146.48	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		67			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,201,000**	**$**	**81,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		133.17			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		86.06			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,397,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		94.67			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		152		73	
Passes		7		**15.15**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,915,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		89,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**178,000**			
				TOTAL CAPITAL COST	**$ 24,614,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	459,364	CF
	3.44	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	133.17	CFS
	86.06	MGD

#N/A			
SEDIMENTATION BASIN (CSOTF)			
4 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	86.06	133.17	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	14,400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	171	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	85	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	1.30	174,420	
Construction Cost (CSOTF) $	**16,520,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	86.06	133.17	= Peak Rate
Force Main Diameter (In)	64		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**12,151,000**	**$ 77,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	133.17		Ref: Technical Parameters
Diameter (In)	78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	262,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	13,100		= ACH x Volume / 60
Construction Cost (Odor Control) $	**687,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	86.06		Ref: CSO Statistics
Construction Cost (Screening) $	**4,397,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	86.06		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	145	70	
Passes	7	**15.24**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**1,809,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	3.44		Sed Basin Volume
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	1.72		= Peak Vol/DW Time
Construction Cost $	**8,834,161**		
8. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	40,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**80,000**		
		TOTAL CAPITAL COST $	**49,397,161**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	459,364	CF
	3.44	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	133.17	CFS
	86.06	MGD

		#N/A		
HIGH RATE END OF PIPE TREATMENT (HREOP)				
		4 Overflows / Year		
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		86.06	133.17	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,020		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		46	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		23	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**15,368,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		94.67	146.48	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		67		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,201,000**	**$ 81,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		133.17		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		25,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,250		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**109,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		86.06		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,397,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		94.67		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		152	73	
Passes		7	**15.15**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,915,000	$ 2,273,000	
Construction Cost (Disinfection)	**$**	**4,188,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		62,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**124,000**		
			TOTAL CAPITAL COST	**$ 42,310,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	4	
Peak Volume	459,364	CF
	3.44	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	133.17	CFS
	86.06	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		4 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		86.06		133.17	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,397,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		86.06		133.17	= Peak Flow x % Req Pump
Force Main Diameter (In)		64			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**12,151,000**	**$**	**77,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		133.17			Ref: CSO Statistics
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		26,600			=CFS x 200
Odor Control Flow Rate (CFM)		1,330			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**114,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		86.06			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		145		70	
Passes		7		**15.24**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,809,000	$	2,133,000	
Construction Cost (Disinfection)	**$**	**3,942,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		32,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**64,000**			
				TOTAL CAPITAL COST	**$ 25,587,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	400,828	CF
	3.00	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	89.86	CFS
	58.08	MGD

#N/A			
CONSOLIDATION SEWERS			
6 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,490	Width of Sewershed along Riverline
Peak Flow (CFS)		61.12	25% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	780,000	
Peak Flow (CFS)		122.23	50% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	993,000	
Peak Flow (CFS)		183.35	75% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,239,000	
Peak Flow (CFS)		244.46	100% of Peak Flow Rate
Diameter (In)		96	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		623	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,375,000	
Construction Cost (Consolidation Sewers)	**$**	**4,387,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		96	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	156,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**156,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 4,543,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	400,828	CF
	3.00	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	89.86	CFS
	58.08	MGD

#N/A			
SEWER SEPARATION			
6 Overflows / Year			
1. Sewer Separation Parameters			
Drainage Area - Suburban Areas (Acres)	0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas	100%		Complete Separation
Drainage Area - Urban Areas (Acres)	469		Ref: CSO Statistics
% Separation - Urban Areas	100%		Complete Separation
Construction Cost (Sewer Separation) $	**93,800,000**		
2. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Reg Mod Only
Number Regulators			Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators) $	**-**		
3. Land Acquisition Parameters			
Land Acquisition - Sewer Separation (SF)	204,296		1% Drainage Area
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**409,000**		
		TOTAL CAPITAL COST $	**94,209,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	400,828	CF
	3.00	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	89.86	CFS
	58.08	MGD

		#N/A			
		SURFACE STORAGE TANK			
		6 Overflows / Year			
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.00		401,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.53		472,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		218			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		146			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.57		477,420	**Sufficient Volume**
Tank Area (SF)		32,000			= Length x Width
Construction Cost (Storage Tank)		**3,121,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		58.08		89.86	= Peak Rate
Force Main Diameter (In)		52			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,737,000**	**$**	**62,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		89.86			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		708,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,540			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**247,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.08			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,101,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		3.00			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.50			= Peak Vol/DW Time
Construction Cost	**$**	**8,727,836**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		64,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**128,000**			
				TOTAL CAPITAL COST	**$ 28,965,836**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	400,828	CF
	3.00	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	89.86	CFS
	58.08	MGD

#N/A

SUB-SURFACE STORAGE TANK

6 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.00	401,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.53	472,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		218		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		146		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.57	477,420	**Sufficient Volume**
Tank Area (SF)		32,000		= Length x Width
Construction Cost (Storage Tank)		**10,147,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.00	4.64	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		12		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,885,000**	**$ 21,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		89.86		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		708,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		35,400		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,498,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.08		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,101,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.00		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.50		= Peak Vol/DW Time
Construction Cost	**$**	**8,727,836**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		64,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**128,000**		
			TOTAL CAPITAL COST	**$ 30,349,836**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	400,828	CF
	3.00	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	89.86	CFS
	58.08	MGD

	#N/A			
	SWIRL CONCENTRATOR / VORTEX SEPARATOR			
	6 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		58.08	89.86	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		63.88	98.85	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		55		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,446,000**	**$ 66,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		89.86		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.08		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,101,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		63.88		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		125	60	
Passes		5	**15.17**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,500,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		60,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**120,000**		
			TOTAL CAPITAL COST	**$ 19,075,000**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	400,828	CF
	3.00	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	89.86	CFS
	58.08	MGD

		#N/A		
		SEDIMENTATION BASIN (CSOTF)		
		6 Overflows / Year		
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		58.08	89.86	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		9,700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		140	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		70	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.88	117,600	
Construction Cost (CSOTF)	**$**	**16,412,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		58.08	89.86	= Peak Rate
Force Main Diameter (In)		52		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,737,000**	**$ 62,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		89.86		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		176,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,800		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**503,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.08		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,101,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		58.08		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		120	57	
Passes		5	**15.22**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,412,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.00		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.50		= Peak Vol/DW Time
Construction Cost	**$**	**8,727,836**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		28,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**56,000**		
			TOTAL CAPITAL COST $	**43,852,836**

RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	400,828	CF
	3.00	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	89.86	CFS
	58.08	MGD

#N/A

HIGH RATE END OF PIPE TREATMENT (HREOP)

6 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		58.08	89.86	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		690		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		38	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		19	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**10,599,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		63.88	98.85	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		55		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,446,000**	**$ 66,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		89.86		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		17,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		850		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**81,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.08		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,101,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		63.88		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		125	60	
Passes		5	**15.17**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,500,000	$ 1,561,000	
Construction Cost (Disinfection)	**$**	**3,061,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		49,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**98,000**		
			TOTAL CAPITAL COST	**$ 31,294,000**

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RESULTS SUMMARY		
Number of Events / Year	66	
Number of Overflows / Year	6	
Peak Volume	400,828	CF
	3.00	MG
Total Volume	8,912,713	CF
	66.67	MG
Peak Rate	89.86	CFS
	58.08	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		6 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		58.08		89.86	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,101,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		58.08		89.86	= Peak Flow x % Req Pump
Force Main Diameter (In)		52			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,737,000**	**$**	**62,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		89.86			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**4,543,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		18,000			=CFS x 200
Odor Control Flow Rate (CFM)		900			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**84,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		58.08			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		120		57	
Passes		5		**15.22**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,412,000	$	1,465,000	
Construction Cost (Disinfection)	**$**	**2,877,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		29,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**58,000**			
				TOTAL CAPITAL COST	**$ 19,761,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)							
#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	157.99	$553,341	20	10.910	$6,036,912
	Tank O&M	No. Events / Yr	66	$83,648	50	14.484	$1,211,522
		Const Cost ($)	$17,239,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	158	$25,088	20	10.910	$273,704
	Odor Control O&M	Capacity (cfm)	16,970	$59,395	20	10.910	$647,996
	Reserve / Replace	10% Gravity / 15% Pump					$108,686
			Total Annual O&M	**$722,000**		**Total PW O&M**	**$8,279,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	14.38	$111,606	20	10.910	$1,217,614
	Tank O&M	No. Events / Yr	66	$153,588	50	14.484	$2,224,504
		Const Cost ($)	$45,215,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	158	$25,088	20	10.910	$273,704
	Odor Control O&M	Capacity (cfm)	169,650	$593,775	20	10.910	$6,478,049
	Reserve / Replace	10% Gravity / 15% Pump					$48,831
			Total Annual O&M	**$885,000**		**Total PW O&M**	**$10,243,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	157.99	$553,341	20	10.910	$6,036,912
	Sed. Basin O&M	Flow Rate (mgd)	157.99	$17,774	50	14.484	$257,429
	Screening O&M	Flow Rate (mgd)	157.99	$25,088	20	10.910	$273,704
	Disinfection O&M	Flow Rate (mgd)	157.99	$351,310	20	10.910	$3,832,773
	Odor Control O&M	Capacity (cfm)	23,900.00	$83,650	20	10.910	$912,616
	Reserve / Replace	10% Gravity / 15% Pump					$116,109
			Total Annual O&M	**$1,032,000**		**Total PW O&M**	**$11,430,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	173.79	$589,721	20	10.910	$6,433,826
	HREP O&M	Flow Rate (mgd)	157.99	$457,320	20	10.910	$4,989,336
	Screening O&M	Flow Rate (mgd)	157.99	$25,088	20	10.910	$273,704
	Disinfection O&M	Flow Rate (mgd)	173.79	$372,312	20	10.910	$4,061,903
	Odor Control O&M	Capacity (cfm)	2,300.00	$8,050	20	10.910	$87,825
	Reserve / Replace	10% Gravity / 15% Pump					$198,761
			Total Annual O&M	**$1,453,000**		**Total PW O&M**	**$16,045,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	173.79	$589,721	20	10.910	$6,433,826
	Swirl / Vortex O&M	Flow Rate (mgd)	157.99	$17,774	20	10.910	$193,912
	Screening O&M	Flow Rate (mgd)	157.99	$25,088	20	10.910	$273,704
	Disinfection O&M	Flow Rate (mgd)	173.79	$372,312	20	10.910	$4,061,903
	Odor Control O&M	Capacity (cfm)	24,500.00	$85,750	20	10.910	$935,527
	Reserve / Replace	10% Gravity / 15% Pump					$133,294
			Total Annual O&M	**$1,091,000**		**Total PW O&M**	**$12,032,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	157.99	$553,341	20	10.910	$6,036,912
	Screening O&M	Flow Rate (mgd)	157.99	$25,088	20	10.910	$273,704
	Disinfection O&M	Flow Rate (mgd)	157.99	$351,310	20	10.910	$3,832,773
	Odor Control O&M	Capacity (cfm)	2,450.00	$8,575	20	10.910	$93,553
	Reserve / Replace	10% Gravity / 15% Pump					$113,617
			Total Annual O&M	**$939,000**		**Total PW O&M**	**$10,351,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	124.21	$471,177	20	10.910	$5,140,515
	Tank O&M	No. Events / Yr	66	$52,370	50	14.484	$758,511
		Const Cost ($)	$4,728,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	124	$20,547	20	10.910	$224,167
	Odor Control O&M	Capacity (cfm)	5,190	$18,165	20	10.910	$198,179
	Reserve / Replace	10% Gravity / 15% Pump					$86,234
			Total Annual O&M	**$563,000**		**Total PW O&M**	**$6,408,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	4.39	$50,500	20	10.910	$550,947
	Tank O&M	No. Events / Yr	66	$76,630	50	14.484	$1,109,883
		Const Cost ($)	$14,432,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	124	$20,547	20	10.910	$224,167
	Odor Control O&M	Capacity (cfm)	51,850	$181,475	20	10.910	$1,979,881
	Reserve / Replace	10% Gravity / 15% Pump					$30,871
			Total Annual O&M	**$330,000**		**Total PW O&M**	**$3,896,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	124.21	$471,177	20	10.910	$5,140,515
	Sed. Basin O&M	Flow Rate (mgd)	124.21	$13,973	50	14.484	$202,381
	Screening O&M	Flow Rate (mgd)	124.21	$20,547	20	10.910	$224,167
	Disinfection O&M	Flow Rate (mgd)	124.21	$303,415	20	10.910	$3,310,238
	Odor Control O&M	Capacity (cfm)	18,800.00	$65,800	20	10.910	$717,874
	Reserve / Replace	10% Gravity / 15% Pump					$93,858
			Total Annual O&M	**$875,000**		**Total PW O&M**	**$9,689,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	136.63	$502,156	20	10.910	$5,478,493
	HREP O&M	Flow Rate (mgd)	124.21	$396,982	20	10.910	$4,331,054
	Screening O&M	Flow Rate (mgd)	124.21	$20,547	20	10.910	$224,167
	Disinfection O&M	Flow Rate (mgd)	136.63	$321,554	20	10.910	$3,508,130
	Odor Control O&M	Capacity (cfm)	1,850.00	$6,475	20	10.910	$70,642
	Reserve / Replace	10% Gravity / 15% Pump					$158,410
			Total Annual O&M	**$1,248,000**		**Total PW O&M**	**$13,771,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	136.63	$502,156	20	10.910	$5,478,493
	Swirl / Vortex O&M	Flow Rate (mgd)	124.21	$13,973	20	10.910	$152,446
	Screening O&M	Flow Rate (mgd)	124.21	$20,547	20	10.910	$224,167
	Disinfection O&M	Flow Rate (mgd)	136.63	$321,554	20	10.910	$3,508,130
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$97,841
			Total Annual O&M	**$859,000**		**Total PW O&M**	**$9,461,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	124.21	$471,177	20	10.910	$5,140,515
	Screening O&M	Flow Rate (mgd)	124.21	$20,547	20	10.910	$224,167
	Disinfection O&M	Flow Rate (mgd)	124.21	$303,415	20	10.910	$3,310,238
	Odor Control O&M	Capacity (cfm)	1,920.00	$6,720	20	10.910	$73,315
	Reserve / Replace	10% Gravity / 15% Pump					$91,793
			Total Annual O&M	**$802,000**		**Total PW O&M**	**$8,840,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)							
#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	106.85	$426,092	20	10.910	$4,648,638
	Tank O&M	No. Events / Yr	66	$50,703	50	14.484	$734,360
		Const Cost ($)	$4,061,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	107	$18,376	20	10.910	$200,482
	Odor Control O&M	Capacity (cfm)	4,500	$15,750	20	10.910	$171,832
	Reserve / Replace	10% Gravity / 15% Pump					$75,310
			Total Annual O&M	**$511,000**		**Total PW O&M**	**$5,831,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.82	$46,002	20	10.910	$501,883
	Tank O&M	No. Events / Yr	66	$72,228	50	14.484	$1,046,119
		Const Cost ($)	$12,671,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	107	$18,376	20	10.910	$200,482
	Odor Control O&M	Capacity (cfm)	45,000	$157,500	20	10.910	$1,718,315
	Reserve / Replace	10% Gravity / 15% Pump					$27,736
			Total Annual O&M	**$295,000**		**Total PW O&M**	**$3,495,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	106.85	$426,092	20	10.910	$4,648,638
	Sed. Basin O&M	Flow Rate (mgd)	106.85	$12,020	50	14.484	$174,096
	Screening O&M	Flow Rate (mgd)	106.85	$18,376	20	10.910	$200,482
	Disinfection O&M	Flow Rate (mgd)	106.85	$276,826	20	10.910	$3,020,155
	Odor Control O&M	Capacity (cfm)	16,250.00	$56,875	20	10.910	$620,503
	Reserve / Replace	10% Gravity / 15% Pump					$82,298
			Total Annual O&M	**$791,000**		**Total PW O&M**	**$8,746,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	117.53	$454,107	20	10.910	$4,954,276
	HREP O&M	Flow Rate (mgd)	106.85	$363,346	20	10.910	$3,964,086
	Screening O&M	Flow Rate (mgd)	106.85	$18,376	20	10.910	$200,482
	Disinfection O&M	Flow Rate (mgd)	117.53	$293,375	20	10.910	$3,200,705
	Odor Control O&M	Capacity (cfm)	1,600.00	$5,600	20	10.910	$61,096
	Reserve / Replace	10% Gravity / 15% Pump					$137,765
			Total Annual O&M	**$1,135,000**		**Total PW O&M**	**$12,518,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	117.53	$454,107	20	10.910	$4,954,276
	Swirl / Vortex O&M	Flow Rate (mgd)	106.85	$12,020	20	10.910	$131,140
	Screening O&M	Flow Rate (mgd)	106.85	$18,376	20	10.910	$200,482
	Disinfection O&M	Flow Rate (mgd)	117.53	$293,375	20	10.910	$3,200,705
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$85,696
			Total Annual O&M	**$778,000**		**Total PW O&M**	**$8,572,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	106.85	$426,092	20	10.910	$4,648,638
	Screening O&M	Flow Rate (mgd)	106.85	$18,376	20	10.910	$200,482
	Disinfection O&M	Flow Rate (mgd)	106.85	$276,826	20	10.910	$3,020,155
	Odor Control O&M	Capacity (cfm)	1,660.00	$5,810	20	10.910	$63,387
	Reserve / Replace	10% Gravity / 15% Pump					$80,454
			Total Annual O&M	**$728,000**		**Total PW O&M**	**$8,013,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	86.06	$368,755	20	10.910	$4,023,096
	Tank O&M	No. Events / Yr	66	$49,600	50	14.484	$718,392
		Const Cost ($)	$3,620,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	86	$15,921	20	10.910	$173,702
	Odor Control O&M	Capacity (cfm)	4,050	$14,175	20	10.910	$154,648
	Reserve / Replace	10% Gravity / 15% Pump					$62,281
			Total Annual O&M	**$449,000**		**Total PW O&M**	**$5,132,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.44	$42,877	20	10.910	$467,791
	Tank O&M	No. Events / Yr	66	$69,290	50	14.484	$1,003,574
		Const Cost ($)	$11,496,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	86	$15,921	20	10.910	$173,702
	Odor Control O&M	Capacity (cfm)	40,500	$141,750	20	10.910	$1,546,484
	Reserve / Replace	10% Gravity / 15% Pump					$24,477
			Total Annual O&M	**$270,000**		**Total PW O&M**	**$3,216,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	86.06	$368,755	20	10.910	$4,023,096
	Sed. Basin O&M	Flow Rate (mgd)	86.06	$9,682	50	14.484	$140,231
	Screening O&M	Flow Rate (mgd)	86.06	$15,921	20	10.910	$173,702
	Disinfection O&M	Flow Rate (mgd)	86.06	$242,647	20	10.910	$2,647,264
	Odor Control O&M	Capacity (cfm)	13,100.00	$45,850	20	10.910	$500,221
	Reserve / Replace	10% Gravity / 15% Pump					$68,325
			Total Annual O&M	**$683,000**		**Total PW O&M**	**$7,553,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	94.67	$393,000	20	10.910	$4,287,605
	HREP O&M	Flow Rate (mgd)	86.06	$319,942	20	10.910	$3,490,547
	Screening O&M	Flow Rate (mgd)	86.06	$15,921	20	10.910	$173,702
	Disinfection O&M	Flow Rate (mgd)	94.67	$257,153	20	10.910	$2,805,522
	Odor Control O&M	Capacity (cfm)	1,250.00	$4,375	20	10.910	$47,731
	Reserve / Replace	10% Gravity / 15% Pump					$113,126
			Total Annual O&M	**$991,000**		**Total PW O&M**	**$10,918,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	94.67	$393,000	20	10.910	$4,287,605
	Swirl / Vortex O&M	Flow Rate (mgd)	86.06	$9,682	20	10.910	$105,630
	Screening O&M	Flow Rate (mgd)	86.06	$15,921	20	10.910	$173,702
	Disinfection O&M	Flow Rate (mgd)	94.67	$257,153	20	10.910	$2,805,522
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$71,029
			Total Annual O&M	**$676,000**		**Total PW O&M**	**$7,443,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	86.06	$368,755	20	10.910	$4,023,096
	Screening O&M	Flow Rate (mgd)	86.06	$15,921	20	10.910	$173,702
	Disinfection O&M	Flow Rate (mgd)	86.06	$242,647	20	10.910	$2,647,264
	Odor Control O&M	Capacity (cfm)	1,330.00	$4,655	20	10.910	$50,786
	Reserve / Replace	10% Gravity / 15% Pump					$66,766
			Total Annual O&M	**$632,000**		**Total PW O&M**	**$6,962,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)							
#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	58.08	$283,544	20	10.910	$3,093,449
	Tank O&M	No. Events / Yr	66	$48,353	50	14.484	$700,324
		Const Cost ($)	$3,121,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	58	$12,865	20	10.910	$140,361
	Odor Control O&M	Capacity (cfm)	3,540	$12,390	20	10.910	$135,174
	Reserve / Replace	10% Gravity / 15% Pump					$44,754
			Total Annual O&M	**$358,000**		**Total PW O&M**	**$4,114,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.00	$39,145	20	10.910	$427,071
	Tank O&M	No. Events / Yr	66	$65,918	50	14.484	$954,728
		Const Cost ($)	$10,147,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	58	$12,865	20	10.910	$140,361
	Odor Control O&M	Capacity (cfm)	35,400	$123,900	20	10.910	$1,351,741
	Reserve / Replace	10% Gravity / 15% Pump					$20,200
			Total Annual O&M	**$242,000**		**Total PW O&M**	**$2,894,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	58.08	$283,544	20	10.910	$3,093,449
	Sed. Basin O&M	Flow Rate (mgd)	58.08	$6,534	50	14.484	$94,631
	Screening O&M	Flow Rate (mgd)	58.08	$12,865	20	10.910	$140,361
	Disinfection O&M	Flow Rate (mgd)	58.08	$190,949	20	10.910	$2,083,246
	Odor Control O&M	Capacity (cfm)	8,800.00	$30,800	20	10.910	$336,026
	Reserve / Replace	10% Gravity / 15% Pump					$49,290
			Total Annual O&M	**$525,000**		**Total PW O&M**	**$5,797,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	63.88	$302,186	20	10.910	$3,296,836
	HREP O&M	Flow Rate (mgd)	58.08	$253,874	20	10.910	$2,769,751
	Screening O&M	Flow Rate (mgd)	58.08	$12,865	20	10.910	$140,361
	Disinfection O&M	Flow Rate (mgd)	63.88	$202,365	20	10.910	$2,207,786
	Odor Control O&M	Capacity (cfm)	850.00	$2,975	20	10.910	$32,457
	Reserve / Replace	10% Gravity / 15% Pump					$80,104
			Total Annual O&M	**$775,000**		**Total PW O&M**	**$8,527,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	63.88	$302,186	20	10.910	$3,296,836
	Swirl / Vortex O&M	Flow Rate (mgd)	58.08	$6,534	20	10.910	$71,282
	Screening O&M	Flow Rate (mgd)	58.08	$12,865	20	10.910	$140,361
	Disinfection O&M	Flow Rate (mgd)	63.88	$202,365	20	10.910	$2,207,786
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$51,054
			Total Annual O&M	**$524,000**		**Total PW O&M**	**$5,767,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	58.08	$283,544	20	10.910	$3,093,449
	Screening O&M	Flow Rate (mgd)	58.08	$12,865	20	10.910	$140,361
	Disinfection O&M	Flow Rate (mgd)	58.08	$190,949	20	10.910	$2,083,246
	Odor Control O&M	Capacity (cfm)	900.00	$3,150	20	10.910	$34,366
	Reserve / Replace	10% Gravity / 15% Pump					$48,151
			Total Annual O&M	**$491,000**		**Total PW O&M**	**$5,400,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$94.2	$94,209,000	$0
1	$94.2	$94,209,000	$0
2	$94.2	$94,209,000	$0
4	$94.2	$94,209,000	$0
6	$94.2	$94,209,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$88.5	$78,303,556	$10,243,000
1	$42.7	$38,826,723	$3,896,000
2	$39.3	$35,800,813	$3,495,000
4	$36.6	$33,354,161	$3,216,000
6	$33.2	$30,349,836	$2,894,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$71.9	$63,646,556	$8,279,000
1	$48.6	$42,200,723	$6,408,000
2	$44.2	$38,411,813	$5,831,000
4	$39.5	$34,335,161	$5,132,000
6	$33.1	$28,965,836	$4,114,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$58.2	$46,191,000	$12,032,000
1	$41.5	$32,010,000	$9,461,000
2	$37.2	$28,667,000	$8,572,000
4	$32.1	$24,614,000	$7,443,000
6	$24.8	$19,075,000	$5,767,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$86.4	$70,366,000	$16,045,000
1	$70.9	$57,164,000	$13,771,000
2	$62.9	$50,390,000	$12,518,000
4	$53.2	$42,310,000	$10,918,000
6	$39.8	$31,294,000	$8,527,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$74.4	$62,985,820	$11,430,000
1	$66.7	$56,986,723	$9,689,000
2	$62.3	$53,507,813	$8,746,000
4	$57.0	$49,397,161	$7,553,000
6	$49.6	$43,852,836	$5,797,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$50.0	$39,655,000	$10,351,000
1	$42.0	$33,122,000	$8,840,000
2	$37.7	$29,726,000	$8,013,000
4	$32.5	$25,587,000	$6,962,000
6	$25.2	$19,761,000	$5,400,000

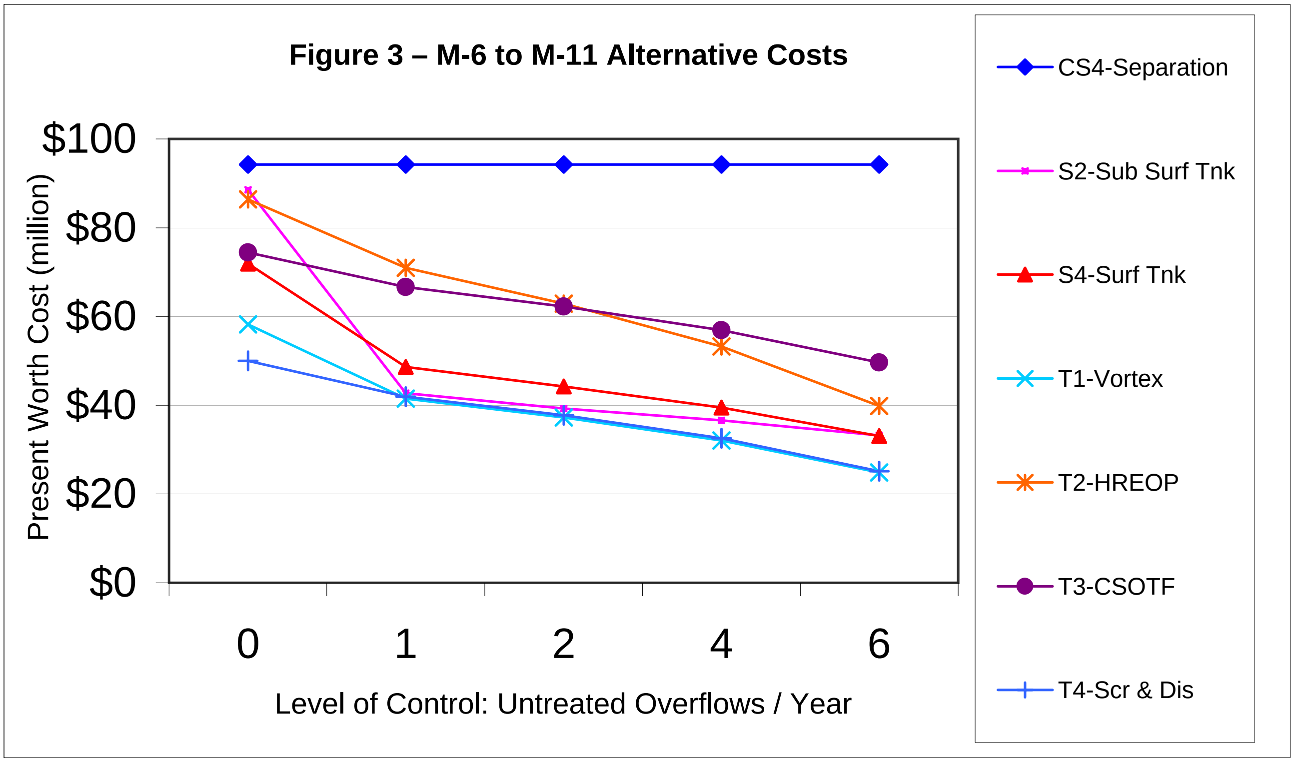


Figure 3 – M-6 to M-11 Alternative Costs
Present Worth Cost (million)
$100
$80
$60
$40
$20
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	M-6 to M-11	**Results Summary**	
Structures within Region	M-6, M-7, M-8, M-10, and M-11	Number of Events:	66
Model ID	M-6 to M-11.1	Peak Volume:	1,923,122 ft^3
Structure Type	Consolidation		14.39 MG
PWSA Sewershed	N/A	Total Volume:	8,912,713 ft^3
Stream of Discharge	Monongahela River		66.67 MG
NPDES Permit Number	N/A	Peak Rate:	244.46 cfs
Owner	N/A		

Model Network (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2

Model Run 2005 Baseline Conditions w/Boundary (8.8.07)

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 1:50	2942	1/5/2005 14:45	1923122.03	14385.914	0	39.84	15
1/11/2005 8:30	1533	1/12/2005 1:30	586834.64	4389.817	1	43.40	12
2/14/2005 4:50	1919	2/14/2005 19:45	510370.20	3817.824	2	18.52	31
1/3/2005 8:20	1453	1/3/2005 13:45	462699.35	3461.223	3	23.93	28
5/13/2005 22:30	1643	5/13/2005 22:45	459364.28	3436.274	4	165.33	2
8/20/2005 18:15	127	8/20/2005 18:30	423936.40	3171.256	5	244.46	0
11/29/2005 6:45	691	11/29/2005 7:00	400827.60	2998.391	6	36.58	18
3/28/2005 9:00	1292	3/28/2005 10:15	303166.82	2267.839	7	26.92	24
4/1/2005 19:25	2573	4/2/2005 6:30	274856.28	2056.062	8	28.90	22
11/14/2005 21:50	410	11/15/2005 4:00	272768.72	2040.446	9	37.20	16
10/25/2005 1:15	1249	10/25/2005 3:45	241382.56	1805.662	10	17.39	33
7/26/2005 19:45	64	7/26/2005 20:00	236480.05	1768.989	11	192.19	1
1/13/2005 23:00	652	1/14/2005 2:15	199764.38	1494.337	12	22.24	30
1/8/2005 1:50	702	1/8/2005 5:15	186231.48	1393.105	13	36.95	17
4/23/2005 3:45	522	4/23/2005 4:15	184978.16	1383.729	14	121.62	5
7/5/2005 16:20	128	7/5/2005 17:00	174765.25	1307.331	15	89.86	6
8/29/2005 11:25	285	8/29/2005 13:45	171901.50	1285.909	16	140.64	3
9/29/2005 5:30	74	9/29/2005 5:45	145864.12	1091.137	17	133.17	4
2/20/2005 15:45	1062	2/20/2005 20:30	132247.80	989.280	18	29.12	21
5/11/2005 22:35	120	5/11/2005 22:50	123590.46	924.518	19	42.60	14
12/15/2005 11:10	931	12/15/2005 14:00	119361.68	892.885	20	25.68	25
10/21/2005 19:00	764	10/22/2005 6:45	114075.42	853.341	21	43.25	13
2/9/2005 15:10	441	2/9/2005 16:45	111777.08	836.148	22	54.88	10
10/24/2005 13:10	360	10/24/2005 14:45	80577.35	602.759	23	10.51	47
10/7/2005 10:15	190	10/7/2005 10:45	67734.52	506.688	24	27.18	23
5/28/2005 8:35	98	5/28/2005 9:30	66800.41	499.700	25	30.06	20
3/23/2005 12:10	161	3/23/2005 12:45	64404.26	481.776	26	13.92	40
5/23/2005 16:20	52	5/23/2005 16:30	63994.54	478.711	27	49.56	11
7/15/2005 17:40	75	7/15/2005 18:00	60937.38	455.842	28	56.55	9
4/22/2005 15:55	199	4/22/2005 18:00	56348.14	421.512	29	15.97	36
8/8/2005 8:50	89	8/8/2005 9:15	50349.41	376.639	30	24.57	27
10/22/2005 15:50	104	10/22/2005 16:30	45289.23	338.786	31	17.99	32
2/16/2005 7:00	416	2/16/2005 8:15	44816.70	335.251	32	12.78	43

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	**Exceedance Duration (minutes)**	**Time of Peak Flow**	**(ft^3)**	**(1,000 gallons)**	**Number of Exceedances**	**(cfs)**	**Number of Exceedances**
8/27/2005 15:20	50	8/27/2005 15:30	41969.41	313.952	33	63.14	7
11/9/2005 19:25	47	11/9/2005 19:45	41603.48	311.215	34	59.60	8
3/23/2005 2:35	210	3/23/2005 5:15	41455.28	310.106	35	9.28	48
11/1/2005 15:05	198	11/1/2005 16:30	40994.23	306.657	36	14.04	39
11/16/2005 4:10	485	11/16/2005 4:15	33667.11	251.847	37	13.11	42
3/27/2005 16:50	141	3/27/2005 18:00	33542.10	250.912	38	10.68	46
7/25/2005 13:20	44	7/25/2005 13:30	27604.49	206.495	39	34.73	19
7/17/2005 16:30	75	7/17/2005 16:45	27452.85	205.361	40	15.89	37
5/28/2005 17:25	102	5/28/2005 18:30	22793.44	170.506	41	11.95	44
4/20/2005 18:50	329	4/20/2005 23:15	22310.59	166.894	42	5.00	54
7/21/2005 14:30	40	7/21/2005 14:45	21606.58	161.628	43	23.78	29
11/9/2005 4:20	52	11/9/2005 4:30	20946.02	156.687	44	24.78	26
7/16/2005 11:20	62	7/16/2005 11:35	20342.07	152.169	45	16.84	35
6/3/2005 8:55	54	6/3/2005 9:15	15459.53	115.645	46	17.29	34
6/11/2005 17:44	45	6/11/2005 18:00	13297.18	99.470	47	13.60	41
11/8/2005 14:51	143	11/8/2005 15:15	12996.25	97.218	48	11.60	45
5/20/2005 6:10	269	5/20/2005 6:35	12612.80	94.350	49	4.77	55
9/26/2005 5:45	264	9/26/2005 9:50	11193.86	83.736	50	4.29	57
6/14/2005 19:05	54	6/14/2005 19:15	10804.32	80.822	51	6.84	50
12/25/2005 11:05	160	12/25/2005 12:45	10588.23	79.205	52	3.99	58
9/16/2005 21:35	35	9/16/2005 21:45	9550.75	71.444	53	14.51	38
4/30/2005 4:45	143	4/30/2005 6:45	8425.38	63.026	54	2.98	59
10/21/2005 7:20	94	10/21/2005 7:30	7530.06	56.329	55	5.98	51
8/26/2005 20:55	49	8/26/2005 21:05	7196.17	53.831	56	5.18	52
10/26/2005 7:25	210	10/26/2005 9:00	6936.44	51.888	57	2.54	63
4/27/2005 0:25	94	4/27/2005 0:45	6429.54	48.096	58	2.94	60
7/12/2005 19:50	42	7/12/2005 20:00	5695.24	42.603	59	5.10	53
5/7/2005 13:20	35	5/7/2005 13:30	5684.92	42.526	60	7.20	49
6/28/2005 18:15	65	6/28/2005 18:20	3418.08	25.569	61	2.79	62
1/30/2005 12:50	42	1/30/2005 13:00	2949.40	22.063	62	2.92	61
11/6/2005 9:55	20	11/6/2005 10:00	2054.48	15.369	63	4.57	56
3/20/2005 7:25	36	3/20/2005 7:35	1510.42	11.299	64	1.37	64
6/17/2005 1:36	63	6/17/2005 2:30	473.80	3.544	65	0.38	65

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	M-6 to M-11
Structures within Region	M-6, M-7, M-8, M-10, and M-11
Model ID	M-6 to M-11.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Monongahela River
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	66
Peak Volume:	1,923,122 ft^3
	14.39 MG
Total Volume:	8,912,713 ft^3
	66.67 MG
Peak Rate:	244.46 cfs

Figure 1 - M-6 to M-11 CSO Volume

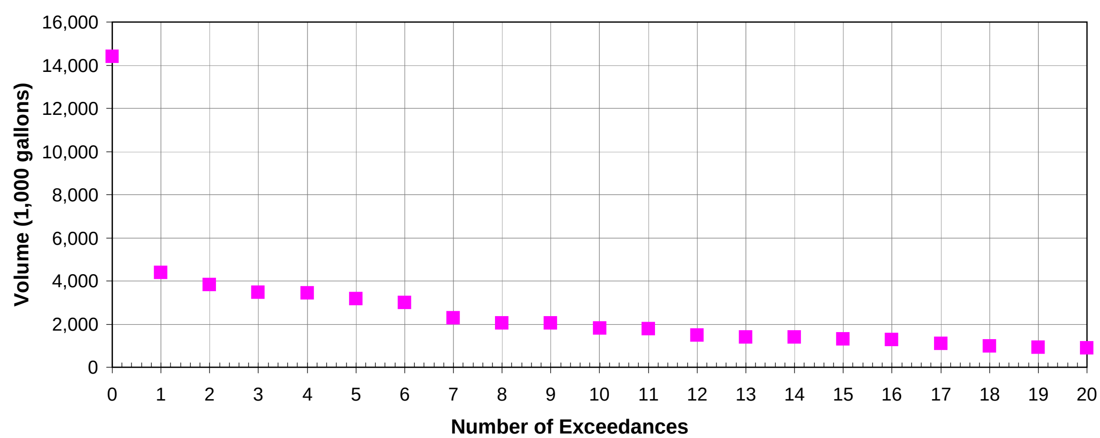
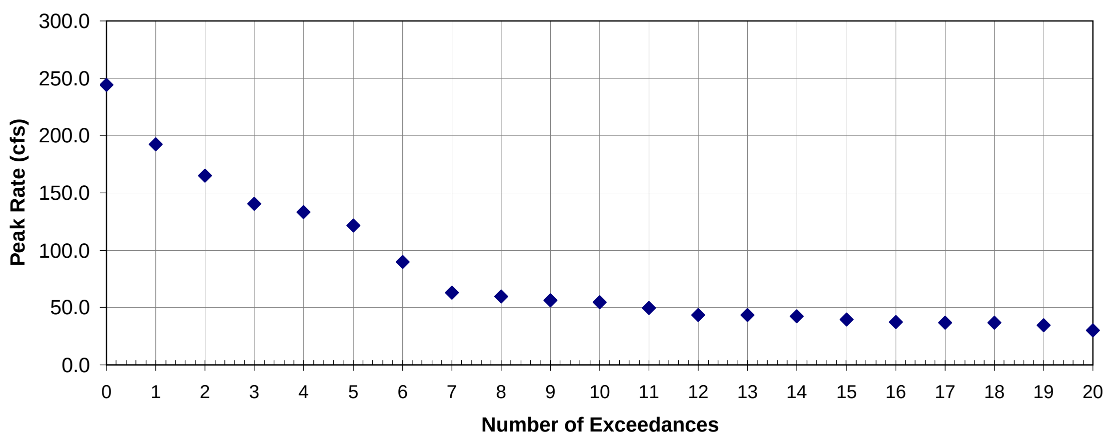


Figure 2 - M-6 to M-11 CSO Peak Flow Rate



D.35.1 M-6 TO M-11 – ARLINGTON THROUGH 25TH STREET SEWERSHEDS – NPDES# 004DM06, 003BM07, 003BM08, 003CM10, AND 003CM11

Description of Outfalls

The Arlington through 25th Street Sewersheds are located in portions of Allentown, Arlington, Arlington Heights, Mount Washington, South Shore, Southside Flats and Southside Slopes sections in the City of Pittsburgh. These sewersheds include approximately 1,369 acres of residential, business and commercial users that contribute flow to twenty-two (22) ALCOSAN outfalls. The sewershed has been divided into four separate consolidated groups of outfalls. The first consolidation contains outfalls M-6 through M-11. The M-6 tributary area consists of 256 acres of combined sewers, the M-7 tributary area consists of 12 acres of combined sewers, the M-8 tributary area consists of 15 acres of combined sewers, the M-10 tributary area consists of 170 acres of combined sewers and the M-11 tributary area consists of 16 acres of combined sewers. The Arlington through 25th Street Sewersheds are comprised of approximately 1,184 manholes and 269,713 linear feet (51.1 miles) of sewer up to 90 inches in diameter. Outfalls M-6 through M-11 currently convey overflows from each of the respective ALCOSAN diversion chambers to the Monongahela River.

Attachment 1, *Tributary Area Map,* shows the CSO locations and the tributary areas.

The outfalls typically experience 66 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 14.39 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from both outfalls is approximately 244.46 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

Figure 1 - M-6 to M-11 CSO Volume

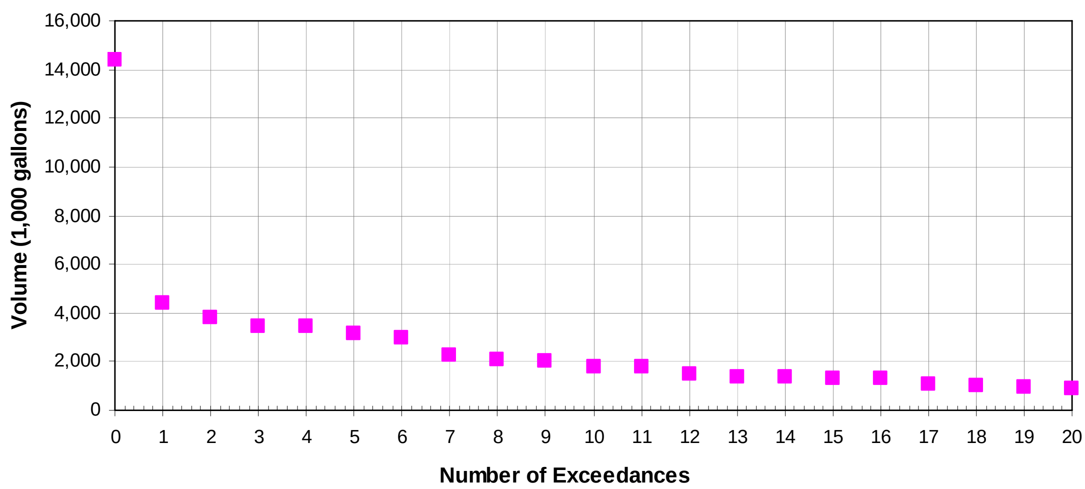
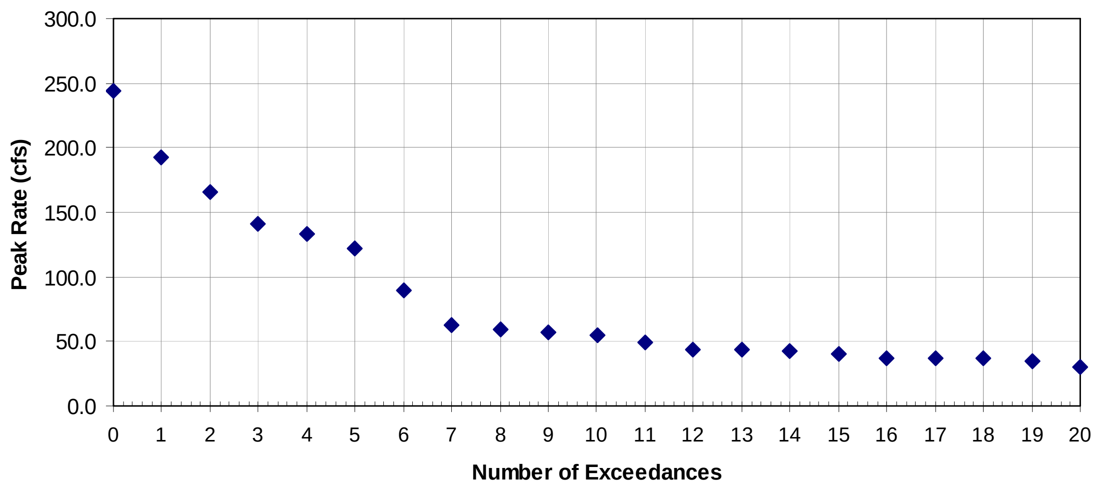


Figure 2 - M-6 to M-11 CSO Peak Flow Rate



A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers. The sewers are required to convey CSOs from outfalls 004DM06, 003BM07, 003BM08 and 003CM11 to the vicinity of outfall 003CM10. There appears to be a limited amount of available space for potential storage or treatment facilities to the west of this outfall, north of the existing railroad tracks (between S. Sixth Street and S. Eighth Street). Critical infrastructure in this area includes railroad tracks, the Liberty Bridge and riverfront development along the Monongahela River. The site is generally bounded by the Monongahela River to the north, railroad tracks to the south and private property to west and east.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4-M-6 to M-11: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2- M-6 to M-11: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4- M-6 to M-11: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1- M-6 to M-11: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2- M-6 to M-11: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3- M-6 to M-11: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4- M-6 to M-11: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – M-6 to M-11 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.

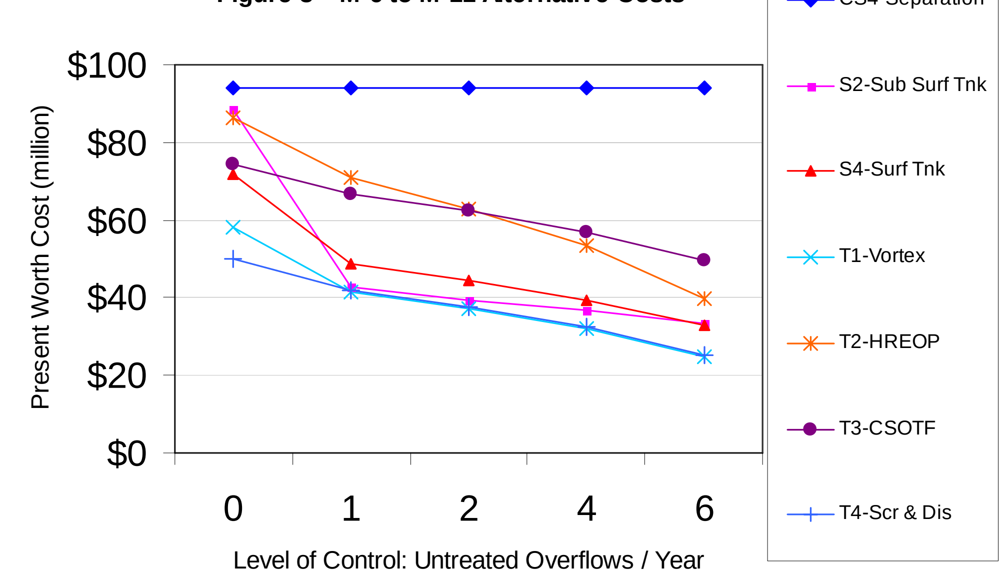


Figure 3 – M-6 to M-11 Alternative Costs

The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

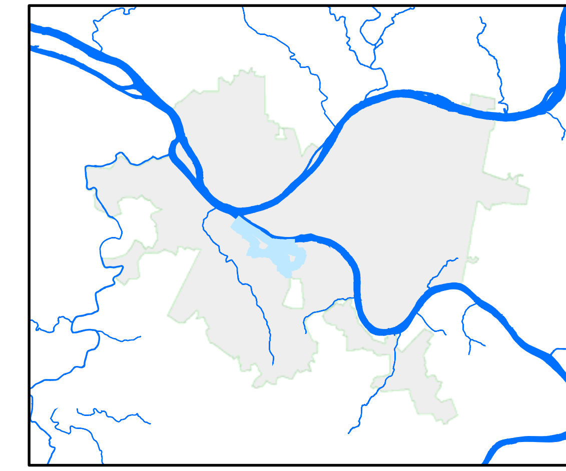
Recommendations

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-M-6 to M-11: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Several significant issues exist with the siting of a CSO storage and treatment facility. A site large enough to store control level 0 does not appear to be available in the vicinity of outfall 003CM10. Installing a structure with a deeper sidewater depth could reduce the size of footprint required for a storage facility. Construction of the consolidation sewers will also be a significant endeavor considering the congested infrastructure that exists along the river in this area.



Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

1,000 0 1,000
Feet

Attachment 1
M-6 to M-11
Tributary Area Map
Arlington through 25th St.
Sewershed

CSO Controls Alternatives

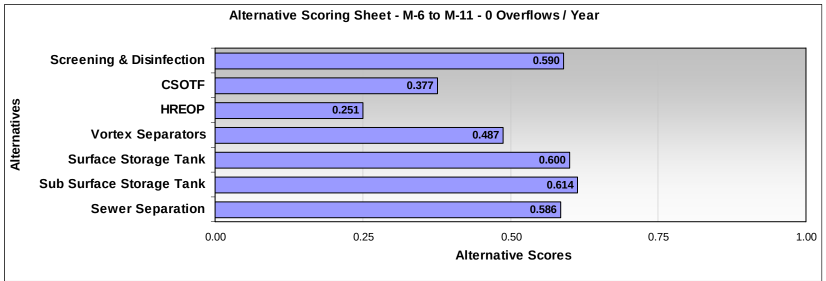
PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

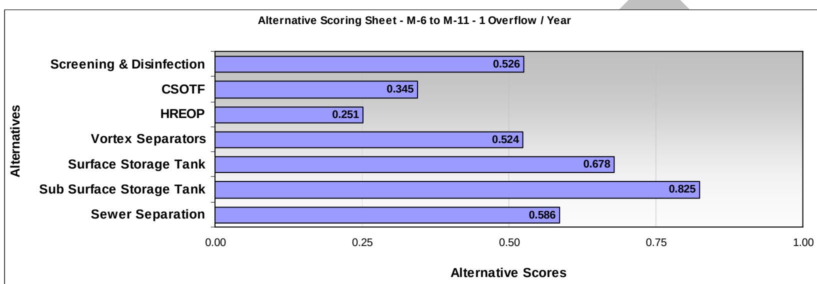
SW-D-0256.pdf

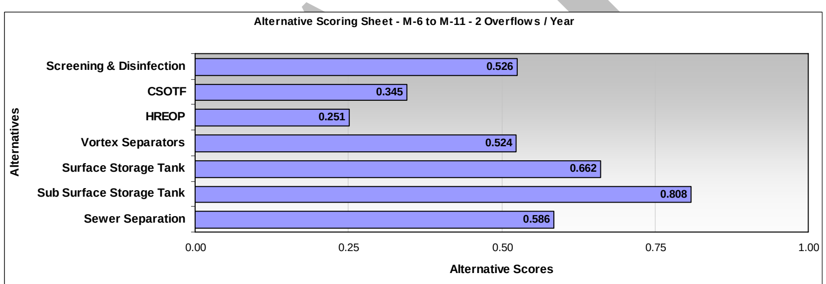
Attachment 2 - CSO Alternatives Development Worksheet

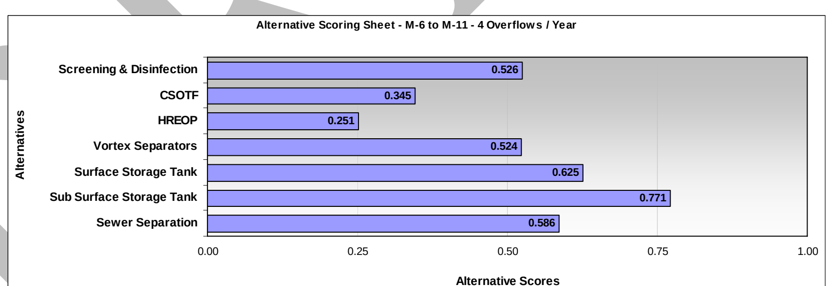
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will not be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

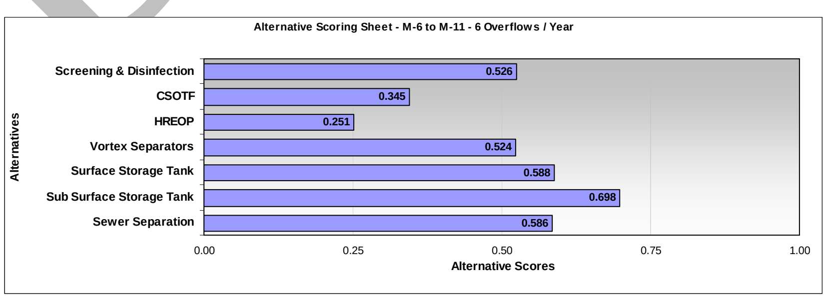
Attachment 3 – Alternative Scoring Sheet

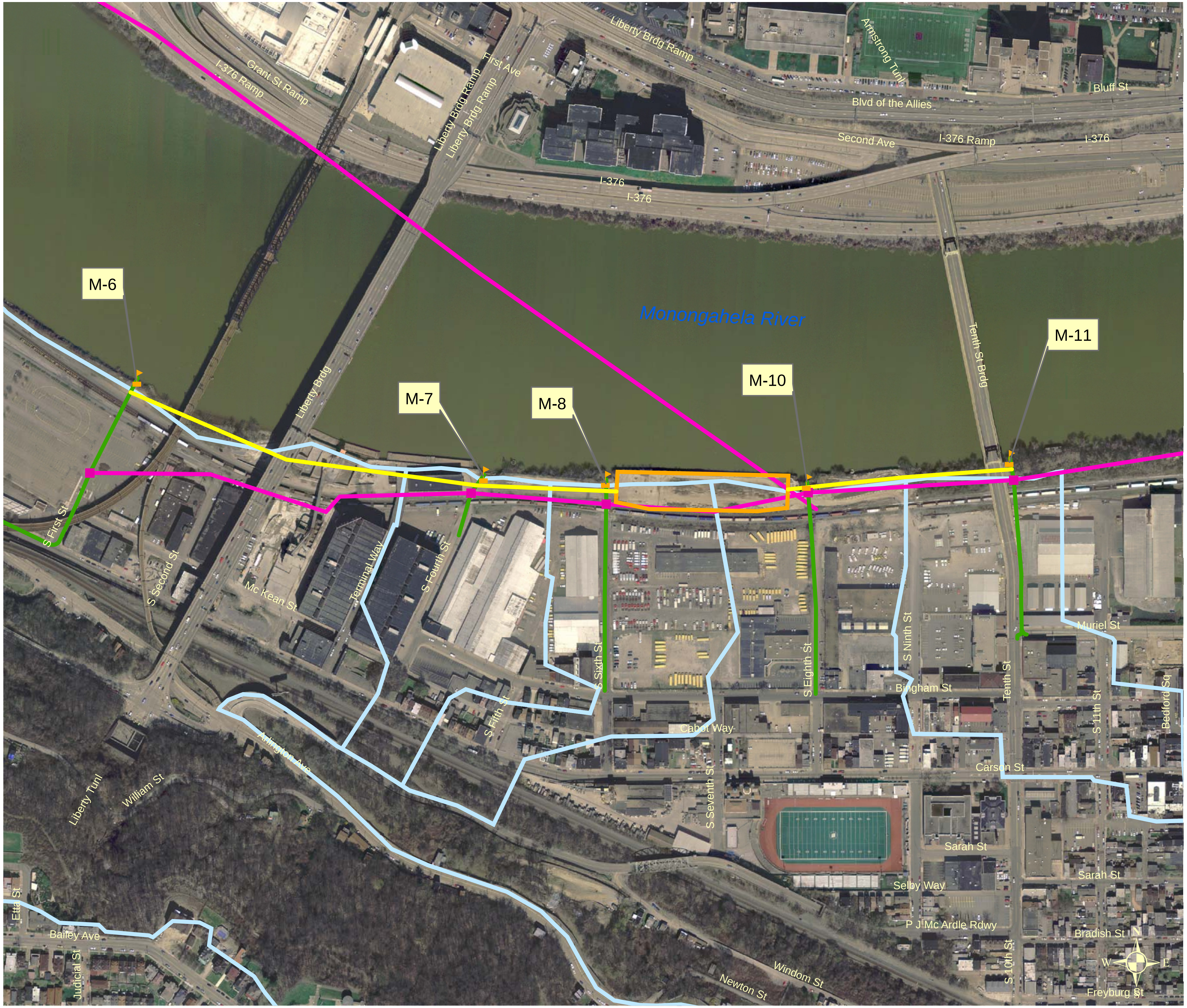


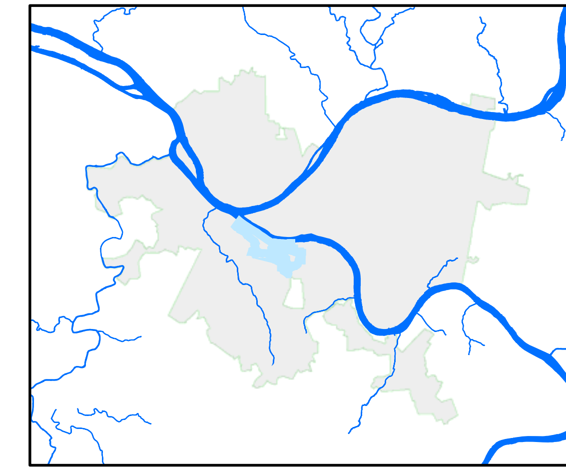












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

300 0 300 Feet

Attachment 4
M-6 to M-11
Facilities Boundary Map
Arlington through 25th St. Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0256.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	4	4	4	3
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	2	3	3	3	3
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	4	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	2	2	2	2	2
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	1	1	1	1	1
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.614**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.788**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.771**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.771**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.735**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.637**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.642**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.625**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.625**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.625**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.487**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.558**

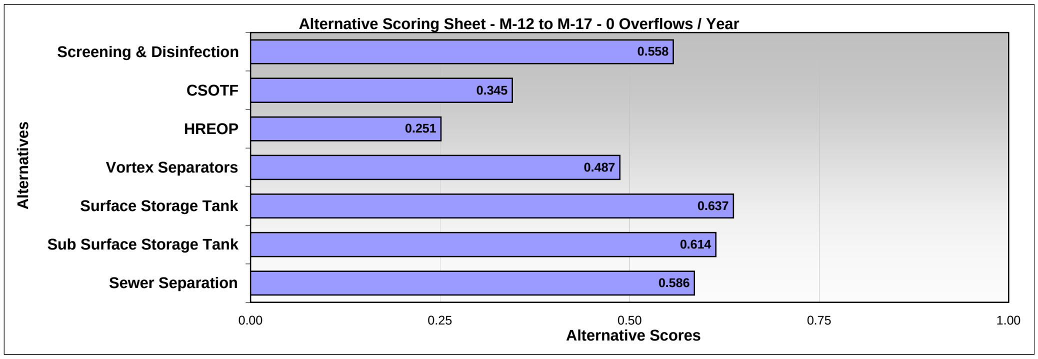
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

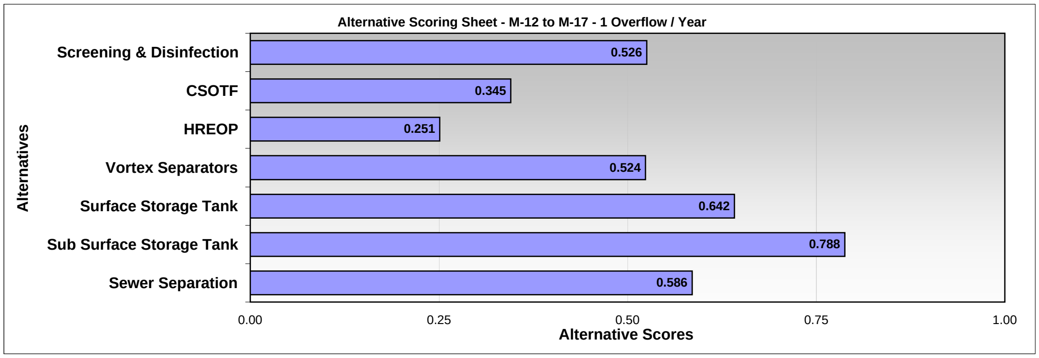
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

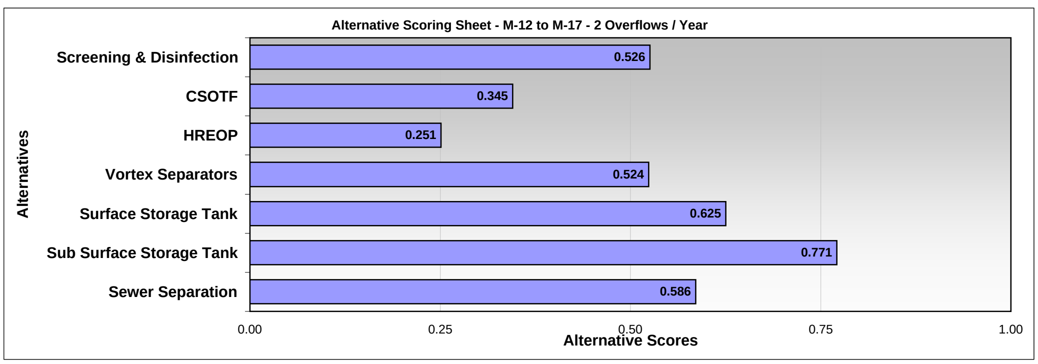
Total Score

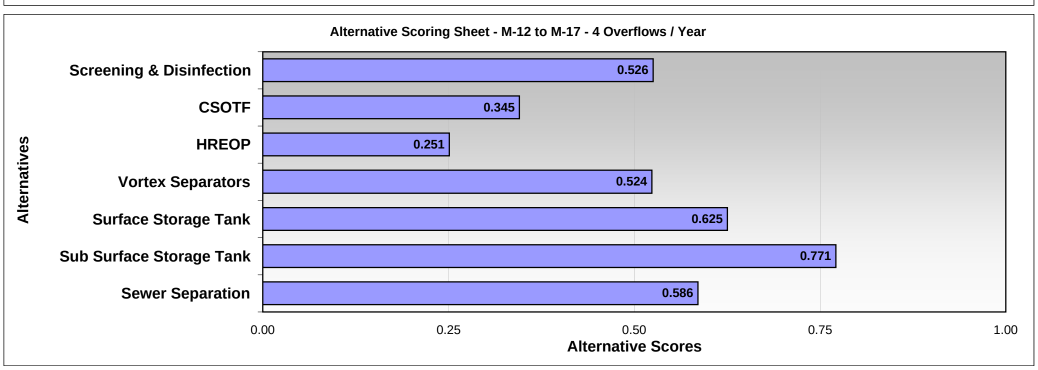
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

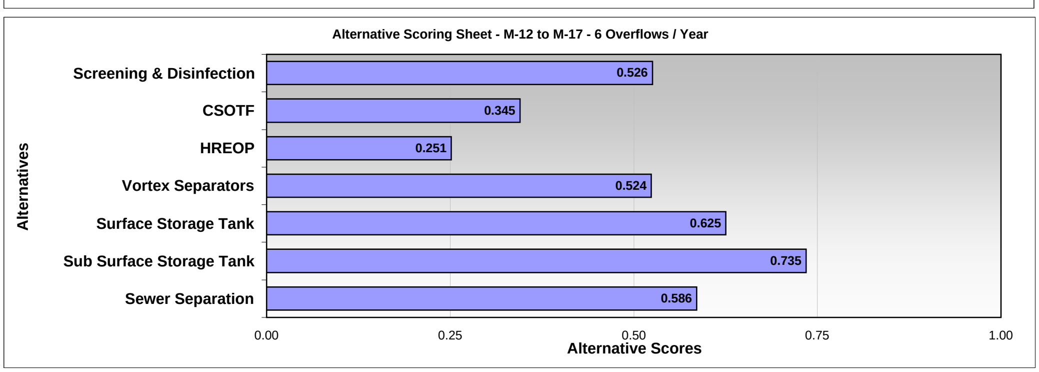
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**


Alternative Scoring Sheet - M-12 to M-17 - 0 Overflows / Year
Alternatives
Screening & Disinfection
0.558
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.487
Surface Storage Tank
0.637
Sub Surface Storage Tank
0.614
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - M-12 to M-17 - 1 Overflow / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.524
Surface Storage Tank
0.642
Sub Surface Storage Tank
0.788
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - M-12 to M-17 - 2 Overflows / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.524
Surface Storage Tank
0.625
Sub Surface Storage Tank
0.771
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - M-12 to M-17 - 4 Overflows / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.524
Surface Storage Tank
0.625
Sub Surface Storage Tank
0.771
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - M-12 to M-17 - 6 Overflows / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.524
Surface Storage Tank
0.625
Sub Surface Storage Tank
0.735
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	0	
Peak Volume	1,237,617	CF
	9.26	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	175.68	CFS
	113.54	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	0 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,670	Input by Engineer
Peak Flow (CFS)		43.92	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	559,000	
Peak Flow (CFS)		87.84	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	836,000	
Peak Flow (CFS)		131.76	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,065,000	
Peak Flow (CFS)		175.68	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,329,000	
Construction Cost (Consolidation Sewers)	**$**	**3,789,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections			Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 3,941,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	0	
Peak Volume	1,237,617	CF
	9.26	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	175.68	CFS
	113.54	MGD

		#N/A		
		SEWER SEPARATION		
		0 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)				**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		406		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**81,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		176,854		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**354,000**		
			TOTAL CAPITAL COST	**$ 81,554,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	0	
Peak Volume	1,237,617	CF
	9.26	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	175.68	CFS
	113.54	MGD

	#N/A		
	SURFACE STORAGE TANK		
	0 Overflows / Year		
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	9.26	1,238,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	10.89	1,456,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	383		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	255		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	10.96	1,464,975	**Sufficient Volume**
Tank Area (SF)	98,000		= Length x Width
Construction Cost (Storage Tank)	**10,663,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	113.54	175.68	= Peak Rate
Force Main Diameter (In)	73		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**15,503,000**	**$ 89,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	175.68		Ref: Technical Parameters
Diameter (In)	90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)			Input by Engineer
Depth (Ft)			Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	2,184,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	10,920		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**596,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	113.54		Ref: CSO Statistics
Construction Cost (Screening) $	**5,669,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	9.26		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	4.63		= Peak Vol/DW Time
Construction Cost $	**10,248,538**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	157,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**314,000**		
		TOTAL CAPITAL COST	**$ 47,322,538**

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RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	0	
Peak Volume	1,237,617	CF
	9.26	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	175.68	CFS
	113.54	MGD

#N/A			
SUB-SURFACE STORAGE TANK			
0 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	9.26	1,238,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	10.89	1,456,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	383		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)	255		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)	10.96	1,464,975	**Sufficient Volume**
Tank Area (SF)	98,000		= Length x Width
Construction Cost (Storage Tank)	**29,424,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	9.26	14.32	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	21		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 2,735,000**	**$ 29,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	175.68		Ref: Technical Parameters
Diameter (In)	90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)			Input by Engineer
Depth (Ft)			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$ -**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	2,184,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	109,200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$ 3,622,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	113.54		Ref: CSO Statistics
Construction Cost (Screening)	**$ 5,669,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	9.26		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	4.63		= Peak Vol/DW Time
Construction Cost	**$ 10,248,538**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$ 299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	157,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 314,000**		
		TOTAL CAPITAL COST	**$ 56,281,538**

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RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	0	
Peak Volume	1,237,617	CF
	9.26	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	175.68	CFS
	113.54	MGD

#N/A

SWIRL CONCENTRATOR / VORTEX SEPARATOR

0 Overflows / Year

1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		113.54		175.68	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		12			
Construction Cost (Swirl / Vortex)	**$**	**5,439,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		124.89		193.25	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		77			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**16,889,000**	**$**	**94,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		175.68			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		346,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		17,300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**855,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		113.54			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,669,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		124.89			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		175		84	
Passes / Detention (Min)		7		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,230,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		118,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**236,000**			
			TOTAL CAPITAL COST	**$**	**35,652,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	0	
Peak Volume	1,237,617	CF
	9.26	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	175.68	CFS
	113.54	MGD

#N/A

SEDIMENTATION BASIN (CSOTF)

0 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		113.54	175.68	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		19,000		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		196	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		98	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.72	230,496	
Construction Cost (CSOTF)	**$**	**16,693,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		113.54	175.68	= Peak Rate
Force Main Diameter (In)		73		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,503,000**	**$ 89,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		175.68		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		346,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		17,300		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**855,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		113.54		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,669,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		113.54		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		167	80	
Passes / Detention (Min)		7	**15.21**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,122,000**		
7. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.72		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.86		= Peak Vol/DW Time
Construction Cost	**$**	**8,418,495**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
9. Land Acquisition Parameters				
Land Required - CSOTF (SF)		51,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**102,000**		
			TOTAL CAPITAL COST	**$ 53,691,495**

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RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	0	
Peak Volume	1,237,617	CF
	9.26	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	175.68	CFS
	113.54	MGD

	#N/A		
	HIGH RATE END OF PIPE TREATMENT (HREOP)		
	0 Overflows / Year		
1. High Rate End of Pipe Treatment (HREOP) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	113.54	175.68	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	1,340		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	53	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	26	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Construction Cost (HREOP) $	**20,203,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	124.89	193.25	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)	77		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**16,889,000**	**$ 94,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	175.68		Ref: Technical Parameters
Diameter (In)	90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)			Input by Engineer
Depth (Ft)			Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	33,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)	1,650		= ACH x Volume / 60
Construction Cost (Odor Control) $	**136,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	113.54		Ref: CSO Statistics
Construction Cost (Screening) $	**5,669,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	124.89		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	175	84	
Passes / Detention (Min)	7	**15.21**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection / CC Tank) $	2,230,000	$ 2,789,000	
Construction Cost (Disinfection) $	**5,019,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - HREOP (SF)	75,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**150,000**		
		TOTAL CAPITAL COST $	**52,400,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	0	
Peak Volume	1,237,617	CF
	9.26	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	175.68	CFS
	113.54	MGD

#N/A					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		113.54		175.68	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,669,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		113.54		175.68	= Peak Flow x % Req Pump
Force Main Diameter (In)		73			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,503,000**	**$**	**89,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		175.68			Ref: CSO Statistics
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		35,100			=CFS x 200
Odor Control Flow Rate (CFM)		1,760			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**143,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		113.54			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		167		80	
Passes / Detention (Min)		7		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,122,000	$	2,600,000	
Construction Cost (Disinfection)	**$**	**4,722,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		35,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**			
				TOTAL CAPITAL COST	**$ 30,436,000**

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RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	1	
Peak Volume	589,198	CF
	4.41	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	171.68	CFS
	110.95	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	1 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,670	Width of Sewershed along Riverline
Peak Flow (CFS)		43.92	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	559,000	
Peak Flow (CFS)		87.84	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	836,000	
Peak Flow (CFS)		131.76	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,065,000	
Peak Flow (CFS)		175.68	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,329,000	
Construction Cost (Consolidation Sewers)	**$**	**3,789,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 3,941,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	1	
Peak Volume	589,198	CF
	4.41	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	171.68	CFS
	110.95	MGD

		#N/A		
		SEWER SEPARATION		
		1 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		406		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**81,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		176,854		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**354,000**		
			TOTAL CAPITAL COST	**$ 81,554,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	1	
Peak Volume	589,198	CF
	4.41	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	171.68	CFS
	110.95	MGD

		#N/A			
		SURFACE STORAGE TANK			
		1 Overflows / Year			
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.41		589,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		5.18		693,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		264			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		176			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		5.21		696,960	**Sufficient Volume**
Tank Area (SF)		46,000			= Length x Width
Construction Cost (Storage Tank)		**4,749,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		110.95		171.68	= Peak Rate
Force Main Diameter (In)		72			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,188,000**	**$**	**88,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		171.68			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,040,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		5,200			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**333,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		110.95			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,549,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		4.41			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.20			= Peak Vol/DW Time
Construction Cost	**$**	**9,070,016**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		85,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**170,000**			
			TOTAL CAPITAL COST	**$**	**39,387,016**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	1	
Peak Volume	589,198	CF
	4.41	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	171.68	CFS
	110.95	MGD

		#N/A			
		SUB-SURFACE STORAGE TANK			
		1 Overflows / Year			
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.41		589,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		5.18		693,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		264			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		176			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		5.21		696,960	**Sufficient Volume**
Tank Area (SF)		46,000			= Length x Width
Construction Cost (Storage Tank)		**14,487,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		4.41		6.82	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		14			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,114,000**	**$**	**23,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		171.68			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,040,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		52,000			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,025,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		110.95			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,549,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		4.41			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.20			= Peak Vol/DW Time
Construction Cost	**$**	**9,070,016**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		85,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**170,000**			
				TOTAL CAPITAL COST	**$ 37,678,016**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	1	
Peak Volume	589,198	CF
	4.41	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	171.68	CFS
	110.95	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
1 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		110.95		171.68	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		122.05		188.85	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		76			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**16,542,000**	**$**	**93,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		171.68			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		110.95			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,549,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		122.05			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		173		83	
Passes		7		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,204,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		115,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**230,000**			
				TOTAL CAPITAL COST	**$ 28,858,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	1	
Peak Volume	589,198	CF
	4.41	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	171.68	CFS
	110.95	MGD

#N/A					
SEDIMENTATION BASIN (CSOTF)					
1 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		110.95		171.68	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		18,500			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		193		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		97		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.68		224,652	
Construction Cost (CSOTF)	**$**	**16,672,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		110.95		171.68	= Peak Rate
Force Main Diameter (In)		72			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,188,000**	**$**	**88,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		171.68			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		337,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		16,850			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**837,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		110.95			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,549,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		110.95			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		165		79	
Passes		7		**15.19**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,096,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		4.41			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.20			= Peak Vol/DW Time
Construction Cost	**$**	**9,070,016**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		50,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**100,000**			
				TOTAL CAPITAL COST $	**53,840,016**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	1	
Peak Volume	589,198	CF
	4.41	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	171.68	CFS
	110.95	MGD

#N/A					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		110.95		171.68	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,310			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		52		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		26		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**19,741,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		122.05		188.85	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		76			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**16,542,000**	**$**	**93,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		171.68			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,600			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**132,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		110.95			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,549,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		122.05			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		173		83	
Passes		7		15.21	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,204,000	$	2,741,000	
Construction Cost (Disinfection)	**$**	**4,945,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		73,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**146,000**			
			TOTAL CAPITAL COST	**$**	**51,388,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	1	
Peak Volume	589,198	CF
	4.41	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	171.68	CFS
	110.95	MGD

#N/A			
SCREENING AND DISINFECTION			
1 Overflows / Year			
1. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Default Value
Peak Flow, into facility (MGD)	110.95	171.68	Ref: CSO Statistics
Construction Cost (Screening)	**$ 5,549,000**		
2. Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)	110.95	171.68	= Peak Flow x % Req Pump
Force Main Diameter (In)	72		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 15,188,000**	**$ 88,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	171.68		Ref: CSO Statistics
Diameter (In)	90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$ -**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	34,300		=CFS x 200
Odor Control Flow Rate (CFM)	1,720		= ACH x Volume / 60
Construction Cost (Odor Control)	**$ 140,000**		
5. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Default Value
Peak Flow (MGD)	110.95		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)	165	79	
Passes	7	**15.19**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$ 2,096,000	$ 2,554,000	
Construction Cost (Disinfection)	**$ 4,650,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$ 299,000**		
7. Land Acquisition Parameters			
Land Required - Screening & Disinfection (SF)	34,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 68,000**		
		TOTAL CAPITAL COST	**$ 29,923,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	2	
Peak Volume	539,778	CF
	4.04	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	159.27	CFS
	102.93	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	2 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,670	Width of Sewershed along Riverline
Peak Flow (CFS)		43.92	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	559,000	
Peak Flow (CFS)		87.84	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	836,000	
Peak Flow (CFS)		131.76	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,065,000	
Peak Flow (CFS)		175.68	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,329,000	
Construction Cost (Consolidation Sewers)	**$**	**3,789,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 3,941,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	2	
Peak Volume	539,778	CF
	4.04	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	159.27	CFS
	102.93	MGD

		#N/A		
		SEWER SEPARATION		
		2 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		406		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**81,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		176,854		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**354,000**		
			TOTAL CAPITAL COST	**$ 81,554,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	2	
Peak Volume	539,778	CF
	4.04	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	159.27	CFS
	102.93	MGD

#N/A				
SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.04	540,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.75	635,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		253		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		169		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.80	641,355	**Sufficient Volume**
Tank Area (SF)		43,000		= Length x Width
Construction Cost (Storage Tank)		**4,316,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		102.93	159.27	= Peak Rate
Force Main Diameter (In)		70		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,210,000**	**$ 85,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		159.27		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		953,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,770		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**311,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		102.93		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,178,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		4.04		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.02		= Peak Vol/DW Time
Construction Cost	**$**	**8,980,236**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		79,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**158,000**		
			TOTAL CAPITAL COST	**$ 37,478,236**

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RESULTS SUMMARY			
Number of Events / Year	73		
Number of Overflows / Year	2		
Peak Volume	539,778	CF	
	4.04	MG	
Total Volume	8,460,809	CF	
	63.29	MG	
Peak Rate	159.27	CFS	
	102.93	MGD	

	#N/A			
	SUB-SURFACE STORAGE TANK			
	2 Overflows / Year			
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.04	540,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.75	635,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		253		= $(\text{Vol / SWD * 1.5})^{1/2}$
Width (Ft)		169		= $(\text{Vol / SWD / 1.5})^{1/2}$
Total Volume (MG / CF)		4.80	641,355	**Sufficient Volume**
Tank Area (SF)		43,000		= Length x Width
Construction Cost (Storage Tank)		**13,348,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		4.04	6.25	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		14		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,056,000**	**$ 23,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		159.27		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		953,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		47,650		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,891,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		102.93		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,178,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		4.04		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.02		= Peak Vol/DW Time
Construction Cost	**$**	**8,980,236**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		79,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**158,000**		
			TOTAL CAPITAL COST	**$ 35,874,236**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	2	
Peak Volume	539,778	CF
	4.04	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	159.27	CFS
	102.93	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
2 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		102.93		159.27	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		113.23		175.20	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		73			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,465,000**	**$**	**89,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		159.27			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		102.93			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,178,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		113.23			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		167		80	
Passes		7		**15.25**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,119,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		107,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**214,000**			
				TOTAL CAPITAL COST	**$ 27,305,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	2	
Peak Volume	539,778	CF
	4.04	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	159.27	CFS
	102.93	MGD

#N/A

SEDIMENTATION BASIN (CSOTF)

2 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		102.93		159.27	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		17,200			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		186		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		93		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.55		207,576	
Construction Cost (CSOTF)	**$**	**16,614,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		102.93		159.27	= Peak Rate
Force Main Diameter (In)		70			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,210,000**	**$**	**85,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		159.27			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		311,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		15,550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**786,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		102.93			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,178,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		102.93			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		159		76	
Passes		7		**15.17**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,010,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		4.04			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,980,236**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		47,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**94,000**			
				TOTAL CAPITAL COST **$**	**52,197,236**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	2	
Peak Volume	539,778	CF
	4.04	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	159.27	CFS
	102.93	MGD

		#N/A			
HIGH RATE END OF PIPE TREATMENT (HREOP)					
		2 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		102.93		159.27	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,220			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		50		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		25		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**18,319,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		113.23		175.20	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		73			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,465,000**	**$**	**89,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		159.27			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		30,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,500			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**126,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		102.93			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,178,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		113.23			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		167		80	
Passes		7		15.25	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,119,000	$	2,600,000	
Construction Cost (Disinfection)	**$**	**4,719,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		70,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**140,000**			
			TOTAL CAPITAL COST	**$**	**48,276,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	2	
Peak Volume	539,778	CF
	4.04	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	159.27	CFS
	102.93	MGD

#N/A					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		102.93		159.27	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,178,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		102.93		159.27	= Peak Flow x % Req Pump
Force Main Diameter (In)		70			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,210,000**	**$**	**85,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		159.27			Ref: CSO Statistics
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		31,900			=CFS x 200
Odor Control Flow Rate (CFM)		1,600			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**132,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		102.93			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		159		76	
Passes		7		15.17	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,010,000	$	2,418,000	
Construction Cost (Disinfection)	**$**	**4,428,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		33,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**			
				TOTAL CAPITAL COST	**$ 28,339,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	4	
Peak Volume	381,587	CF
	2.85	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	118.82	CFS
	76.79	MGD

#N/A			
CONSOLIDATION SEWERS			
4 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,670	Width of Sewershed along Riverline
Peak Flow (CFS)		43.92	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	559,000	
Peak Flow (CFS)		87.84	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	836,000	
Peak Flow (CFS)		131.76	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,065,000	
Peak Flow (CFS)		175.68	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,329,000	
Construction Cost (Consolidation Sewers)	**$**	**3,789,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST $	**3,941,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	4	
Peak Volume	381,587	CF
	2.85	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	118.82	CFS
	76.79	MGD

		#N/A		
		SEWER SEPARATION		
		4 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		Typ 0, Rev as Req'd
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		406		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**81,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		176,854		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**354,000**		
			TOTAL CAPITAL COST $	**81,554,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	4	
Peak Volume	381,587	CF
	2.85	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	118.82	CFS
	76.79	MGD

		#N/A		
		SURFACE STORAGE TANK		
		4 Overflows / Year		
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.85	382,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.36	449,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		213		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		142		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.39	453,690	**Sufficient Volume**
Tank Area (SF)		30,000		= Length x Width
Construction Cost (Storage Tank)		**2,958,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		76.79	118.82	= Peak Rate
Force Main Diameter (In)		60		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,020,000**	**$ 72,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		118.82		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		674,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,370		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**237,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		76.79		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,968,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.85		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.43		= Peak Vol/DW Time
Construction Cost	**$**	**8,692,890**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		62,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**124,000**		
			TOTAL CAPITAL COST	**$ 31,311,890**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	4	
Peak Volume	381,587	CF
	2.85	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	118.82	CFS
	76.79	MGD

#N/A			
SUB-SURFACE STORAGE TANK			
4 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	2.85	382,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	3.36	449,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	213		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	142		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	3.39	453,690	**Sufficient Volume**
Tank Area (SF)	30,000		= Length x Width
Construction Cost (Storage Tank)	**9,704,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	2.85	4.42	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	12		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,860,000**	**$ 21,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	118.82		Ref: Technical Parameters
Diameter (In)	78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	674,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	33,700		= ACH x Volume / 60
Construction Cost (Odor Control) $	**1,441,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	76.79		Ref: CSO Statistics
Construction Cost (Screening) $	**3,968,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	2.85		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	1.43		= Peak Vol/DW Time
Construction Cost $	**8,692,890**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	62,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**124,000**		
		TOTAL CAPITAL COST	**$ 30,050,890**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	4	
Peak Volume	381,587	CF
	2.85	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	118.82	CFS
	76.79	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		76.79		118.82	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		84.47		130.70	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		63			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,957,000**	**$**	**76,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		118.82			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		76.79			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,968,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		84.47			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		144		69	
Passes		5		**15.20**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,788,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		80,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**160,000**			
			TOTAL CAPITAL COST	**$**	**22,189,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	4	
Peak Volume	381,587	CF
	2.85	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	118.82	CFS
	76.79	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		76.79	118.82	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		12,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		161	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		81	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.17	156,492	
Construction Cost (CSOTF)	**$**	**16,479,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		76.79	118.82	= Peak Rate
Force Main Diameter (In)		60		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,020,000**	**$ 72,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		118.82		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		235,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,750		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**631,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		76.79		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,968,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		76.79		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		137	66	
Passes		5	**15.22**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,686,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.85		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.43		= Peak Vol/DW Time
Construction Cost	**$**	**8,692,890**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		36,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**72,000**		
			TOTAL CAPITAL COST	**$ 46,860,890**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	4	
Peak Volume	381,587	CF
	2.85	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	118.82	CFS
	76.79	MGD

		#N/A			
HIGH RATE END OF PIPE TREATMENT (HREOP)					
		4 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		76.79		118.82	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		910			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		44		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		22		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**13,770,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		84.47		130.70	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		63			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,957,000**	**$**	**76,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		118.82			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		23,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,150			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**102,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		76.79			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,968,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		84.47			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		144		69	
Passes		5		**15.20**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,788,000	$	1,913,000	
Construction Cost (Disinfection)	**$**	**3,701,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		57,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**114,000**			
			TOTAL CAPITAL COST	**$**	**37,928,000**

RESULTS SUMMARY			
Number of Events / Year	73		
Number of Overflows / Year	4		
Peak Volume	381,587	CF	
	2.85	MG	
Total Volume	8,460,809	CF	
	63.29	MG	
Peak Rate	118.82	CFS	
	76.79	MGD	

		#N/A			
		SCREENING AND DISINFECTION			
		4 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		76.79		118.82	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,968,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		76.79		118.82	= Peak Flow x % Req Pump
Force Main Diameter (In)		60			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,020,000**	**$**	**72,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		118.82			Ref: CSO Statistics
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		23,800			=CFS x 200
Odor Control Flow Rate (CFM)		1,190			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**105,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		76.79			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		137		66	
Passes		5		**15.22**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,686,000	$	1,784,000	
Construction Cost (Disinfection)	**$**	**3,470,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		31,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**62,000**			
				TOTAL CAPITAL COST	**$ 22,937,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	6	
Peak Volume	308,936	CF
	2.31	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	90.23	CFS
	58.31	MGD

#N/A			
CONSOLIDATION SEWERS			
6 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,670	Width of Sewershed along Riverline
Peak Flow (CFS)		43.92	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	559,000	
Peak Flow (CFS)		87.84	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	836,000	
Peak Flow (CFS)		131.76	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,065,000	
Peak Flow (CFS)		175.68	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		668	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,329,000	
Construction Cost (Consolidation Sewers)	**$**	**3,789,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 3,941,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	6	
Peak Volume	308,936	CF
	2.31	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	90.23	CFS
	58.31	MGD

		#N/A		
		SEWER SEPARATION		
		6 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		406		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**81,200,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		176,854		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**354,000**		
			TOTAL CAPITAL COST	**$ 81,554,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	6	
Peak Volume	308,936	CF
	2.31	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	90.23	CFS
	58.31	MGD

		#N/A			
		SURFACE STORAGE TANK			
		6 Overflows / Year			
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.31		309,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.72		364,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		192			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		128			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.76		368,640	**Sufficient Volume**
Tank Area (SF)		25,000			= Length x Width
Construction Cost (Storage Tank)		**2,349,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		58.31		90.23	= Peak Rate
Force Main Diameter (In)		53			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,765,000**	**$**	**63,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		90.23			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		546,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,730			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**201,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.31			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,112,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		2.31			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.16			= Peak Vol/DW Time
Construction Cost	**$**	**8,560,943**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		54,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**108,000**			
			TOTAL CAPITAL COST	**$**	**27,398,943**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	6	
Peak Volume	308,936	CF
	2.31	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	90.23	CFS
	58.31	MGD

		#N/A		
		SUB-SURFACE STORAGE TANK		
		6 Overflows / Year		
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.31	309,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.72	364,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		192		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		128		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.76	368,640	**Sufficient Volume**
Tank Area (SF)		25,000		= Length x Width
Construction Cost (Storage Tank)		**8,031,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.31	3.58	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,765,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		90.23		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		546,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		27,300		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,222,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.31		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,112,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.31		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.16		= Peak Vol/DW Time
Construction Cost	**$**	**8,560,943**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		54,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**108,000**		
			TOTAL CAPITAL COST	**$ 27,057,943**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	6	
Peak Volume	308,936	CF
	2.31	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	90.23	CFS
	58.31	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
6 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		58.31		90.23	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		64.14		99.25	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		55			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,477,000**	**$**	**66,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		90.23			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.31			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,112,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		64.14			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		126		60	
Passes		5		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,504,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		61,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**122,000**			
				TOTAL CAPITAL COST	**$ 18,521,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	6	
Peak Volume	308,936	CF
	2.31	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	90.23	CFS
	58.31	MGD

		#N/A		
		SEDIMENTATION BASIN (CSOTF)		
		6 Overflows / Year		
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		58.31	90.23	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		9,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		141	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		71	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.90	120,132	
Construction Cost (CSOTF)	**$**	**16,415,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		58.31	90.23	= Peak Rate
Force Main Diameter (In)		53		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,765,000**	**$ 63,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		90.23		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		180,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		9,000		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**512,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.31		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,112,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		58.31		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		120	57	
Passes		5	**15.16**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,415,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.31		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.16		= Peak Vol/DW Time
Construction Cost	**$**	**8,560,943**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		29,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**58,000**		
			TOTAL CAPITAL COST	**$ 43,140,943**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	6	
Peak Volume	308,936	CF
	2.31	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	90.23	CFS
	58.31	MGD

	#N/A			
	HIGH RATE END OF PIPE TREATMENT (HREOP)			
	6 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		58.31	90.23	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		690		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		38	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		19	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**10,638,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		64.14	99.25	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		55		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,477,000**	**$ 66,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		90.23		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		17,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		850		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**81,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		58.31		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,112,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		64.14		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		126	60	
Passes		5	**15.23**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,504,000	$ 1,572,000	
Construction Cost (Disinfection)	**$**	**3,076,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		49,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**98,000**		
			TOTAL CAPITAL COST	**$ 30,788,000**

RESULTS SUMMARY		
Number of Events / Year	73	
Number of Overflows / Year	6	
Peak Volume	308,936	CF
	2.31	MG
Total Volume	8,460,809	CF
	63.29	MG
Peak Rate	90.23	CFS
	58.31	MGD

		#N/A		
		SCREENING AND DISINFECTION		
		6 Overflows / Year		
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		58.31	90.23	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,112,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		58.31	90.23	= Peak Flow x % Req Pump
Force Main Diameter (In)		53		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,765,000**	**$ 63,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		90.23		Ref: CSO Statistics
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,941,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		18,000		=CFS x 200
Odor Control Flow Rate (CFM)		900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**84,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		58.31		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		120	57	
Passes		5	**15.16**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,415,000	$ 1,465,000	
Construction Cost (Disinfection)	**$**	**2,880,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		29,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**58,000**		
			TOTAL CAPITAL COST	**$ 19,202,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	113.54	$443,744	20	10.910	$4,841,219
	Tank O&M	No. Events / Yr	73	$71,509	50	14.484	$1,035,703
		Const Cost ($)	$10,663,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	114	$19,200	20	10.910	$209,472
	Odor Control O&M	Capacity (cfm)	10,920	$38,220	20	10.910	$416,978
	Reserve / Replace	10% Gravity / 15% Pump					$80,293
			Total Annual O&M	**$573,000**		**Total PW O&M**	**$6,584,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	9.26	$83,138	20	10.910	$907,029
	Tank O&M	No. Events / Yr	73	$118,411	50	14.484	$1,715,019
		Const Cost ($)	$29,424,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	114	$19,200	20	10.910	$209,472
	Odor Control O&M	Capacity (cfm)	109,200	$382,200	20	10.910	$4,169,779
	Reserve / Replace	10% Gravity / 15% Pump					$36,430
			Total Annual O&M	**$603,000**		**Total PW O&M**	**$7,038,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	113.54	$443,744	20	10.910	$4,841,219
	Sed. Basin O&M	Flow Rate (mgd)	113.54	$12,773	50	14.484	$185,002
	Screening O&M	Flow Rate (mgd)	113.54	$19,200	20	10.910	$209,472
	Disinfection O&M	Flow Rate (mgd)	113.54	$287,264	20	10.910	$3,134,037
	Odor Control O&M	Capacity (cfm)	17,300.00	$60,550	20	10.910	$660,597
	Reserve / Replace	10% Gravity / 15% Pump					$86,769
			Total Annual O&M	**$824,000**		**Total PW O&M**	**$9,117,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	124.89	$472,919	20	10.910	$5,159,519
	HREP O&M	Flow Rate (mgd)	113.54	$376,564	20	10.910	$4,108,291
	Screening O&M	Flow Rate (mgd)	113.54	$19,200	20	10.910	$209,472
	Disinfection O&M	Flow Rate (mgd)	124.89	$304,438	20	10.910	$3,321,395
	Odor Control O&M	Capacity (cfm)	1,650.00	$5,775	20	10.910	$63,005
	Reserve / Replace	10% Gravity / 15% Pump					$145,714
			Total Annual O&M	**$1,179,000**		**Total PW O&M**	**$13,007,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	124.89	$472,919	20	10.910	$5,159,519
	Swirl / Vortex O&M	Flow Rate (mgd)	113.54	$12,773	20	10.910	$139,355
	Screening O&M	Flow Rate (mgd)	113.54	$19,200	20	10.910	$209,472
	Disinfection O&M	Flow Rate (mgd)	124.89	$304,438	20	10.910	$3,321,395
	Odor Control O&M	Capacity (cfm)	17,300.00	$60,550	20	10.910	$660,597
	Reserve / Replace	10% Gravity / 15% Pump					$100,115
			Total Annual O&M	**$870,000**		**Total PW O&M**	**$9,590,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	113.54	$443,744	20	10.910	$4,841,219
	Screening O&M	Flow Rate (mgd)	113.54	$19,200	20	10.910	$209,472
	Disinfection O&M	Flow Rate (mgd)	113.54	$287,264	20	10.910	$3,134,037
	Odor Control O&M	Capacity (cfm)	1,760.00	$6,160	20	10.910	$67,205
	Reserve / Replace	10% Gravity / 15% Pump					$84,833
			Total Annual O&M	**$757,000**		**Total PW O&M**	**$8,337,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)							
#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	110.95	$436,966	20	10.910	$4,767,272
	Tank O&M	No. Events / Yr	73	$56,724	50	14.484	$821,563
		Const Cost ($)	$4,749,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	111	$18,880	20	10.910	$205,978
	Odor Control O&M	Capacity (cfm)	5,200	$18,200	20	10.910	$198,561
	Reserve / Replace	10% Gravity / 15% Pump					$77,966
			Total Annual O&M	**$531,000**		**Total PW O&M**	**$6,071,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	4.41	$50,635	20	10.910	$552,428
	Tank O&M	No. Events / Yr	73	$81,069	50	14.484	$1,174,166
		Const Cost ($)	$14,487,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	111	$18,880	20	10.910	$205,978
	Odor Control O&M	Capacity (cfm)	52,000	$182,000	20	10.910	$1,985,609
	Reserve / Replace	10% Gravity / 15% Pump					$29,226
			Total Annual O&M	**$333,000**		**Total PW O&M**	**$3,947,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	110.95	$436,966	20	10.910	$4,767,272
	Sed. Basin O&M	Flow Rate (mgd)	110.95	$12,482	50	14.484	$180,788
	Screening O&M	Flow Rate (mgd)	110.95	$18,880	20	10.910	$205,978
	Disinfection O&M	Flow Rate (mgd)	110.95	$283,261	20	10.910	$3,090,357
	Odor Control O&M	Capacity (cfm)	16,850.00	$58,975	20	10.910	$643,414
	Reserve / Replace	10% Gravity / 15% Pump					$85,038
			Total Annual O&M	**$811,000**		**Total PW O&M**	**$8,973,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	122.05	$465,696	20	10.910	$5,080,710
	HREP O&M	Flow Rate (mgd)	110.95	$371,496	20	10.910	$4,053,002
	Screening O&M	Flow Rate (mgd)	110.95	$18,880	20	10.910	$205,978
	Disinfection O&M	Flow Rate (mgd)	122.05	$300,194	20	10.910	$3,275,103
	Odor Control O&M	Capacity (cfm)	1,600.00	$5,600	20	10.910	$61,096
	Reserve / Replace	10% Gravity / 15% Pump					$142,634
			Total Annual O&M	**$1,162,000**		**Total PW O&M**	**$12,819,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	122.05	$465,696	20	10.910	$5,080,710
	Swirl / Vortex O&M	Flow Rate (mgd)	110.95	$12,482	20	10.910	$136,181
	Screening O&M	Flow Rate (mgd)	110.95	$18,880	20	10.910	$205,978
	Disinfection O&M	Flow Rate (mgd)	122.05	$300,194	20	10.910	$3,275,103
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$88,580
			Total Annual O&M	**$798,000**		**Total PW O&M**	**$8,787,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	110.95	$436,966	20	10.910	$4,767,272
	Screening O&M	Flow Rate (mgd)	110.95	$18,880	20	10.910	$205,978
	Disinfection O&M	Flow Rate (mgd)	110.95	$283,261	20	10.910	$3,090,357
	Odor Control O&M	Capacity (cfm)	1,720.00	$6,020	20	10.910	$65,678
	Reserve / Replace	10% Gravity / 15% Pump					$83,142
			Total Annual O&M	**$746,000**		**Total PW O&M**	**$8,212,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	102.93	$415,605	20	10.910	$4,534,223
	Tank O&M	No. Events / Yr	73	$55,641	50	14.484	$805,884
		Const Cost ($)	$4,316,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	103	$17,902	20	10.910	$195,310
	Odor Control O&M	Capacity (cfm)	4,770	$16,695	20	10.910	$182,141
	Reserve / Replace	10% Gravity / 15% Pump					$72,907
			Total Annual O&M	**$506,000**		**Total PW O&M**	**$5,790,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	4.04	$47,757	20	10.910	$521,024
	Tank O&M	No. Events / Yr	73	$78,221	50	14.484	$1,132,924
		Const Cost ($)	$13,348,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	103	$17,902	20	10.910	$195,310
	Odor Control O&M	Capacity (cfm)	47,650	$166,775	20	10.910	$1,819,505
	Reserve / Replace	10% Gravity / 15% Pump					$27,616
			Total Annual O&M	**$311,000**		**Total PW O&M**	**$3,696,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	102.93	$415,605	20	10.910	$4,534,223
	Sed. Basin O&M	Flow Rate (mgd)	102.93	$11,580	50	14.484	$167,722
	Screening O&M	Flow Rate (mgd)	102.93	$17,902	20	10.910	$195,310
	Disinfection O&M	Flow Rate (mgd)	102.93	$270,607	20	10.910	$2,952,301
	Odor Control O&M	Capacity (cfm)	15,550.00	$54,425	20	10.910	$593,773
	Reserve / Replace	10% Gravity / 15% Pump					$79,666
			Total Annual O&M	**$771,000**		**Total PW O&M**	**$8,523,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	113.23	$442,930	20	10.910	$4,832,339
	HREP O&M	Flow Rate (mgd)	102.93	$355,463	20	10.910	$3,878,076
	Screening O&M	Flow Rate (mgd)	102.93	$17,902	20	10.910	$195,310
	Disinfection O&M	Flow Rate (mgd)	113.23	$286,784	20	10.910	$3,128,794
	Odor Control O&M	Capacity (cfm)	1,500.00	$5,250	20	10.910	$57,277
	Reserve / Replace	10% Gravity / 15% Pump					$133,115
			Total Annual O&M	**$1,109,000**		**Total PW O&M**	**$12,225,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	113.23	$442,930	20	10.910	$4,832,339
	Swirl / Vortex O&M	Flow Rate (mgd)	102.93	$11,580	20	10.910	$126,339
	Screening O&M	Flow Rate (mgd)	102.93	$17,902	20	10.910	$195,310
	Disinfection O&M	Flow Rate (mgd)	113.23	$286,784	20	10.910	$3,128,794
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$82,945
			Total Annual O&M	**$760,000**		**Total PW O&M**	**$8,366,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	102.93	$415,605	20	10.910	$4,534,223
	Screening O&M	Flow Rate (mgd)	102.93	$17,902	20	10.910	$195,310
	Disinfection O&M	Flow Rate (mgd)	102.93	$270,607	20	10.910	$2,952,301
	Odor Control O&M	Capacity (cfm)	1,600.00	$5,600	20	10.910	$61,096
	Reserve / Replace	10% Gravity / 15% Pump					$77,887
			Total Annual O&M	**$710,000**		**Total PW O&M**	**$7,821,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)							
#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	76.79	$341,717	20	10.910	$3,728,113
	Tank O&M	No. Events / Yr	73	$52,246	50	14.484	$756,713
		Const Cost ($)	$2,958,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	77	$14,877	20	10.910	$162,312
	Odor Control O&M	Capacity (cfm)	3,370	$11,795	20	10.910	$128,683
	Reserve / Replace	10% Gravity / 15% Pump					$56,399
			Total Annual O&M	**$421,000**		**Total PW O&M**	**$4,832,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.85	$37,880	20	10.910	$413,264
	Tank O&M	No. Events / Yr	73	$69,111	50	14.484	$1,000,978
		Const Cost ($)	$9,704,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	77	$14,877	20	10.910	$162,312
	Odor Control O&M	Capacity (cfm)	33,700	$117,950	20	10.910	$1,286,827
	Reserve / Replace	10% Gravity / 15% Pump					$22,301
			Total Annual O&M	**$240,000**		**Total PW O&M**	**$2,886,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	76.79	$341,717	20	10.910	$3,728,113
	Sed. Basin O&M	Flow Rate (mgd)	76.79	$8,639	50	14.484	$125,125
	Screening O&M	Flow Rate (mgd)	76.79	$14,877	20	10.910	$162,312
	Disinfection O&M	Flow Rate (mgd)	76.79	$226,370	20	10.910	$2,469,685
	Odor Control O&M	Capacity (cfm)	11,750.00	$41,125	20	10.910	$448,671
	Reserve / Replace	10% Gravity / 15% Pump					$62,057
			Total Annual O&M	**$633,000**		**Total PW O&M**	**$6,996,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	84.47	$364,184	20	10.910	$3,973,229
	HREP O&M	Flow Rate (mgd)	76.79	$299,199	20	10.910	$3,264,241
	Screening O&M	Flow Rate (mgd)	76.79	$14,877	20	10.910	$162,312
	Disinfection O&M	Flow Rate (mgd)	84.47	$239,903	20	10.910	$2,617,327
	Odor Control O&M	Capacity (cfm)	1,150.00	$4,025	20	10.910	$43,913
	Reserve / Replace	10% Gravity / 15% Pump					$102,173
			Total Annual O&M	**$923,000**		**Total PW O&M**	**$10,163,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	84.47	$364,184	20	10.910	$3,973,229
	Swirl / Vortex O&M	Flow Rate (mgd)	76.79	$8,639	20	10.910	$94,252
	Screening O&M	Flow Rate (mgd)	76.79	$14,877	20	10.910	$162,312
	Disinfection O&M	Flow Rate (mgd)	84.47	$239,903	20	10.910	$2,617,327
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$64,441
			Total Annual O&M	**$628,000**		**Total PW O&M**	**$6,912,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	76.79	$341,717	20	10.910	$3,728,113
	Screening O&M	Flow Rate (mgd)	76.79	$14,877	20	10.910	$162,312
	Disinfection O&M	Flow Rate (mgd)	76.79	$226,370	20	10.910	$2,469,685
	Odor Control O&M	Capacity (cfm)	1,190.00	$4,165	20	10.910	$45,440
	Reserve / Replace	10% Gravity / 15% Pump					$60,626
			Total Annual O&M	**$588,000**		**Total PW O&M**	**$6,466,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)							
#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	58.31	$284,304	20	10.910	$3,101,736
	Tank O&M	No. Events / Yr	73	$50,724	50	14.484	$734,661
		Const Cost ($)	$2,349,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	58	$12,890	20	10.910	$140,626
	Odor Control O&M	Capacity (cfm)	2,730	$9,555	20	10.910	$104,244
	Reserve / Replace	10% Gravity / 15% Pump					$44,773
			Total Annual O&M	**$358,000**		**Total PW O&M**	**$4,126,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.31	$32,895	20	10.910	$358,877
	Tank O&M	No. Events / Yr	73	$64,929	50	14.484	$940,401
		Const Cost ($)	$8,031,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	58	$12,890	20	10.910	$140,626
	Odor Control O&M	Capacity (cfm)	27,300	$95,550	20	10.910	$1,042,445
	Reserve / Replace	10% Gravity / 15% Pump					$18,990
			Total Annual O&M	**$207,000**		**Total PW O&M**	**$2,501,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	58.31	$284,304	20	10.910	$3,101,736
	Sed. Basin O&M	Flow Rate (mgd)	58.31	$6,560	50	14.484	$95,011
	Screening O&M	Flow Rate (mgd)	58.31	$12,890	20	10.910	$140,626
	Disinfection O&M	Flow Rate (mgd)	58.31	$191,416	20	10.910	$2,088,334
	Odor Control O&M	Capacity (cfm)	9,000.00	$31,500	20	10.910	$343,663
	Reserve / Replace	10% Gravity / 15% Pump					$49,467
			Total Annual O&M	**$527,000**		**Total PW O&M**	**$5,819,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	64.14	$302,996	20	10.910	$3,305,668
	HREP O&M	Flow Rate (mgd)	58.31	$254,473	20	10.910	$2,776,282
	Screening O&M	Flow Rate (mgd)	58.31	$12,890	20	10.910	$140,626
	Disinfection O&M	Flow Rate (mgd)	64.14	$202,859	20	10.910	$2,213,178
	Odor Control O&M	Capacity (cfm)	850.00	$2,975	20	10.910	$32,457
	Reserve / Replace	10% Gravity / 15% Pump					$80,377
			Total Annual O&M	**$777,000**		**Total PW O&M**	**$8,549,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	64.14	$302,996	20	10.910	$3,305,668
	Swirl / Vortex O&M	Flow Rate (mgd)	58.31	$6,560	20	10.910	$71,568
	Screening O&M	Flow Rate (mgd)	58.31	$12,890	20	10.910	$140,626
	Disinfection O&M	Flow Rate (mgd)	64.14	$202,859	20	10.910	$2,213,178
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$51,222
			Total Annual O&M	**$526,000**		**Total PW O&M**	**$5,782,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	58.31	$284,304	20	10.910	$3,101,736
	Screening O&M	Flow Rate (mgd)	58.31	$12,890	20	10.910	$140,626
	Disinfection O&M	Flow Rate (mgd)	58.31	$191,416	20	10.910	$2,088,334
	Odor Control O&M	Capacity (cfm)	900.00	$3,150	20	10.910	$34,366
	Reserve / Replace	10% Gravity / 15% Pump					$48,303
			Total Annual O&M	**$492,000**		**Total PW O&M**	**$5,413,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$81.6	$81,554,000	$0
1	$81.6	$81,554,000	$0
2	$81.6	$81,554,000	$0
4	$81.6	$81,554,000	$0
6	$81.6	$81,554,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$63.3	$56,281,538	$7,038,000
1	$41.6	$37,678,016	$3,947,000
2	$39.6	$35,874,236	$3,696,000
4	$32.9	$30,050,890	$2,886,000
6	$29.6	$27,057,943	$2,501,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$53.9	$47,322,538	$6,584,000
1	$45.5	$39,387,016	$6,071,000
2	$43.3	$37,478,236	$5,790,000
4	$36.1	$31,311,890	$4,832,000
6	$31.5	$27,398,943	$4,126,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$45.2	$35,652,000	$9,590,000
1	$37.6	$28,858,000	$8,787,000
2	$35.7	$27,305,000	$8,366,000
4	$29.1	$22,189,000	$6,912,000
6	$24.3	$18,521,000	$5,782,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$65.4	$52,400,000	$13,007,000
1	$64.2	$51,388,000	$12,819,000
2	$60.5	$48,276,000	$12,225,000
4	$48.1	$37,928,000	$10,163,000
6	$39.3	$30,788,000	$8,549,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$62.8	$53,691,495	$9,117,000
1	$62.8	$53,840,016	$8,973,000
2	$60.7	$52,197,236	$8,523,000
4	$53.9	$46,860,890	$6,996,000
6	$49.0	$43,140,943	$5,819,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$38.8	$30,436,000	$8,337,000
1	$38.1	$29,923,000	$8,212,000
2	$36.2	$28,339,000	$7,821,000
4	$29.4	$22,937,000	$6,466,000
6	$24.6	$19,202,000	$5,413,000

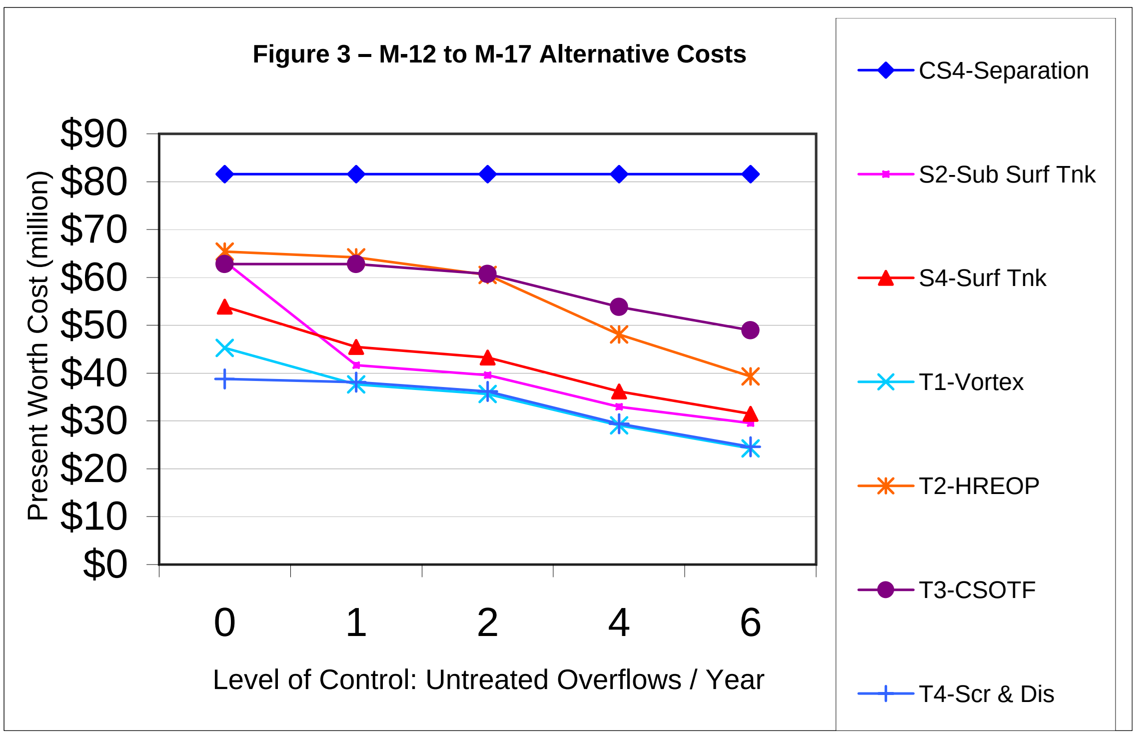


Figure 3 – M-12 to M-17 Alternative Costs
Present Worth Cost (million)
$90
$80
$70
$60
$50
$40
$30
$20
$10
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES for "Typical Year - 2005" Base Line Condition

Region Name	M-12 to M-17
Structures within Region	M-12, M-13, M-14, M-14A, M-15, M-16, and M-17
Model ID	M-12 to M-17.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Monongahela River
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	73
Peak Volume:	1,237,617 ft^3
	9.26 MG
Total Volume:	8,460,809 ft^3
	63.29 MG
Peak Rate:	175.68 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 14:00	4262	1/8/2005 5:45	1237616.60	9257.991	0	35.62	21
1/9/2005 10:03	3837	1/11/2005 11:30	589197.59	4407.493	1	32.67	23
1/12/2005 21:04	2577	1/14/2005 2:30	539778.11	4037.810	2	17.98	33
11/29/2005 6:50	450	11/29/2005 7:00	390468.51	2920.900	3	42.95	16
5/13/2005 22:30	703	5/13/2005 22:45	381587.36	2854.464	4	159.27	2
1/15/2005 5:04	3600	1/15/2005 15:00	339014.19	2535.996	5	7.18	55
2/14/2005 4:50	1066	2/14/2005 20:00	308936.46	2310.999	6	16.96	36
1/3/2005 8:15	778	1/3/2005 13:30	277840.58	2078.386	7	20.64	31
11/14/2005 21:50	407	11/15/2005 1:45	275856.79	2063.547	8	37.68	19
3/28/2005 9:10	677	3/28/2005 19:00	251630.70	1882.323	9	29.15	25
3/29/2005 21:04	2082	3/30/2005 18:55	248509.49	1858.975	10	5.04	64
8/20/2005 18:15	130	8/20/2005 18:45	240821.08	1801.462	11	113.64	5
10/25/2005 1:40	1267	10/25/2005 3:45	227045.77	1698.416	12	17.39	35
7/26/2005 19:45	64	7/26/2005 20:00	223868.82	1674.651	13	175.68	0
9/29/2005 5:25	80	9/29/2005 5:45	198530.56	1485.108	14	171.68	1
5/11/2005 22:35	115	5/11/2005 23:00	180849.46	1352.844	15	90.23	6
4/1/2005 19:30	895	4/2/2005 6:35	179790.91	1344.926	16	24.20	30
7/5/2005 16:35	115	7/5/2005 17:00	176969.54	1323.821	17	118.82	4
4/23/2005 3:50	75	4/23/2005 4:15	164987.17	1234.187	18	148.76	3
10/21/2005 19:05	764	10/22/2005 6:45	161971.23	1211.626	19	86.11	7
11/30/2005 19:00	1650	12/1/2005 7:55	121741.83	910.690	20	3.87	65
2/20/2005 19:30	455	2/20/2005 20:00	102275.31	765.070	21	28.44	27
2/9/2005 15:10	145	2/9/2005 16:45	97023.61	725.785	22	39.11	18
8/29/2005 11:35	155	8/29/2005 13:45	96008.22	718.189	23	83.70	8
12/15/2005 11:10	590	12/15/2005 14:00	93709.47	700.994	24	25.71	28
5/28/2005 8:30	633	5/28/2005 9:30	88815.19	664.382	25	31.34	24
8/8/2005 9:00	74	8/8/2005 9:15	76665.79	573.498	26	47.87	15
11/16/2005 4:05	493	11/16/2005 4:15	75695.71	566.242	27	57.47	11
5/23/2005 16:20	49	5/23/2005 16:30	73843.84	552.389	28	51.28	13
4/22/2005 15:50	204	4/22/2005 16:00	66755.86	499.367	29	16.95	37
10/7/2005 10:10	109	10/7/2005 10:45	65076.98	486.808	30	25.55	29
7/17/2005 16:25	84	7/17/2005 16:35	64973.45	486.034	31	41.95	17
10/24/2005 13:10	239	10/24/2005 14:30	60564.40	453.052	32	10.47	49

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
6/11/2005 17:35	45	6/11/2005 17:45	59912.26	448.174	33	73.35	9
3/23/2005 12:10	155	3/23/2005 12:30	58549.67	437.981	34	14.05	41
9/16/2005 21:35	44	9/16/2005 21:45	47530.81	355.554	35	51.11	14
11/9/2005 19:35	35	11/9/2005 19:45	45054.52	337.030	36	61.79	10
7/16/2005 11:20	69	7/16/2005 11:30	44961.99	336.338	37	35.74	20
3/23/2005 2:35	205	3/23/2005 2:45	43068.18	322.172	38	12.63	42
10/22/2005 15:55	98	10/22/2005 16:35	42330.81	316.656	39	17.42	34
7/25/2005 13:25	325	7/25/2005 13:30	39532.77	295.725	40	35.12	22
8/27/2005 15:25	42	8/27/2005 15:30	39107.63	292.545	41	54.47	12
11/1/2005 15:15	165	11/1/2005 16:30	36171.39	270.580	42	12.09	43
2/16/2005 7:10	89	2/16/2005 8:10	32979.79	246.705	43	9.94	51
3/27/2005 17:00	83	3/27/2005 17:10	32533.62	243.368	44	10.23	50
1/26/2005 4:40	95	1/26/2005 5:00	30099.40	225.159	45	9.23	52
5/14/2005 16:25	88	5/14/2005 17:00	24772.30	185.309	46	14.84	40
5/20/2005 6:10	121	5/20/2005 6:30	23141.53	173.110	47	15.80	38
6/3/2005 8:55	52	6/3/2005 9:15	22007.66	164.628	48	18.58	32
11/8/2005 14:45	59	11/8/2005 15:15	19616.64	146.742	49	10.67	47
11/6/2005 9:55	29	11/6/2005 10:00	18691.38	139.821	50	29.11	26
12/9/2005 4:00	65	12/9/2005 4:15	17178.81	128.506	51	10.59	48
9/26/2005 5:40	269	9/26/2005 5:50	15810.67	118.272	52	7.71	54
10/21/2005 7:25	40	10/21/2005 7:35	14581.90	109.080	53	11.07	46
11/9/2005 4:25	49	11/9/2005 4:35	13993.68	104.680	54	15.66	39
1/30/2005 12:55	67	1/30/2005 13:00	13538.21	101.273	55	8.92	53
12/25/2005 11:10	154	12/25/2005 12:50	12331.48	92.246	56	5.69	61
4/3/2005 1:50	295	4/3/2005 6:15	11925.46	89.208	57	5.97	59
4/27/2005 0:30	55	4/27/2005 1:00	11326.65	84.729	58	5.63	62
5/7/2005 13:25	35	5/7/2005 13:30	11131.37	83.268	59	11.51	45
6/14/2005 19:20	40	6/14/2005 19:30	8926.51	66.775	60	6.83	56
7/15/2005 17:50	44	7/15/2005 18:05	7314.85	54.719	61	6.05	58
4/20/2005 19:40	35	4/20/2005 19:45	6679.24	49.964	62	6.59	57
10/26/2005 7:35	123	10/26/2005 7:40	6672.82	49.916	63	3.78	67
7/21/2005 15:00	20	7/21/2005 15:05	5015.95	37.522	64	11.70	44
1/18/2005 0:00	642	1/18/2005 0:05	4777.03	35.735	65	0.46	70
8/26/2005 21:15	39	8/26/2005 21:20	4260.93	31.874	66	5.21	63
6/17/2005 1:30	30	6/17/2005 1:35	3740.61	27.982	67	5.85	60
6/16/2005 11:35	25	6/16/2005 11:40	2427.24	18.157	68	3.53	68
4/30/2005 6:45	20	4/30/2005 6:50	1944.87	14.549	69	3.80	66
3/9/2005 6:04	447	3/9/2005 7:05	1745.01	13.054	70	0.16	71
4/4/2005 7:01	64	4/4/2005 7:05	271.40	2.030	71	0.09	72
1/5/2005 4:39	154	1/5/2005 4:50	-53268.57	-398.476	72	1.40	69

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	M-12 to M-17	**Results Summary**	
Structures within Region	M-12, M-13, M-14, M-14A, M-15, M-16, and M-17	Number of Events:	73
Model ID	M-12 to M-17.1	Peak Volume:	1,237,617 ft^3
Structure Type	Consolidation		9.26 MG
PWSA Sewershed	N/A	Total Volume:	8,460,809 ft^3
Stream of Discharge	Monongahela River		63.29 MG
NPDES Permit Number	N/A	Peak Rate:	175.68 cfs
Owner	N/A		

Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Figure 1 - M-12 to M-17 CSO Volume

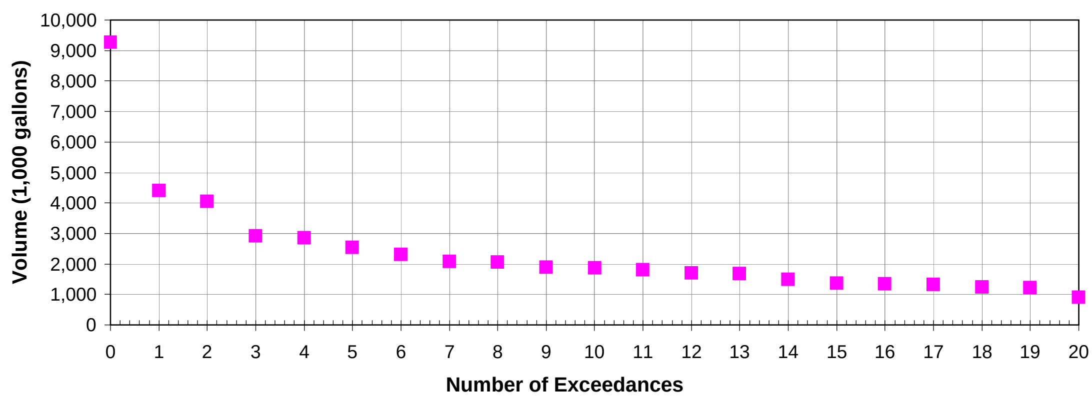
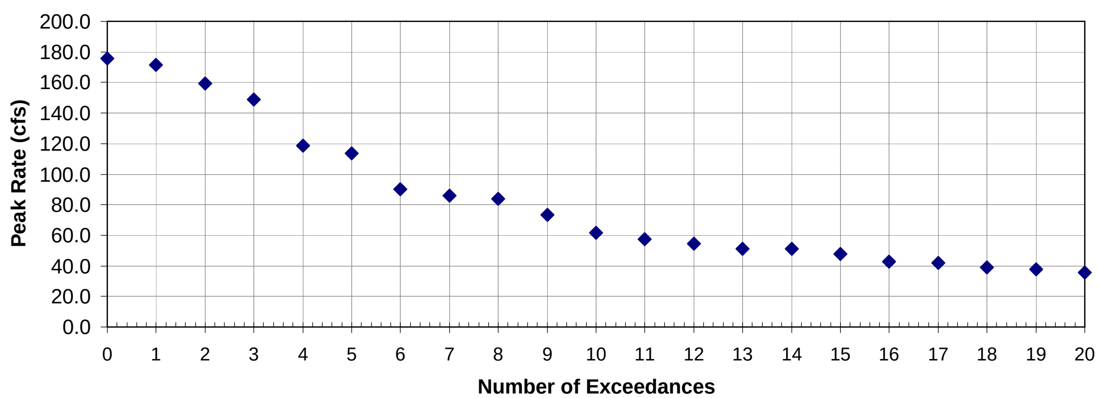


Figure 2 - M-12 to M-17 CSO Peak Flow Rate



D.35.2 M-12 TO M-17 REGION – ARLINGTON THROUGH 25TH STREET SEWERSHEDS – NPDES# 003DM12, 003DM13, 012AM14, 012AM14A, 012AM15, 012BM16, AND 012BM17

Description of Outfalls

The Arlington through 25th Street Sewersheds are located in portions of Allentown, Arlington, Arlington Heights, Mount Washington, South Shore, Southside Flats and Southside Slopes sections in the City of Pittsburgh. These sewersheds include approximately 1,369 acres of residential, business and commercial users that contribute flow to twenty-two (22) ALCOSAN outfalls. The sewershed has been divided into four regions, regions 1 through 4. Region 2 contains outfalls M-12, M-13, M-14, M-14A, M-15, M-16 and M-17. The M-12 tributary area consists of 26 acres of combined sewers, the M-13 tributary area consists of 13 acres of combined sewers, the M-14 tributary area consists of 16 acres of combined sewers, the M-14A tributary area consists of 17 acres of combined sewers, the M-15 tributary area consists of 6 acres of combined sewers, and the M-16 tributary area consists of 301 acres of combined sewers. The M-17 tributary area consists of 8 acres of combined sewers. The Arlington through 25th Street Sewersheds are comprised of approximately 1,184 manholes and 269,713 linear feet (51.1 miles) of sewer up to 90 inches in diameter. Outfalls 003DM12 through 012BM17 currently convey overflows from each of the respective ALCOSAN diversion chambers to the Monongahela River.

Attachment 1, Tributary Area Map, shows the CSO locations and the tributary areas.

Outfalls 003DM12 to 012BM17 typically experience 73 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 9.26 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from the outfalls is approximately 175.68 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

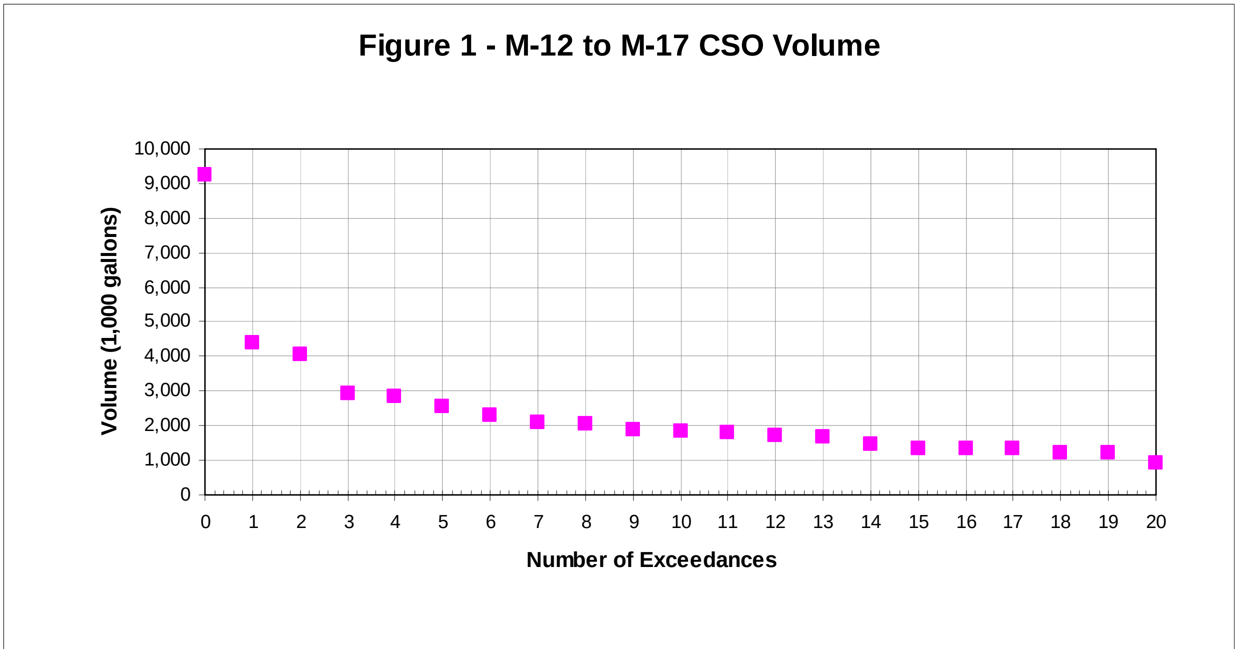


Figure 1 - M-12 to M-17 CSO Volume

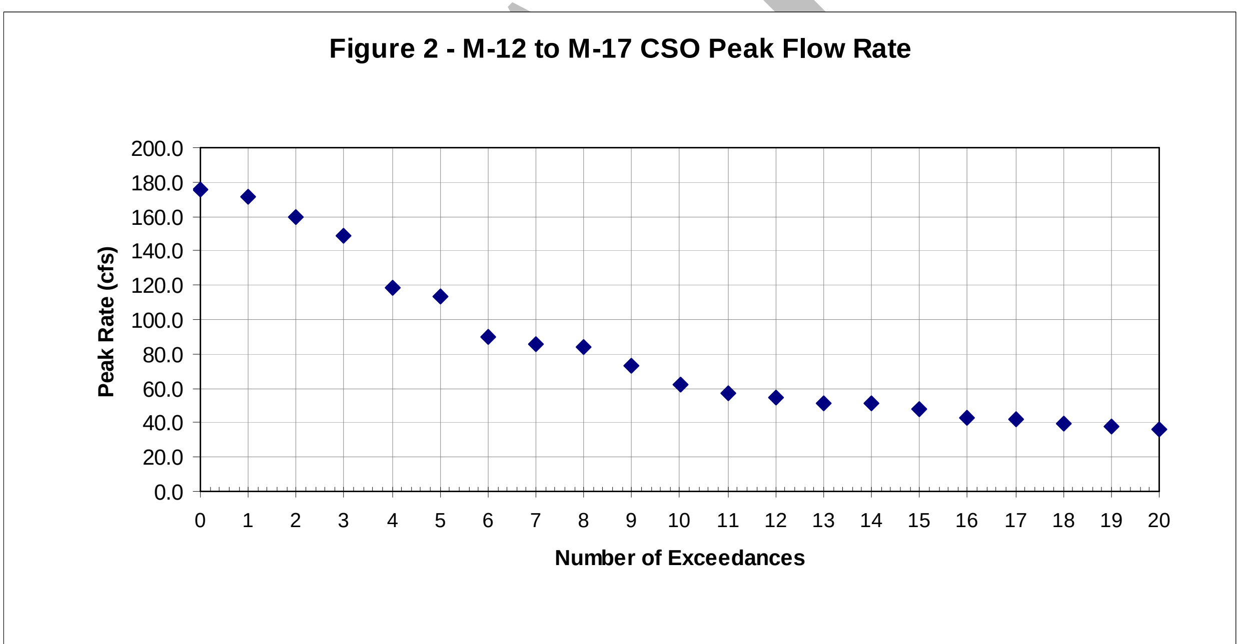


Figure 2 - M-12 to M-17 CSO Peak Flow Rate

A necessary component of all storage and treatment alternatives would be the construction of a consolidation sewer. The sewer is required to convey CSOs from outfalls 003DM12, 003DM13, 012AM14, 012AM14A, 012AM15 and 012BM17 to the vicinity of outfall 012BM16. There appears to be a limited amount of available space for potential storage or treatment facilities to the east of this outfall, north of the existing railroad tracks (between S. 20th Street and S. 21st

Street), near the existing riverfront park. The site is generally bounded by the Monongahela River to the north, railroad tracks to the south and private property to west and east.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4-M-12 TO M-17 REGION: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-M-12 TO M-17 REGION: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-M-12 TO M-17 REGION: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-M-12 TO M-17 REGION: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-M-12 TO M-17 REGION: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-M-12 TO M-17 REGION: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

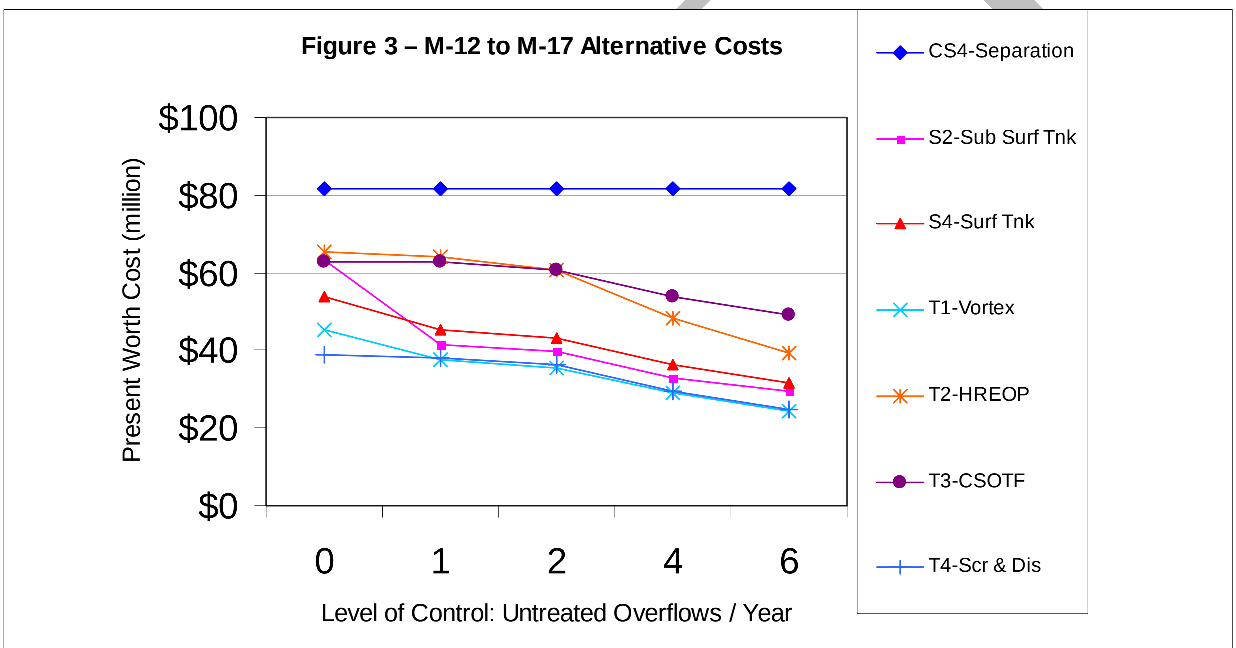
T4-M-12 TO M-17 REGION: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – M-12 to M-17 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall “ranking” at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

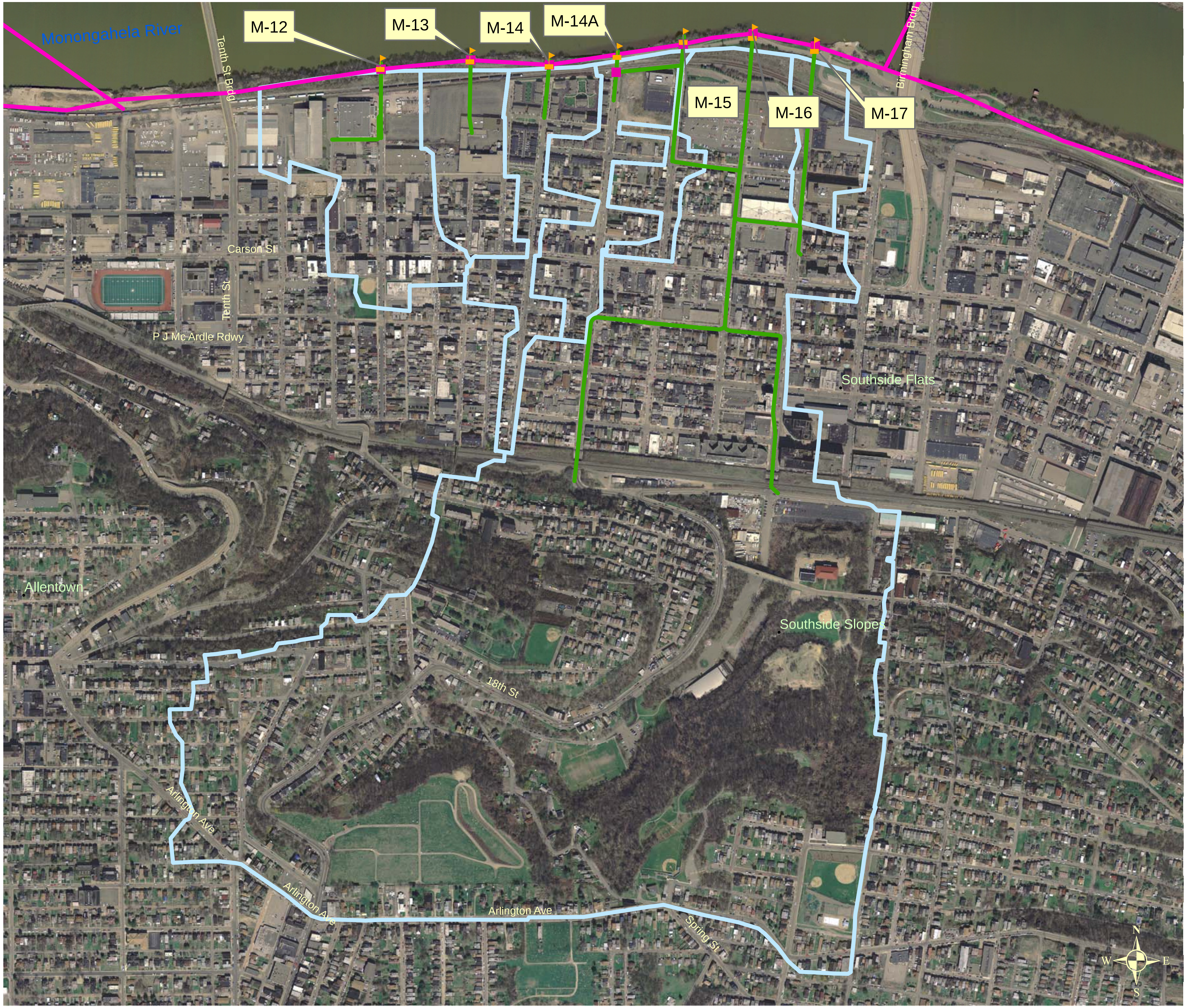
Recommendations

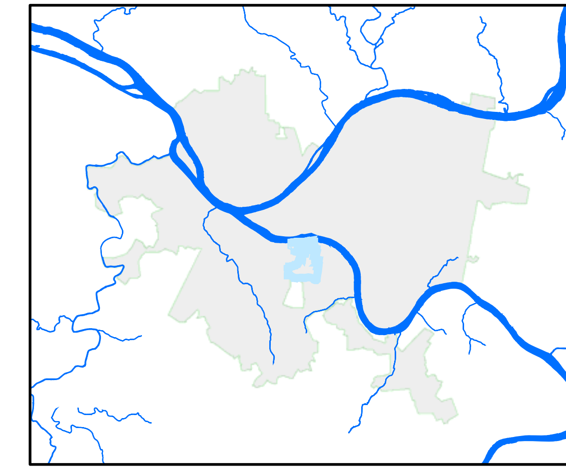
Based upon the above, for control level 0, it is recommended that Alternative S4- M-12 to M-17: Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analysis. For control levels 1 through 6, it is recommended that Alternative S2-M-12 to M-17 Region: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Several significant issues exist with the siting of a CSO storage and treatment facility. A site large enough to store control levels 0 and 1 does not appear to be available in the vicinity of outfall 012BM16. Installing a structure with a deeper sidewater depth could reduce the size of footprint required for a storage facility. Also, in order to consolidate CSOs to outfall 012BM16, it will need to be conveyed in an upstream direction, which may result in a deep gravity consolidation sewer. Construction of the consolidation sewers will also be a significant endeavor considering the congested infrastructure that exists along the river in this area.





Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

500 0 500
Feet

Attachment 1
M-12 to M-17
Tributary Area Map
Arlington through 25th St.
Sewershed

CSO Controls Alternatives

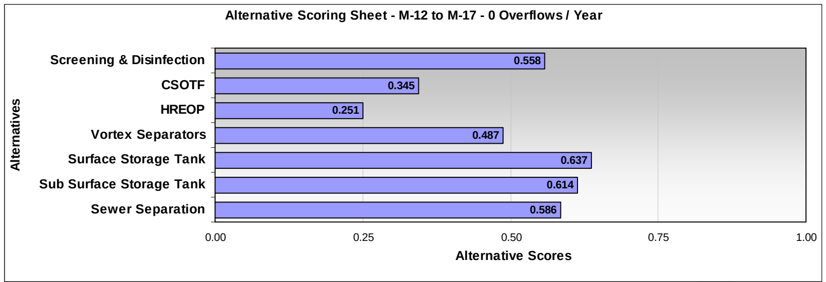
PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

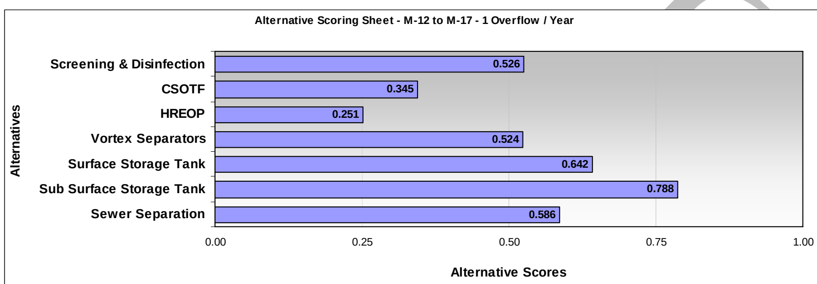
SW-D-0258.pdf

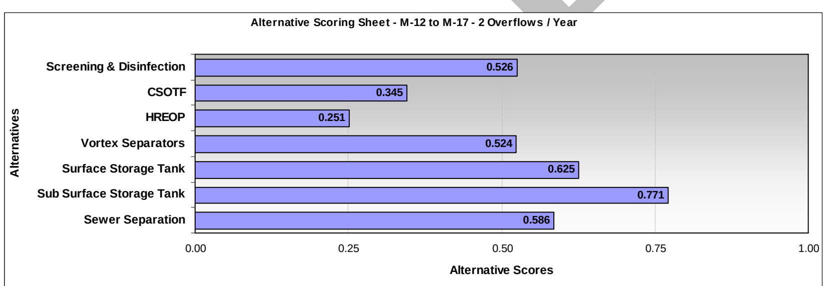
Attachment 2 - CSO Alternatives Development Worksheet

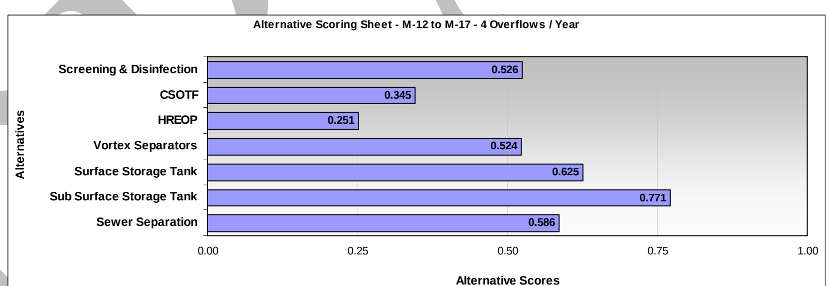
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will not be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

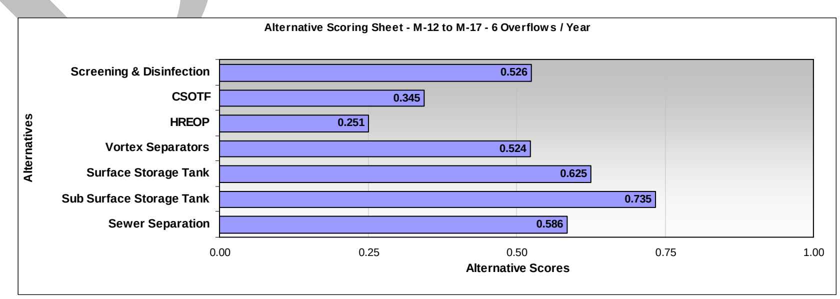
Attachment 3 – Alternative Scoring Sheet

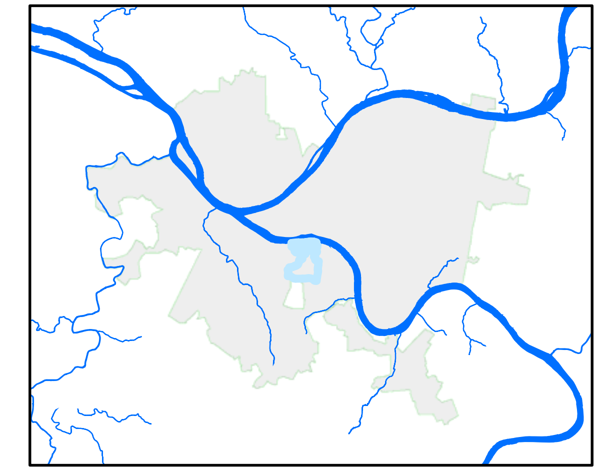












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 590 1,180 Feet

Attachment 4
M-12 to M-17
Facilities Boundary Map
Arlington through 25th St. Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0258.pdf

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	5	5	5	5	5
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	2	3	3	3	3
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	4	5	5	4	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

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Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific[…]					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.					
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	5	4	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.678**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.825**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.808**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.808**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.808**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.637**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.642**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.625**

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.625**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.625**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.487**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.487**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Total Score

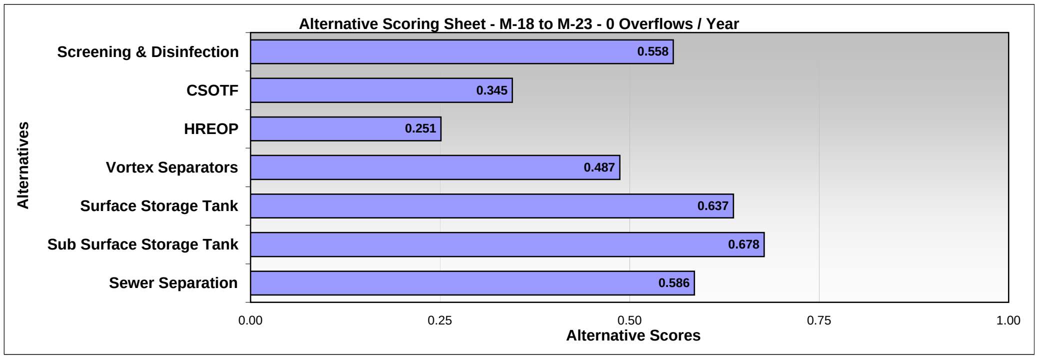
Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.558**

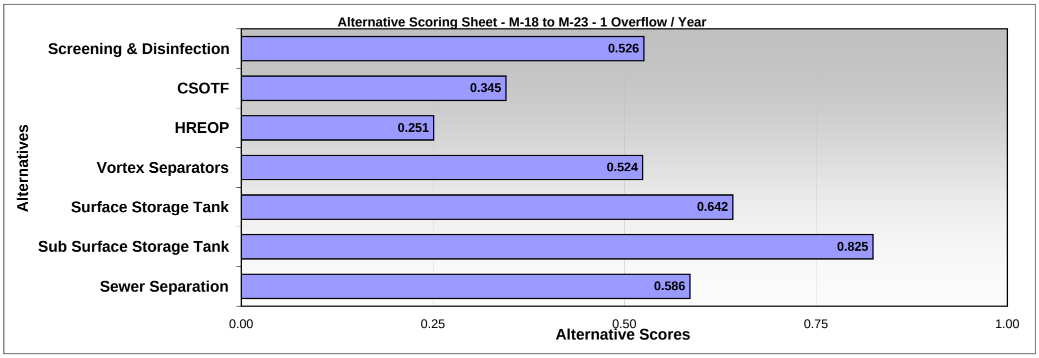
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

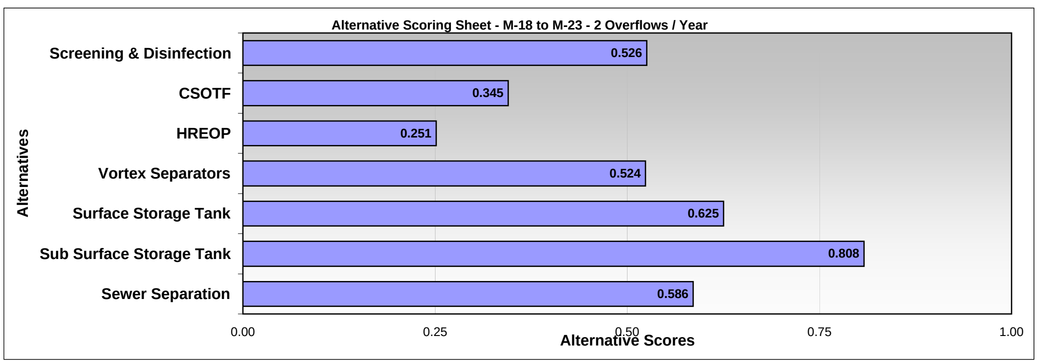
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

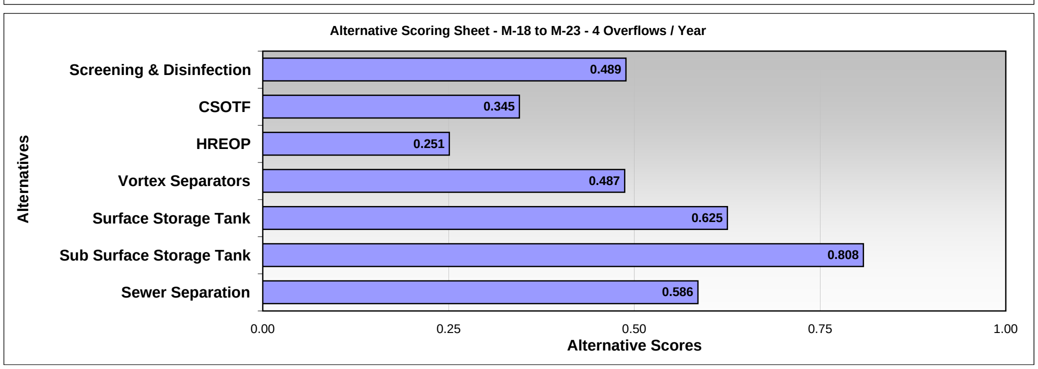
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.489**

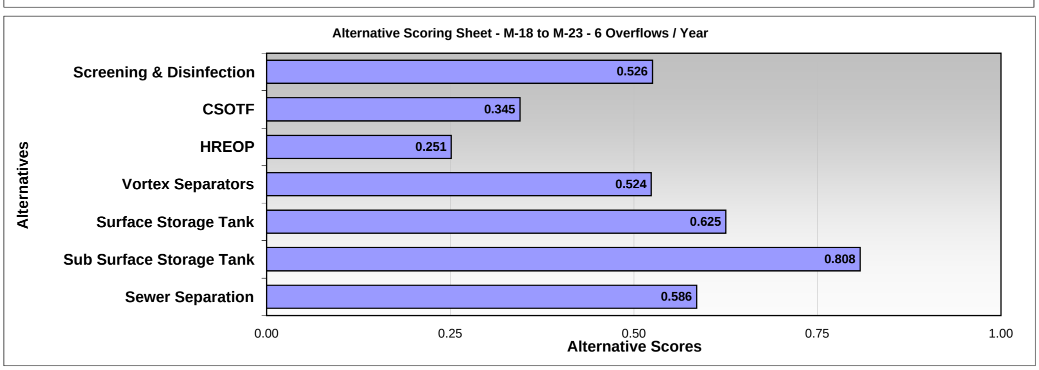
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**


Alternative Scoring Sheet - M-18 to M-23 - 0 Overflows / Year
Alternatives
Screening & Disinfection
0.558
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.487
Surface Storage Tank
0.637
Sub Surface Storage Tank
0.678
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - M-18 to M-23 - 1 Overflow / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.524
Surface Storage Tank
0.642
Sub Surface Storage Tank
0.825
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - M-18 to M-23 - 2 Overflows / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.524
Surface Storage Tank
0.625
Sub Surface Storage Tank
0.808
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - M-18 to M-23 - 4 Overflows / Year
Alternatives
Screening & Disinfection
0.489
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.487
Surface Storage Tank
0.625
Sub Surface Storage Tank
0.808
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - M-18 to M-23 - 6 Overflows / Year
Alternatives
Screening & Disinfection
0.526
CSOTF
0.345
HREOP
0.251
Vortex Separators
0.524
Surface Storage Tank
0.625
Sub Surface Storage Tank
0.808
Sewer Separation
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	0	
Peak Volume	912,169	CF
	6.82	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	156.47	CFS
	101.12	MGD

#N/A			
CONSOLIDATION SEWERS			
0 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,820	Input by Engineer
Peak Flow (CFS)		39.12	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	381,000	
Peak Flow (CFS)		78.23	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	570,000	
Peak Flow (CFS)		117.35	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	726,000	
Peak Flow (CFS)		156.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	906,000	
Construction Cost (Consolidation Sewers)	**$**	**2,583,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections			Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 2,735,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	0	
Peak Volume	912,169	CF
	6.82	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	156.47	CFS
	101.12	MGD

		#N/A		
		SEWER SEPARATION		
		0 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)				**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		242		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**48,400,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		105,415		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**211,000**		
			TOTAL CAPITAL COST	**$ 48,611,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	0	
Peak Volume	912,169	CF
	6.82	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	156.47	CFS
	101.12	MGD

#N/A				
SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		6.82	912,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		8.03	1,073,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		329		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		219		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		8.08	1,080,765	**Sufficient Volume**
Tank Area (SF)		72,000		= Length x Width
Construction Cost (Storage Tank)		**7,646,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		101.12	156.47	= Peak Rate
Force Main Diameter (In)		69		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,988,000**	**$ 83,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		156.47		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,610,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,050		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**469,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		101.12		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,094,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		6.82		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		3.41		= Peak Vol/DW Time
Construction Cost	**$**	**9,656,903**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		121,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**242,000**		
			TOTAL CAPITAL COST	**$ 40,212,903**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	0	
Peak Volume	912,169	CF
	6.82	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	156.47	CFS
	101.12	MGD

		#N/A		
		SUB-SURFACE STORAGE TANK		
		0 Overflows / Year		
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		6.82	912,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		8.03	1,073,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		329		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		219		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		8.08	1,080,765	**Sufficient Volume**
Tank Area (SF)		72,000		= Length x Width
Construction Cost (Storage Tank)		**21,927,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		6.82	10.56	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		18		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,455,000**	**$ 26,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		156.47		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,610,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		80,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,852,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		101.12		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,094,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		6.82		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		3.41		= Peak Vol/DW Time
Construction Cost	**$**	**9,656,903**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		121,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**242,000**		
			TOTAL CAPITAL COST	**$ 45,286,903**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	0	
Peak Volume	912,169	CF
	6.82	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	156.47	CFS
	101.12	MGD

	#N/A			
	SWIRL CONCENTRATOR / VORTEX SEPARATOR			
	0 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		101.12	156.47	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		11		
Construction Cost (Swirl / Vortex)	**$**	**5,068,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		111.23	172.12	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		73		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,222,000**	**$ 89,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		156.47		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		317,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		15,850		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**798,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		101.12		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,094,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		111.23		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		165	79	
Passes / Detention (Min)		7	**15.15**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,099,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		105,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**210,000**		
			TOTAL CAPITAL COST	**$ 31,614,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	0	
Peak Volume	912,169	CF
	6.82	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	156.47	CFS
	101.12	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
0 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		101.12	156.47	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		16,900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		185	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		92	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.53	204,240	
Construction Cost (CSOTF)	**$**	**16,604,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		101.12	156.47	= Peak Rate
Force Main Diameter (In)		69		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,988,000**	**$ 83,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		156.47		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		306,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		15,300		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**776,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		101.12		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,094,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		101.12		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		158	75	
Passes / Detention (Min)		7	**15.15**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,990,000**		
7. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.53		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.76		= Peak Vol/DW Time
Construction Cost	**$**	**8,370,818**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
9. Land Acquisition Parameters				
Land Required - CSOTF (SF)		46,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**92,000**		
			TOTAL CAPITAL COST	**$ 50,031,818**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	0	
Peak Volume	912,169	CF
	6.82	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	156.47	CFS
	101.12	MGD

#N/A

HIGH RATE END OF PIPE TREATMENT (HREOP)

0 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		101.12	156.47	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,190		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		50	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		25	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**17,999,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		111.23	172.12	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		73		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,222,000**	**$ 89,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		156.47		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		30,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**126,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		101.12		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,094,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		111.23		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		165	79	
Passes / Detention (Min)		7	15.15	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,099,000	$ 2,554,000	
Construction Cost (Disinfection)	**$**	**4,653,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		69,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**138,000**		
			TOTAL CAPITAL COST	**$ 46,355,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	0	
Peak Volume	912,169	CF
	6.82	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	156.47	CFS
	101.12	MGD

	#N/A			
	SCREENING AND DISINFECTION			
	0 Overflows / Year			
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		101.12	156.47	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,094,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		101.12	156.47	= Peak Flow x % Req Pump
Force Main Diameter (In)		69		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,988,000**	**$ 83,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		156.47		Ref: CSO Statistics
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		31,300		=CFS x 200
Odor Control Flow Rate (CFM)		1,570		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**130,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		101.12		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		158	75	
Passes / Detention (Min)		7	**15.15**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,990,000	$ 2,387,000	
Construction Cost (Disinfection)	**$**	**4,377,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		33,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**		
			TOTAL CAPITAL COST	**$ 26,772,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	1	
Peak Volume	365,674	CF
	2.74	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	154.81	CFS
	100.05	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	1 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,820	Width of Sewershed along Riverline
Peak Flow (CFS)		39.12	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	381,000	
Peak Flow (CFS)		78.23	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	570,000	
Peak Flow (CFS)		117.35	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	726,000	
Peak Flow (CFS)		156.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	906,000	
Construction Cost (Consolidation Sewers)	**$**	**2,583,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 2,735,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	1	
Peak Volume	365,674	CF
	2.74	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	154.81	CFS
	100.05	MGD

	#N/A		
	SEWER SEPARATION		
	1 Overflows / Year		
1. Sewer Separation Parameters			
Drainage Area - Suburban Areas (Acres)	0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas	100%		Complete Separation
Drainage Area - Urban Areas (Acres)	242		Ref: CSO Statistics
% Separation - Urban Areas	100%		Complete Separation
Construction Cost (Sewer Separation) $	**48,400,000**		
2. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Reg Mod Only
Number Regulators			Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators) $	**-**		
3. Land Acquisition Parameters			
Land Acquisition - Sewer Separation (SF)	105,415		1% Drainage Area
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**211,000**		
		TOTAL CAPITAL COST $	**48,611,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	1	
Peak Volume	365,674	CF
	2.74	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	154.81	CFS
	100.05	MGD

		#N/A		
		SURFACE STORAGE TANK		
		1 Overflows / Year		
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.74	366,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.22	431,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		209		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		139		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.26	435,765	**Sufficient Volume**
Tank Area (SF)		29,000		= Length x Width
Construction Cost (Storage Tank)		**2,823,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		100.05	154.81	= Peak Rate
Force Main Diameter (In)		69		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,858,000**	**$ 83,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		154.81		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		647,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,240		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**230,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,045,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.74		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.37		= Peak Vol/DW Time
Construction Cost	**$**	**8,663,987**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		60,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**120,000**		
			TOTAL CAPITAL COST	**$ 33,856,987**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	1	
Peak Volume	365,674	CF
	2.74	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	154.81	CFS
	100.05	MGD

#N/A				
SUB-SURFACE STORAGE TANK				
1 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.74	366,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.22	431,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		209		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		139		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.26	435,765	**Sufficient Volume**
Tank Area (SF)		29,000		= Length x Width
Construction Cost (Storage Tank)		**9,338,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.74	4.23	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		11		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,839,000**	**$ 20,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		154.81		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		647,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		32,350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,396,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,045,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.74		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.37		= Peak Vol/DW Time
Construction Cost	**$**	**8,663,987**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		60,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**120,000**		
			TOTAL CAPITAL COST	**$ 29,455,987**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	1	
Peak Volume	365,674	CF
	2.74	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	154.81	CFS
	100.05	MGD

	#N/A			
	SWIRL CONCENTRATOR / VORTEX SEPARATOR			
	1 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		100.05	154.81	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		110.06	170.29	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		72		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,078,000**	**$ 88,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		154.81		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,045,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		110.06		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		164	79	
Passes		7	**15.22**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,087,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		104,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**208,000**		
			TOTAL CAPITAL COST	**$ 25,540,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	1	
Peak Volume	365,674	CF
	2.74	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	154.81	CFS
	100.05	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
1 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		100.05	154.81	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		16,700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		184	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		92	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.52	203,136	
Construction Cost (CSOTF)	**$**	**16,600,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		100.05	154.81	= Peak Rate
Force Main Diameter (In)		69		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,858,000**	**$ 83,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		154.81		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		305,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		15,250		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**774,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,045,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		100.05		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		157	75	
Passes		7	**15.21**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,978,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.74		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.37		= Peak Vol/DW Time
Construction Cost	**$**	**8,663,987**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		45,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**90,000**		
			TOTAL CAPITAL COST	**$ 50,125,987**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	1	
Peak Volume	365,674	CF
	2.74	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	154.81	CFS
	100.05	MGD

	#N/A			
	HIGH RATE END OF PIPE TREATMENT (HREOP)			
	1 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)	100.05		154.81	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	1,180			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	50		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	25		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP) $	**17,810,000**			
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)	100%			Ref: Technical Parameters
Underflow Rate (%)	10%			Ref: Technical Parameters
Dewatering Time (Days)	1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	110.06		170.29	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)	72			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100			Input by Engineer
Construction Cost (PS / Force Main) $	**15,078,000**	**$**	**88,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)	154.81			Ref: Technical Parameters
Diameter (In)	90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-			Input by Engineer
Depth (Ft)	-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)	3			Ref: Technical Parameters
Volume of Ventilated Space (CF)	30,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)	1,500			= ACH x Volume / 60
Construction Cost (Odor Control) $	**126,000**			
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)	1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	100.05			Ref: CSO Statistics
Construction Cost (Screening) $	**5,045,000**			
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)	1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)	110.06			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	164		79	
Passes	7		**15.22**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank) $	2,087,000	$	2,541,000	
Construction Cost (Disinfection) $	**4,628,000**			
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4		**Modify Regulator**	Input by Engineer
Number Regulators	1			Input by Engineer
New Vortex Drop Shaft	1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**			
8. Land Acquisition Parameters				
Land Required - HREOP (SF)	68,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF) $	2			Ref: Technical Parameters
Land Acquisition Cost $	**136,000**			
			TOTAL CAPITAL COST $	**45,945,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	1	
Peak Volume	365,674	CF
	2.74	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	154.81	CFS
	100.05	MGD

#N/A					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		100.05		154.81	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,045,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		100.05		154.81	= Peak Flow x % Req Pump
Force Main Diameter (In)		69			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,858,000**	**$**	**83,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		154.81			Ref: CSO Statistics
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		31,000			=CFS x 200
Odor Control Flow Rate (CFM)		1,550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**129,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		100.05			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		157		75	
Passes		7		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,978,000	$	2,374,000	
Construction Cost (Disinfection)	**$**	**4,352,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		33,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**			
				TOTAL CAPITAL COST	**$ 26,567,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	2	
Peak Volume	327,341	CF
	2.45	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	147.07	CFS
	95.04	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	2 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,820	Width of Sewershed along Riverline
Peak Flow (CFS)		39.12	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	381,000	
Peak Flow (CFS)		78.23	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	570,000	
Peak Flow (CFS)		117.35	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	726,000	
Peak Flow (CFS)		156.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	906,000	
Construction Cost (Consolidation Sewers)	**$**	**2,583,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 2,735,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	2	
Peak Volume	327,341	CF
	2.45	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	147.07	CFS
	95.04	MGD

		#N/A		
		SEWER SEPARATION		
		2 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		242		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**48,400,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		105,415		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**211,000**		
			TOTAL CAPITAL COST	**$ 48,611,000**

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RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	2	
Peak Volume	327,341	CF
	2.45	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	147.07	CFS
	95.04	MGD

#N/A

SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.45	327,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.88	385,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		197		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		132		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.92	390,060	**Sufficient Volume**
Tank Area (SF)		26,000		= Length x Width
Construction Cost (Storage Tank)		**2,502,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		95.04	147.07	= Peak Rate
Force Main Diameter (In)		67		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,247,000**	**$ 81,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		147.07		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		578,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,890		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**210,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		95.04		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,813,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		2.45		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.22		= Peak Vol/DW Time
Construction Cost	**$**	**8,594,368**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		56,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**112,000**		
			TOTAL CAPITAL COST	**$ 32,593,368**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	2	
Peak Volume	327,341	CF
	2.45	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	147.07	CFS
	95.04	MGD

#N/A					
SUB-SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		2.45		327,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.88		385,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		197			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		132			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.92		390,060	**Sufficient Volume**
Tank Area (SF)		26,000			= Length x Width
Construction Cost (Storage Tank)		**8,455,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.45		3.79	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		11			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.7		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,789,000**	**$**	**20,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		147.07			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		578,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		28,900			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,278,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		95.04			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,813,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		2.45			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.22			= Peak Vol/DW Time
Construction Cost	**$**	**8,594,368**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		56,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**112,000**			
				TOTAL CAPITAL COST	**$ 28,095,368**

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RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	2	
Peak Volume	327,341	CF
	2.45	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	147.07	CFS
	95.04	MGD

	#N/A		
	SWIRL CONCENTRATOR / VORTEX SEPARATOR		
	2 Overflows / Year		
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	95.04	147.07	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	104.55	161.77	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	70		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**14,407,000**	**$ 85,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	147.07		Ref: Technical Parameters
Diameter (In)	78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	95.04		Ref: CSO Statistics
Construction Cost (Screening) $	**4,813,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	104.55		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	160	77	
Passes	7	**15.23**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**2,028,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	99,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**198,000**		
		TOTAL CAPITAL COST	**$ 24,565,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	2	
Peak Volume	327,341	CF
	2.45	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	147.07	CFS
	95.04	MGD

	#N/A		
	SEDIMENTATION BASIN (CSOTF)		
	2 Overflows / Year		
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	95.04	147.07	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	15,900		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	179	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	90	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	1.45	193,320	
Construction Cost (CSOTF) $	**16,571,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	95.04	147.07	= Peak Rate
Force Main Diameter (In)	67		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**13,247,000**	**$ 81,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	147.07		Ref: Technical Parameters
Diameter (In)	78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	290,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	14,500		= ACH x Volume / 60
Construction Cost (Odor Control) $	**744,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	95.04		Ref: CSO Statistics
Construction Cost (Screening) $	**4,813,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	95.04		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	153	73	
Passes	7	**15.19**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**1,920,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	2.45		Sed Basin Volume
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	1.22		= Peak Vol/DW Time
Construction Cost $	**8,594,368**		
8. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	43,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**86,000**		
		TOTAL CAPITAL COST	**$ 49,090,368**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	2	
Peak Volume	327,341	CF
	2.45	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	147.07	CFS
	95.04	MGD

		#N/A			
		HIGH RATE END OF PIPE TREATMENT (HREOP)			
		2 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		95.04		147.07	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,120			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		48		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		24		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**16,932,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		104.55		161.77	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		70			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,407,000**	**$**	**85,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		147.07			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		28,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**119,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		95.04			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,813,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		104.55			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		160		77	
Passes		7		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,028,000	$	2,450,000	
Construction Cost (Disinfection)	**$**	**4,478,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		66,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**132,000**			
				TOTAL CAPITAL COST	**$ 44,000,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	2	
Peak Volume	327,341	CF
	2.45	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	147.07	CFS
	95.04	MGD

#N/A					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		95.04		147.07	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,813,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		95.04		147.07	= Peak Flow x % Req Pump
Force Main Diameter (In)		67			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,247,000**	**$**	**81,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		147.07			Ref: CSO Statistics
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,400			=CFS x 200
Odor Control Flow Rate (CFM)		1,470			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**124,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		95.04			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		153		73	
Passes		7		**15.19**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,920,000	$	2,286,000	
Construction Cost (Disinfection)	**$**	**4,206,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		33,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**			
				TOTAL CAPITAL COST	**$ 25,571,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	4	
Peak Volume	261,327	CF
	1.95	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	139.27	CFS
	90.01	MGD

#N/A			
CONSOLIDATION SEWERS			
4 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,820	Width of Sewershed along Riverline
Peak Flow (CFS)		39.12	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	381,000	
Peak Flow (CFS)		78.23	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	570,000	
Peak Flow (CFS)		117.35	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	726,000	
Peak Flow (CFS)		156.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	906,000	
Construction Cost (Consolidation Sewers)	**$**	**2,583,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 2,735,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	4	
Peak Volume	261,327	CF
	1.95	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	139.27	CFS
	90.01	MGD

	#N/A			
	SEWER SEPARATION			
	4 Overflows / Year			
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		242		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**48,400,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		105,415		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**211,000**		
			TOTAL CAPITAL COST	**$ 48,611,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	4	
Peak Volume	261,327	CF
	1.95	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	139.27	CFS
	90.01	MGD

#N/A				
SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.95	261,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.30	307,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		176		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		118		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.33	311,520	**Sufficient Volume**
Tank Area (SF)		21,000		= Length x Width
Construction Cost (Storage Tank)		**1,958,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		90.01	139.27	= Peak Rate
Force Main Diameter (In)		65		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**12,632,000**	**$ 78,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		139.27		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		461,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,310		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**176,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		90.01		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,580,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.95		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.98		= Peak Vol/DW Time
Construction Cost	**$**	**8,474,482**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		48,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**96,000**		
			TOTAL CAPITAL COST	**$ 31,028,482**

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RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	4	
Peak Volume	261,327	CF
	1.95	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	139.27	CFS
	90.01	MGD

#N/A			
SUB-SURFACE STORAGE TANK			
4 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	1.95	261,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	2.30	307,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	176		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	118		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	2.33	311,520	**Sufficient Volume**
Tank Area (SF)	21,000		= Length x Width
Construction Cost (Storage Tank)	**6,934,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.95	3.02	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.5	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,701,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	139.27		Ref: Technical Parameters
Diameter (In)	78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	461,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	23,050		= ACH x Volume / 60
Construction Cost (Odor Control) $	**1,070,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	90.01		Ref: CSO Statistics
Construction Cost (Screening) $	**4,580,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	1.95		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	0.98		= Peak Vol/DW Time
Construction Cost $	**8,474,482**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	48,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**96,000**		
		TOTAL CAPITAL COST $	**25,908,482**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	4	
Peak Volume	261,327	CF
	1.95	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	139.27	CFS
	90.01	MGD

#N/A				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
4 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		90.01	139.27	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		99.01	153.20	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		68		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,730,000**	**$ 82,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		139.27		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		90.01		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,580,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		99.01		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		156	75	
Passes		7	**15.27**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,966,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		93,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**186,000**		
			TOTAL CAPITAL COST	**$ 23,578,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	4	
Peak Volume	261,327	CF
	1.95	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	139.27	CFS
	90.01	MGD

#N/A

SEDIMENTATION BASIN (CSOTF)

4 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		90.01		139.27	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		15,100			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		175		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		87		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.37		182,700	
Construction Cost (CSOTF)	**$**	**16,542,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		90.01		139.27	= Peak Rate
Force Main Diameter (In)		65			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**12,632,000**	**$**	**78,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		139.27			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		274,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		13,700			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**712,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		90.01			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,580,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		90.01			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		149		71	
Passes		7		**15.19**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,858,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		1.95			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.98			= Peak Vol/DW Time
Construction Cost	**$**	**8,474,482**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		41,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**82,000**			
				TOTAL CAPITAL COST	**$ 47,992,482**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	4	
Peak Volume	261,327	CF
	1.95	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	139.27	CFS
	90.01	MGD

		#N/A			
		HIGH RATE END OF PIPE TREATMENT (HREOP)			
		4 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		90.01		139.27	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,060			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		47		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		24		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**16,052,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		99.01		153.20	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		68			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,730,000**	**$**	**82,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		139.27			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		27,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,350			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**116,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		90.01			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,580,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		99.01			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		156		75	
Passes		7		**15.27**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,966,000	$	2,361,000	
Construction Cost (Disinfection)	**$**	**4,327,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		64,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**128,000**			
			TOTAL CAPITAL COST	**$**	**42,049,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	4	
Peak Volume	261,327	CF
	1.95	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	139.27	CFS
	90.01	MGD

		#N/A		
		SCREENING AND DISINFECTION		
		4 Overflows / Year		
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		90.01	139.27	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,580,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		90.01	139.27	= Peak Flow x % Req Pump
Force Main Diameter (In)		65		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**12,632,000**	**$ 78,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		139.27		Ref: CSO Statistics
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		27,900		=CFS x 200
Odor Control Flow Rate (CFM)		1,400		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**119,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		90.01		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		149	71	
Passes		7	**15.19**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,858,000	$ 2,200,000	
Construction Cost (Disinfection)	**$**	**4,058,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		32,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**64,000**		
			TOTAL CAPITAL COST	**$ 24,565,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	6	
Peak Volume	234,834	CF
	1.76	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	94.46	CFS
	61.05	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	6 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		1,820	Width of Sewershed along Riverline
Peak Flow (CFS)		39.12	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	381,000	
Peak Flow (CFS)		78.23	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	570,000	
Peak Flow (CFS)		117.35	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	726,000	
Peak Flow (CFS)		156.47	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		455	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	906,000	
Construction Cost (Consolidation Sewers)	**$**	**2,583,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 2,735,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	6	
Peak Volume	234,834	CF
	1.76	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	94.46	CFS
	61.05	MGD

		#N/A		
		SEWER SEPARATION		
		6 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		242		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**48,400,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		105,415		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**211,000**		
			TOTAL CAPITAL COST **$**	**48,611,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	6	
Peak Volume	234,834	CF
	1.76	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	94.46	CFS
	61.05	MGD

	#N/A		
	SURFACE STORAGE TANK		
	6 Overflows / Year		
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	1.76	235,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	2.07	276,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	Sufficient Depth	Ref: Tech Par, Rev as Req'd
Length (Ft)	167		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	112		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	2.10	280,560	Sufficient Volume
Tank Area (SF)	19,000		= Length x Width
Construction Cost (Storage Tank)	**1,742,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Rev as Req'd Ref: Tech Par
Influent Pumping Rate (MGD / CFS)	61.05	94.46	= Peak Rate
Force Main Diameter (In)	54		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**9,099,000**	**$ 64,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	94.46		Ref: Technical Parameters
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	414,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	2,070		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**162,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	61.05		Ref: CSO Statistics
Construction Cost (Screening) $	**3,239,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	1.76		Ref: CSO Statistics
Dewatering Time (Days)	2		Typ 2, Rev as Req'd
Dewatering Pumping Rate (MGD)	0.88		= Peak Vol/DW Time
Construction Cost $	**8,426,372**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	45,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**90,000**		
		TOTAL CAPITAL COST	**$ 25,856,372**

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RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	6	
Peak Volume	234,834	CF
	1.76	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	94.46	CFS
	61.05	MGD

		#N/A			
		SUB-SURFACE STORAGE TANK			
		6 Overflows / Year			
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		1.76		235,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		2.07		276,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		167			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		112			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		2.10		280,560	**Sufficient Volume**
Tank Area (SF)		19,000			= Length x Width
Construction Cost (Storage Tank)		**6,324,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.76		2.72	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		9			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,665,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		94.46			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		414,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		20,700			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**984,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		61.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		1.76			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.88			= Peak Vol/DW Time
Construction Cost	**$**	**8,426,372**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		45,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**90,000**			
				TOTAL CAPITAL COST	**$ 23,781,372**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	6	
Peak Volume	234,834	CF
	1.76	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	94.46	CFS
	61.05	MGD

		#N/A		
		SWIRL CONCENTRATOR / VORTEX SEPARATOR		
		6 Overflows / Year		
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		61.05	94.46	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		67.15	103.91	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		56		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,844,000**	**$ 67,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		94.46		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		61.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		67.15		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		129	61	
Passes		5	**15.15**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,549,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		63,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**126,000**		
			TOTAL CAPITAL COST	**$ 17,859,000**

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RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	6	
Peak Volume	234,834	CF
	1.76	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	94.46	CFS
	61.05	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
6 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		61.05	94.46	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10,200		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		144	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		72	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.93	124,416	
Construction Cost (CSOTF)	**$**	**16,422,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		61.05	94.46	= Peak Rate
Force Main Diameter (In)		54		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,099,000**	**$ 64,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		94.46		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		187,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		9,350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**528,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		61.05		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		61.05		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		123	59	
Passes		5	**15.37**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,457,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.76		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.88		= Peak Vol/DW Time
Construction Cost	**$**	**8,426,372**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		30,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST	**$ 42,329,372**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	6	
Peak Volume	234,834	CF
	1.76	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	94.46	CFS
	61.05	MGD

#N/A					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		61.05		94.46	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		720			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		39		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		19		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**11,097,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		67.15		103.91	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		56			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,844,000**	**$**	**67,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		94.46			Ref: Technical Parameters
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		18,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		900			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**84,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		61.05			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		67.15			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		129		61	
Passes		5		15.15	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,549,000	$	1,618,000	
Construction Cost (Disinfection)	**$**	**3,167,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		50,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**100,000**			
				TOTAL CAPITAL COST	**$ 30,632,000**

RESULTS SUMMARY		
Number of Events / Year	63	
Number of Overflows / Year	6	
Peak Volume	234,834	CF
	1.76	MG
Total Volume	6,129,569	CF
	45.85	MG
Peak Rate	94.46	CFS
	61.05	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		6 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		61.05		94.46	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,239,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		61.05		94.46	= Peak Flow x % Req Pump
Force Main Diameter (In)		54			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**9,099,000**	**$**	**64,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		94.46			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**2,735,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		18,900			=CFS x 200
Odor Control Flow Rate (CFM)		950			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**88,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		61.05			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		123		59	
Passes		5		**15.37**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,457,000	$	1,525,000	
Construction Cost (Disinfection)	**$**	**2,982,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		29,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**58,000**			
				TOTAL CAPITAL COST	**$ 18,564,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	101.12	$410,699	20	10.910	$4,480,704
	Tank O&M	No. Events / Yr	63	$57,822	50	14.484	$837,473
		Const Cost ($)	$7,646,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	101	$17,684	20	10.910	$192,934
	Odor Control O&M	Capacity (cfm)	8,050	$28,175	20	10.910	$307,388
	Reserve / Replace	10% Gravity / 15% Pump					$72,202
			Total Annual O&M	**$515,000**		**Total PW O&M**	**$5,891,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	6.82	$67,806	20	10.910	$739,760
	Tank O&M	No. Events / Yr	63	$93,525	50	14.484	$1,354,574
		Const Cost ($)	$21,927,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	101	$17,684	20	10.910	$192,934
	Odor Control O&M	Capacity (cfm)	80,500	$281,750	20	10.910	$3,073,875
	Reserve / Replace	10% Gravity / 15% Pump					$31,630
			Total Annual O&M	**$461,000**		**Total PW O&M**	**$5,393,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	101.12	$410,699	20	10.910	$4,480,704
	Sed. Basin O&M	Flow Rate (mgd)	101.12	$11,376	50	14.484	$164,767
	Screening O&M	Flow Rate (mgd)	101.12	$17,684	20	10.910	$192,934
	Disinfection O&M	Flow Rate (mgd)	101.12	$267,692	20	10.910	$2,920,509
	Odor Control O&M	Capacity (cfm)	15,300.00	$53,550	20	10.910	$584,227
	Reserve / Replace	10% Gravity / 15% Pump					$78,450
			Total Annual O&M	**$762,000**		**Total PW O&M**	**$8,422,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	111.23	$437,702	20	10.910	$4,775,300
	HREP O&M	Flow Rate (mgd)	101.12	$351,767	20	10.910	$3,837,753
	Screening O&M	Flow Rate (mgd)	101.12	$17,684	20	10.910	$192,934
	Disinfection O&M	Flow Rate (mgd)	111.23	$283,696	20	10.910	$3,095,102
	Odor Control O&M	Capacity (cfm)	1,500.00	$5,250	20	10.910	$57,277
	Reserve / Replace	10% Gravity / 15% Pump					$130,971
			Total Annual O&M	**$1,097,000**		**Total PW O&M**	**$12,089,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	111.23	$437,702	20	10.910	$4,775,300
	Swirl / Vortex O&M	Flow Rate (mgd)	101.12	$11,376	20	10.910	$124,113
	Screening O&M	Flow Rate (mgd)	101.12	$17,684	20	10.910	$192,934
	Disinfection O&M	Flow Rate (mgd)	111.23	$283,696	20	10.910	$3,095,102
	Odor Control O&M	Capacity (cfm)	15,850.00	$55,475	20	10.910	$605,229
	Reserve / Replace	10% Gravity / 15% Pump					$90,734
			Total Annual O&M	**$806,000**		**Total PW O&M**	**$8,883,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	101.12	$410,699	20	10.910	$4,480,704
	Screening O&M	Flow Rate (mgd)	101.12	$17,684	20	10.910	$192,934
	Disinfection O&M	Flow Rate (mgd)	101.12	$267,692	20	10.910	$2,920,509
	Odor Control O&M	Capacity (cfm)	1,570.00	$5,495	20	10.910	$59,950
	Reserve / Replace	10% Gravity / 15% Pump					$76,693
			Total Annual O&M	**$702,000**		**Total PW O&M**	**$7,731,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	100.05	$407,788	20	10.910	$4,448,945
	Tank O&M	No. Events / Yr	63	$45,765	50	14.484	$662,837
		Const Cost ($)	$2,823,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	100	$17,556	20	10.910	$191,536
	Odor Control O&M	Capacity (cfm)	3,240	$11,340	20	10.910	$123,719
	Reserve / Replace	10% Gravity / 15% Pump					$70,889
			Total Annual O&M	**$483,000**		**Total PW O&M**	**$5,498,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.74	$36,817	20	10.910	$401,668
	Tank O&M	No. Events / Yr	63	$62,052	50	14.484	$898,739
		Const Cost ($)	$9,338,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	100	$17,556	20	10.910	$191,536
	Odor Control O&M	Capacity (cfm)	32,350	$113,225	20	10.910	$1,235,278
	Reserve / Replace	10% Gravity / 15% Pump					$25,023
			Total Annual O&M	**$230,000**		**Total PW O&M**	**$2,752,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	100.05	$407,788	20	10.910	$4,448,945
	Sed. Basin O&M	Flow Rate (mgd)	100.05	$11,256	50	14.484	$163,023
	Screening O&M	Flow Rate (mgd)	100.05	$17,556	20	10.910	$191,536
	Disinfection O&M	Flow Rate (mgd)	100.05	$265,962	20	10.910	$2,901,627
	Odor Control O&M	Capacity (cfm)	15,250.00	$53,375	20	10.910	$582,318
	Reserve / Replace	10% Gravity / 15% Pump					$77,748
			Total Annual O&M	**$756,000**		**Total PW O&M**	**$8,365,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	110.06	$434,599	20	10.910	$4,741,453
	HREP O&M	Flow Rate (mgd)	100.05	$349,571	20	10.910	$3,813,799
	Screening O&M	Flow Rate (mgd)	100.05	$17,556	20	10.910	$191,536
	Disinfection O&M	Flow Rate (mgd)	110.06	$281,861	20	10.910	$3,075,092
	Odor Control O&M	Capacity (cfm)	1,500.00	$5,250	20	10.910	$57,277
	Reserve / Replace	10% Gravity / 15% Pump					$129,703
			Total Annual O&M	**$1,089,000**		**Total PW O&M**	**$12,009,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	110.06	$434,599	20	10.910	$4,741,453
	Swirl / Vortex O&M	Flow Rate (mgd)	100.05	$11,256	20	10.910	$122,799
	Screening O&M	Flow Rate (mgd)	100.05	$17,556	20	10.910	$191,536
	Disinfection O&M	Flow Rate (mgd)	110.06	$281,861	20	10.910	$3,075,092
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$80,917
			Total Annual O&M	**$746,000**		**Total PW O&M**	**$8,212,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	100.05	$407,788	20	10.910	$4,448,945
	Screening O&M	Flow Rate (mgd)	100.05	$17,556	20	10.910	$191,536
	Disinfection O&M	Flow Rate (mgd)	100.05	$265,962	20	10.910	$2,901,627
	Odor Control O&M	Capacity (cfm)	1,550.00	$5,425	20	10.910	$59,186
	Reserve / Replace	10% Gravity / 15% Pump					$75,994
			Total Annual O&M	**$697,000**		**Total PW O&M**	**$7,677,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	95.04	$394,042	20	10.910	$4,298,977
	Tank O&M	No. Events / Yr	63	$44,962	50	14.484	$651,214
		Const Cost ($)	$2,502,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	95	$16,963	20	10.910	$185,065
	Odor Control O&M	Capacity (cfm)	2,890	$10,115	20	10.910	$110,354
	Reserve / Replace	10% Gravity / 15% Pump					$67,710
			Total Annual O&M	**$467,000**		**Total PW O&M**	**$5,313,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	2.45	$34,191	20	10.910	$373,024
	Tank O&M	No. Events / Yr	63	$59,845	50	14.484	$866,766
		Const Cost ($)	$8,455,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	95	$16,963	20	10.910	$185,065
	Odor Control O&M	Capacity (cfm)	28,900	$101,150	20	10.910	$1,103,540
	Reserve / Replace	10% Gravity / 15% Pump					$23,867
			Total Annual O&M	**$213,000**		**Total PW O&M**	**$2,552,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	95.04	$394,042	20	10.910	$4,298,977
	Sed. Basin O&M	Flow Rate (mgd)	95.04	$10,693	50	14.484	$154,867
	Screening O&M	Flow Rate (mgd)	95.04	$16,963	20	10.910	$185,065
	Disinfection O&M	Flow Rate (mgd)	95.04	$257,775	20	10.910	$2,812,306
	Odor Control O&M	Capacity (cfm)	14,500.00	$50,750	20	10.910	$553,679
	Reserve / Replace	10% Gravity / 15% Pump					$74,385
			Total Annual O&M	**$731,000**		**Total PW O&M**	**$8,079,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	104.55	$419,950	20	10.910	$4,581,625
	HREP O&M	Flow Rate (mgd)	95.04	$339,177	20	10.910	$3,700,403
	Screening O&M	Flow Rate (mgd)	95.04	$16,963	20	10.910	$185,065
	Disinfection O&M	Flow Rate (mgd)	104.55	$273,185	20	10.910	$2,980,431
	Odor Control O&M	Capacity (cfm)	1,400.00	$4,900	20	10.910	$53,459
	Reserve / Replace	10% Gravity / 15% Pump					$123,767
			Total Annual O&M	**$1,055,000**		**Total PW O&M**	**$11,625,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	104.55	$419,950	20	10.910	$4,581,625
	Swirl / Vortex O&M	Flow Rate (mgd)	95.04	$10,693	20	10.910	$116,655
	Screening O&M	Flow Rate (mgd)	95.04	$16,963	20	10.910	$185,065
	Disinfection O&M	Flow Rate (mgd)	104.55	$273,185	20	10.910	$2,980,431
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$77,388
			Total Annual O&M	**$721,000**		**Total PW O&M**	**$7,941,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	95.04	$394,042	20	10.910	$4,298,977
	Screening O&M	Flow Rate (mgd)	95.04	$16,963	20	10.910	$185,065
	Disinfection O&M	Flow Rate (mgd)	95.04	$257,775	20	10.910	$2,812,306
	Odor Control O&M	Capacity (cfm)	1,470.00	$5,145	20	10.910	$56,132
	Reserve / Replace	10% Gravity / 15% Pump					$72,699
			Total Annual O&M	**$674,000**		**Total PW O&M**	**$7,425,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	90.01	$379,961	20	10.910	$4,145,351
	Tank O&M	No. Events / Yr	63	$43,602	50	14.484	$631,516
		Const Cost ($)	$1,958,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	90	$16,375	20	10.910	$178,652
	Odor Control O&M	Capacity (cfm)	2,310	$8,085	20	10.910	$88,207
	Reserve / Replace	10% Gravity / 15% Pump					$64,475
			Total Annual O&M	**$449,000**		**Total PW O&M**	**$5,108,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.95	$29,415	20	10.910	$320,911
	Tank O&M	No. Events / Yr	63	$56,042	50	14.484	$811,692
		Const Cost ($)	$6,934,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	90	$16,375	20	10.910	$178,652
	Odor Control O&M	Capacity (cfm)	23,050	$80,675	20	10.910	$880,159
	Reserve / Replace	10% Gravity / 15% Pump					$22,308
			Total Annual O&M	**$183,000**		**Total PW O&M**	**$2,214,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	90.01	$379,961	20	10.910	$4,145,351
	Sed. Basin O&M	Flow Rate (mgd)	90.01	$10,126	50	14.484	$146,657
	Screening O&M	Flow Rate (mgd)	90.01	$16,375	20	10.910	$178,652
	Disinfection O&M	Flow Rate (mgd)	90.01	$249,362	20	10.910	$2,720,521
	Odor Control O&M	Capacity (cfm)	13,700.00	$47,950	20	10.910	$523,132
	Reserve / Replace	10% Gravity / 15% Pump					$70,987
			Total Annual O&M	**$704,000**		**Total PW O&M**	**$7,785,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	99.01	$404,943	20	10.910	$4,417,898
	HREP O&M	Flow Rate (mgd)	90.01	$328,485	20	10.910	$3,583,749
	Screening O&M	Flow Rate (mgd)	90.01	$16,375	20	10.910	$178,652
	Disinfection O&M	Flow Rate (mgd)	99.01	$264,269	20	10.910	$2,883,158
	Odor Control O&M	Capacity (cfm)	1,350.00	$4,725	20	10.910	$51,549
	Reserve / Replace	10% Gravity / 15% Pump					$117,800
			Total Annual O&M	**$1,019,000**		**Total PW O&M**	**$11,233,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	99.01	$404,943	20	10.910	$4,417,898
	Swirl / Vortex O&M	Flow Rate (mgd)	90.01	$10,126	20	10.910	$110,471
	Screening O&M	Flow Rate (mgd)	90.01	$16,375	20	10.910	$178,652
	Disinfection O&M	Flow Rate (mgd)	99.01	$264,269	20	10.910	$2,883,158
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$73,824
			Total Annual O&M	**$696,000**		**Total PW O&M**	**$7,664,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	90.01	$379,961	20	10.910	$4,145,351
	Screening O&M	Flow Rate (mgd)	90.01	$16,375	20	10.910	$178,652
	Disinfection O&M	Flow Rate (mgd)	90.01	$249,362	20	10.910	$2,720,521
	Odor Control O&M	Capacity (cfm)	1,400.00	$4,900	20	10.910	$53,459
	Reserve / Replace	10% Gravity / 15% Pump					$69,374
			Total Annual O&M	**$651,000**		**Total PW O&M**	**$7,167,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	61.05	$293,149	20	10.910	$3,198,234
	Tank O&M	No. Events / Yr	63	$43,062	50	14.484	$623,695
		Const Cost ($)	$1,742,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	61	$13,176	20	10.910	$143,751
	Odor Control O&M	Capacity (cfm)	2,070	$7,245	20	10.910	$79,043
	Reserve / Replace	10% Gravity / 15% Pump					$46,375
			Total Annual O&M	**$357,000**		**Total PW O&M**	**$4,091,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.76	$27,387	20	10.910	$298,792
	Tank O&M	No. Events / Yr	63	$54,517	50	14.484	$789,605
		Const Cost ($)	$6,324,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	61	$13,176	20	10.910	$143,751
	Odor Control O&M	Capacity (cfm)	20,700	$72,450	20	10.910	$790,425
	Reserve / Replace	10% Gravity / 15% Pump					$18,280
			Total Annual O&M	**$168,000**		**Total PW O&M**	**$2,041,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)							
#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	61.05	$293,149	20	10.910	$3,198,234
	Sed. Basin O&M	Flow Rate (mgd)	61.05	$6,868	50	14.484	$99,469
	Screening O&M	Flow Rate (mgd)	61.05	$13,176	20	10.910	$143,751
	Disinfection O&M	Flow Rate (mgd)	61.05	$196,838	20	10.910	$2,147,496
	Odor Control O&M	Capacity (cfm)	9,350.00	$32,725	20	10.910	$357,028
	Reserve / Replace	10% Gravity / 15% Pump					$51,333
			Total Annual O&M	**$543,000**		**Total PW O&M**	**$5,997,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	67.15	$312,423	20	10.910	$3,408,511
	HREP O&M	Flow Rate (mgd)	61.05	$261,429	20	10.910	$2,852,172
	Screening O&M	Flow Rate (mgd)	61.05	$13,176	20	10.910	$143,751
	Disinfection O&M	Flow Rate (mgd)	67.15	$208,606	20	10.910	$2,275,877
	Odor Control O&M	Capacity (cfm)	900.00	$3,150	20	10.910	$34,366
	Reserve / Replace	10% Gravity / 15% Pump					$83,599
			Total Annual O&M	**$799,000**		**Total PW O&M**	**$8,798,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	67.15	$312,423	20	10.910	$3,408,511
	Swirl / Vortex O&M	Flow Rate (mgd)	61.05	$6,868	20	10.910	$74,926
	Screening O&M	Flow Rate (mgd)	61.05	$13,176	20	10.910	$143,751
	Disinfection O&M	Flow Rate (mgd)	67.15	$208,606	20	10.910	$2,275,877
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$53,187
			Total Annual O&M	**$542,000**		**Total PW O&M**	**$5,956,000**

#N/A	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	61.05	$293,149	20	10.910	$3,198,234
	Screening O&M	Flow Rate (mgd)	61.05	$13,176	20	10.910	$143,751
	Disinfection O&M	Flow Rate (mgd)	61.05	$196,838	20	10.910	$2,147,496
	Odor Control O&M	Capacity (cfm)	950.00	$3,325	20	10.910	$36,276
	Reserve / Replace	10% Gravity / 15% Pump					$50,136
			Total Annual O&M	**$507,000**		**Total PW O&M**	**$5,576,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$48.6	$48,611,000	$0
1	$48.6	$48,611,000	$0
2	$48.6	$48,611,000	$0
4	$48.6	$48,611,000	$0
6	$48.6	$48,611,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$50.7	$45,286,903	$5,393,000
1	$32.2	$29,455,987	$2,752,000
2	$30.6	$28,095,368	$2,552,000
4	$28.1	$25,908,482	$2,214,000
6	$25.8	$23,781,372	$2,041,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$46.1	$40,212,903	$5,891,000
1	$39.4	$33,856,987	$5,498,000
2	$37.9	$32,593,368	$5,313,000
4	$36.1	$31,028,482	$5,108,000
6	$29.9	$25,856,372	$4,091,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$40.5	$31,614,000	$8,883,000
1	$33.8	$25,540,000	$8,212,000
2	$32.5	$24,565,000	$7,941,000
4	$31.2	$23,578,000	$7,664,000
6	$23.8	$17,859,000	$5,956,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$58.4	$46,355,000	$12,089,000
1	$58.0	$45,945,000	$12,009,000
2	$55.6	$44,000,000	$11,625,000
4	$53.3	$42,049,000	$11,233,000
6	$39.4	$30,632,000	$8,798,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$58.5	$50,031,818	$8,422,000
1	$58.5	$50,125,987	$8,365,000
2	$57.2	$49,090,368	$8,079,000
4	$55.8	$47,992,482	$7,785,000
6	$48.3	$42,329,372	$5,997,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$34.5	$26,772,000	$7,731,000
1	$34.2	$26,567,000	$7,677,000
2	$33.0	$25,571,000	$7,425,000
4	$31.7	$24,565,000	$7,167,000
6	$24.1	$18,564,000	$5,576,000

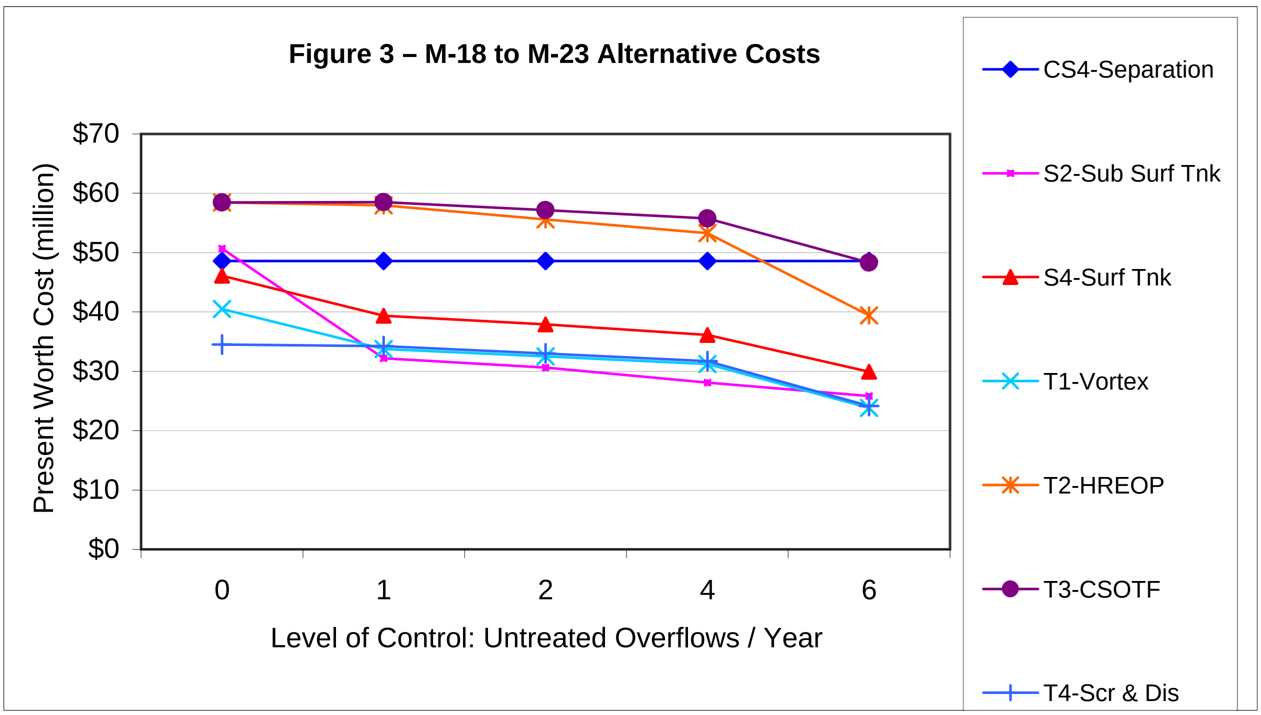


Figure 3 – M-18 to M-23 Alternative Costs
Present Worth Cost (million)
$70
$60
$50
$40
$30
$20
$10
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	M-18 to M-23
Structures within Region	M-18, M-20, M-21, M-22, and M-23
Model ID	M-18 to M-23.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Monongahela River
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	63
Peak Volume:	912,169 ft^3
	6.82 MG
Total Volume:	6,129,569 ft^3
	45.85 MG
Peak Rate:	156.47 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 0:45	3882	1/5/2005 14:45	912169.40	6823.483	0	29.76	20
1/11/2005 8:40	1163	1/12/2005 1:30	365673.74	2735.422	1	39.17	14
5/13/2005 22:30	701	5/13/2005 22:45	327340.93	2448.674	2	139.27	4
11/29/2005 6:50	484	11/29/2005 7:05	321264.30	2403.218	3	34.91	15
2/14/2005 5:55	989	2/14/2005 20:00	261326.51	1954.853	4	16.20	34
1/3/2005 8:18	791	1/3/2005 13:30	252363.57	1887.806	5	19.70	32
3/28/2005 9:05	706	3/28/2005 19:00	234833.62	1756.673	6	31.97	18
4/22/2005 15:50	796	4/23/2005 4:15	225100.98	1683.868	7	154.81	1
11/14/2005 21:55	405	11/15/2005 1:45	211072.30	1578.926	8	29.47	22
7/26/2005 19:45	65	7/26/2005 20:00	197547.85	1477.757	9	156.47	0
8/20/2005 18:25	106	8/20/2005 18:45	193792.29	1449.663	10	94.46	6
9/29/2005 5:30	75	9/29/2005 5:45	166436.31	1245.027	11	143.75	3
4/1/2005 19:40	920	4/2/2005 6:30	164003.26	1226.826	12	23.87	28
10/25/2005 1:40	1263	10/25/2005 3:45	156434.48	1170.208	13	13.12	37
1/13/2005 23:05	348	1/14/2005 2:30	156195.75	1168.422	14	21.49	29
7/5/2005 16:35	111	7/5/2005 17:00	153272.81	1146.557	15	119.68	5
1/8/2005 2:10	410	1/8/2005 5:45	129523.90	968.904	16	30.51	19
6/11/2005 17:30	55	6/11/2005 17:45	124510.54	931.401	17	147.07	2
5/11/2005 22:35	120	5/11/2005 23:00	116819.82	873.871	18	56.03	10
10/21/2005 19:10	759	10/22/2005 6:45	110345.17	825.437	19	59.78	9
1/12/2005 21:03	866	1/13/2005 0:30	97853.57	731.994	20	4.98	56
2/20/2005 19:40	302	2/20/2005 20:00	81151.32	607.052	21	25.60	26
2/9/2005 15:00	157	2/9/2005 16:45	80923.62	605.349	22	32.77	17
8/29/2005 11:35	164	8/29/2005 13:45	78623.08	588.140	23	72.77	7
5/28/2005 8:25	635	5/28/2005 9:30	76644.99	573.343	24	27.18	24
5/23/2005 16:20	55	5/23/2005 16:30	68268.53	510.683	25	46.91	12
8/8/2005 8:55	86	8/8/2005 9:15	66765.18	499.437	26	40.68	13
12/15/2005 11:10	594	12/15/2005 14:00	61779.65	462.143	27	20.38	31
11/16/2005 4:05	494	11/16/2005 4:15	60460.97	452.278	28	50.60	11
11/9/2005 19:30	47	11/9/2005 19:45	53604.93	400.992	29	66.85	8
10/7/2005 10:15	104	10/7/2005 10:45	50427.06	377.220	30	20.80	30
7/16/2005 11:20	92	7/16/2005 11:30	46723.70	349.517	31	33.86	16
7/17/2005 16:25	84	7/17/2005 16:45	44145.48	330.230	32	29.65	21

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
3/23/2005 12:10	154	3/23/2005 12:45	41203.91	308.226	33	10.49	40
10/24/2005 14:00	268	10/24/2005 14:30	34047.59	254.693	34	6.78	53
3/23/2005 2:35	204	3/23/2005 2:45	28879.97	216.037	35	10.47	41
10/22/2005 16:05	84	10/22/2005 16:45	28795.73	215.406	36	13.11	38
2/16/2005 7:10	91	2/16/2005 8:15	26763.39	200.204	37	8.07	50
7/25/2005 13:25	328	7/25/2005 13:30	26289.03	196.655	38	27.46	23
1/26/2005 4:45	94	1/26/2005 5:00	25486.88	190.655	39	8.57	49
9/16/2005 21:35	45	9/16/2005 21:45	24769.25	185.286	40	25.39	27
9/26/2005 5:35	272	9/26/2005 5:45	23536.82	176.067	41	16.26	33
8/27/2005 15:25	46	8/27/2005 15:30	23261.05	174.004	42	26.53	25
3/27/2005 17:00	87	3/27/2005 17:15	22904.77	171.339	43	7.71	52
11/1/2005 15:25	153	11/1/2005 16:30	21870.52	163.602	44	8.60	48
12/9/2005 3:55	74	12/9/2005 4:15	18793.31	140.583	45	11.38	39
6/3/2005 9:00	49	6/3/2005 9:15	16817.54	125.804	46	15.35	36
5/14/2005 16:25	89	5/14/2005 17:00	14518.78	108.608	47	9.15	47
11/8/2005 14:55	49	11/8/2005 15:15	12772.26	95.543	48	10.46	42
5/20/2005 6:10	54	5/20/2005 6:30	11848.47	88.632	49	9.48	44
11/9/2005 4:25	53	11/9/2005 4:30	10311.62	77.136	50	9.34	46
10/21/2005 7:25	44	10/21/2005 7:35	9814.01	73.414	51	7.88	51
1/30/2005 12:50	65	1/30/2005 13:00	9498.96	71.057	52	9.43	45
11/6/2005 9:55	34	11/6/2005 10:00	9391.83	70.256	53	15.97	35
4/27/2005 0:30	54	4/27/2005 1:00	7402.29	55.373	54	3.71	57
5/7/2005 13:25	36	5/7/2005 13:30	6631.85	49.610	55	9.51	43
4/20/2005 19:35	79	4/20/2005 19:45	6366.32	47.623	56	6.51	54
6/14/2005 19:20	42	6/14/2005 19:30	5879.44	43.981	57	5.01	55
4/3/2005 1:50	294	4/3/2005 6:20	4902.40	36.672	58	3.37	58
12/25/2005 11:16	149	12/25/2005 13:00	4219.20	31.562	59	1.95	61
6/17/2005 1:30	37	6/17/2005 1:35	2063.33	15.435	60	2.94	59
7/15/2005 18:00	38	7/15/2005 18:05	1834.85	13.726	61	1.98	60
6/16/2005 11:30	28	6/16/2005 11:40	1294.04	9.680	62	1.60	62

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	M-18 to M-23
Structures within Region	M-18, M-20, M-21, M-22, and M-23
Model ID	M-18 to M-23.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Monongahela River
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	63
Peak Volume:	912,169 ft^3
	6.82 MG
Total Volume:	6,129,569 ft^3
	45.85 MG
Peak Rate:	156.47 cfs

Figure 1 - M-18 to M-23 CSO Volume

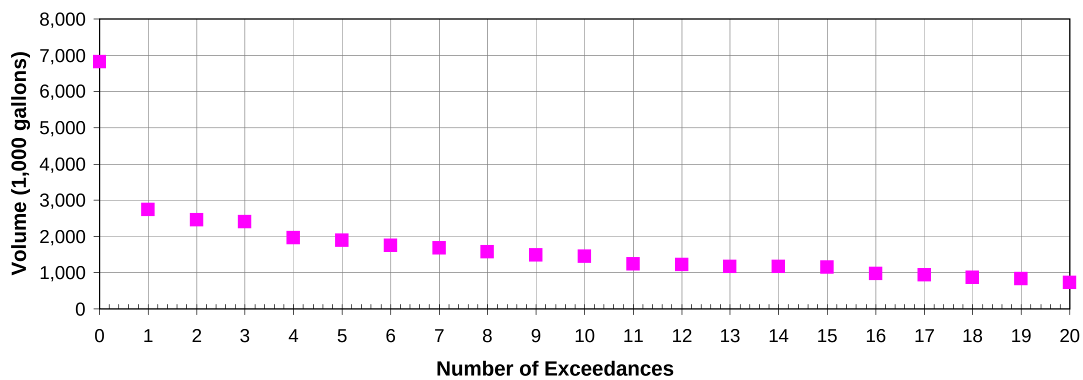
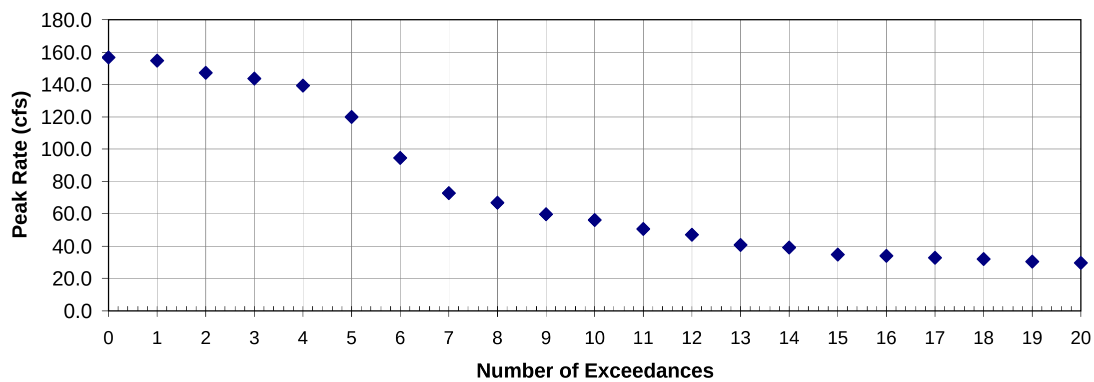


Figure 2 - M-18 to M-23 CSO Peak Flow Rate



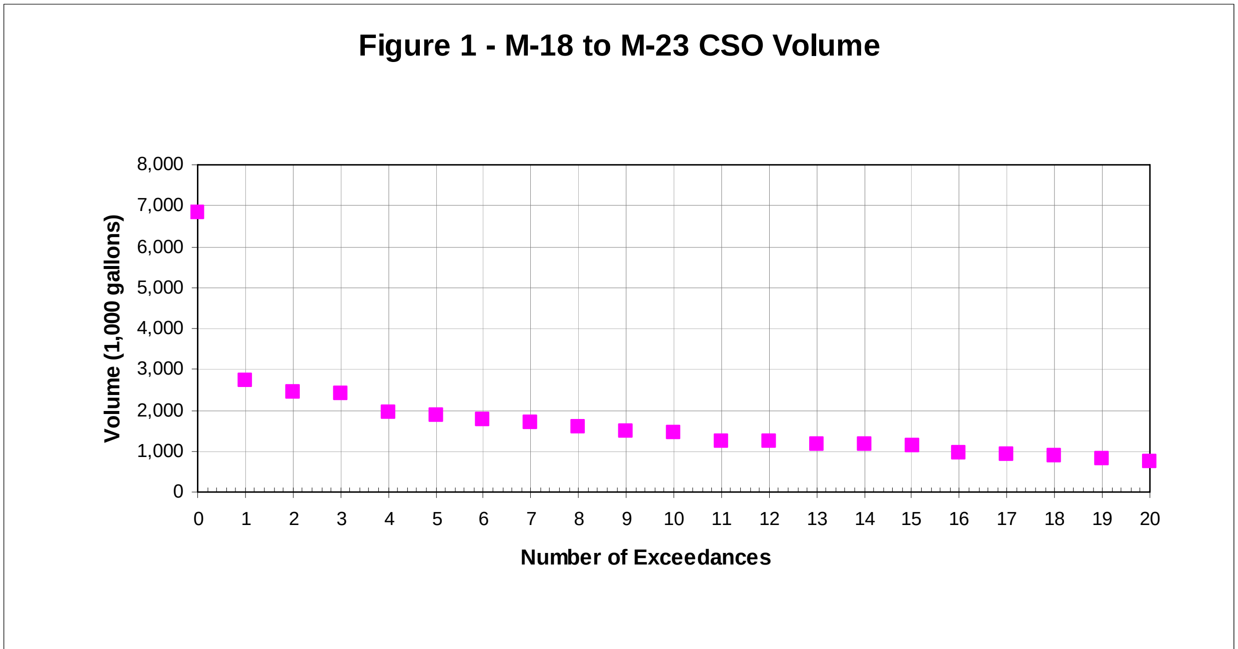
D.35.3 M-18 TO M-23 REGION – ARLINGTON THROUGH 25TH STREET SEWERSHEDS – NPDES# 012CM18, 012CM20, 012CM21, 012HM22, AND 012HM23

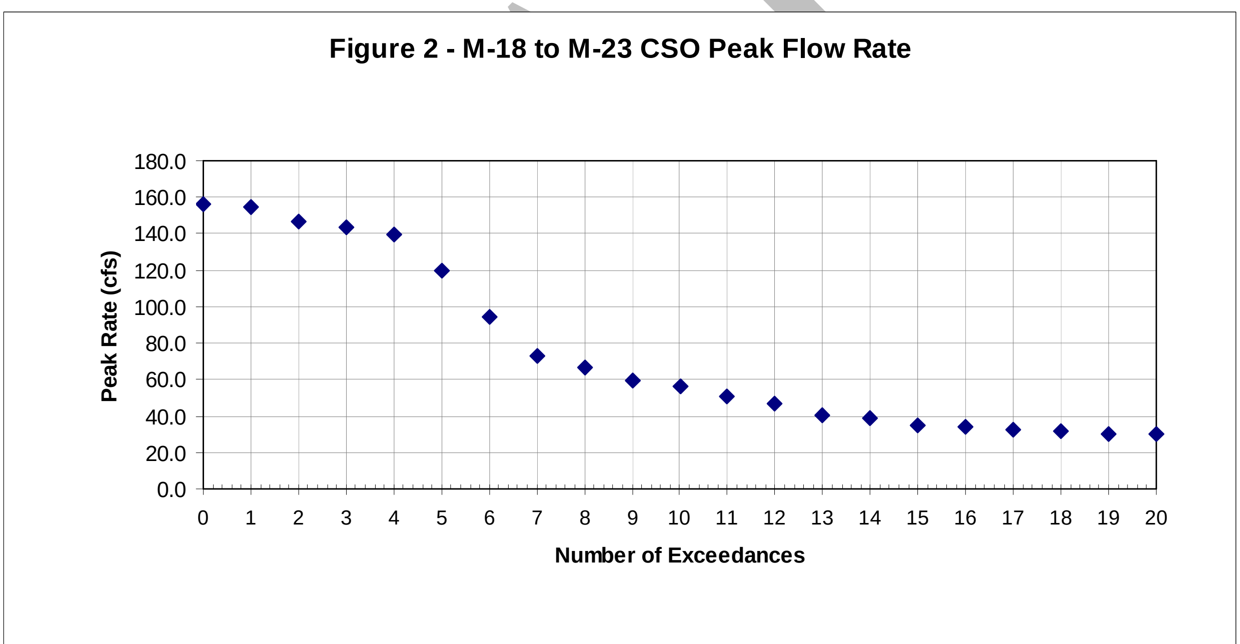
Description of Outfalls

The Arlington through 25th Street Sewersheds are located in portions of Allentown, Arlington, Arlington Heights, Mount Washington, South Shore, Southside Flats and Southside Slopes sections in the City of Pittsburgh. These sewersheds include approximately 1,369 acres of residential, business and commercial users that contribute flow to twenty-two (22) ALCOSAN outfalls. This group of consolidated outfalls includes outfalls M-18, M-20, M-21, M-22, and M-23. The M-18 tributary area consists of 15 acres of combined sewers, the M-20 tributary area consists of 16 acres of combined sewers, the M-21 tributary area consists of 68 acres of combined sewers, the M-22 tributary area consists of 117 acres of combined sewers, and the M-23 tributary area consists of 26 acres of combined sewers. The Arlington through 25th Street Sewersheds are comprised of approximately 1,184 manholes and 269,713 linear feet (51.1 miles) of sewer up to 90 inches in diameter. Outfalls 012CM18 through 012HM23 currently convey overflows from each of the respective ALCOSAN diversion chambers to the Monongahela River.

Attachment 1, *Tributary Area Map,* shows the CSO locations and the tributary areas.

Outfalls 012CM18 to 012HM23 typically experience 63 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 6.82 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from the outfalls is approximately 156.47 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.





A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers. The sewers are required to convey CSOs from outfalls 012CM18, 012CM20, 012HM22, and 012HM23 to the vicinity of outfall 012CM21. There appears to be a limited amount of available space for potential storage or treatment facilities to the northwest of this outfall, north of the existing railroad tracks (between S. 23rd Street and S. 24th Street), east of the Birmingham Bridge. The site is generally bounded by the Monongahela River to the north, railroad tracks to the south and private property to west and east.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4-M-18 TO M-23 REGION: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-M-18 TO M-23 REGION: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-M-18 TO M-23 REGION: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-M-18 TO M-23 REGION: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-M-18 TO M-23 REGION: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-M-18 TO M-23 REGION: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

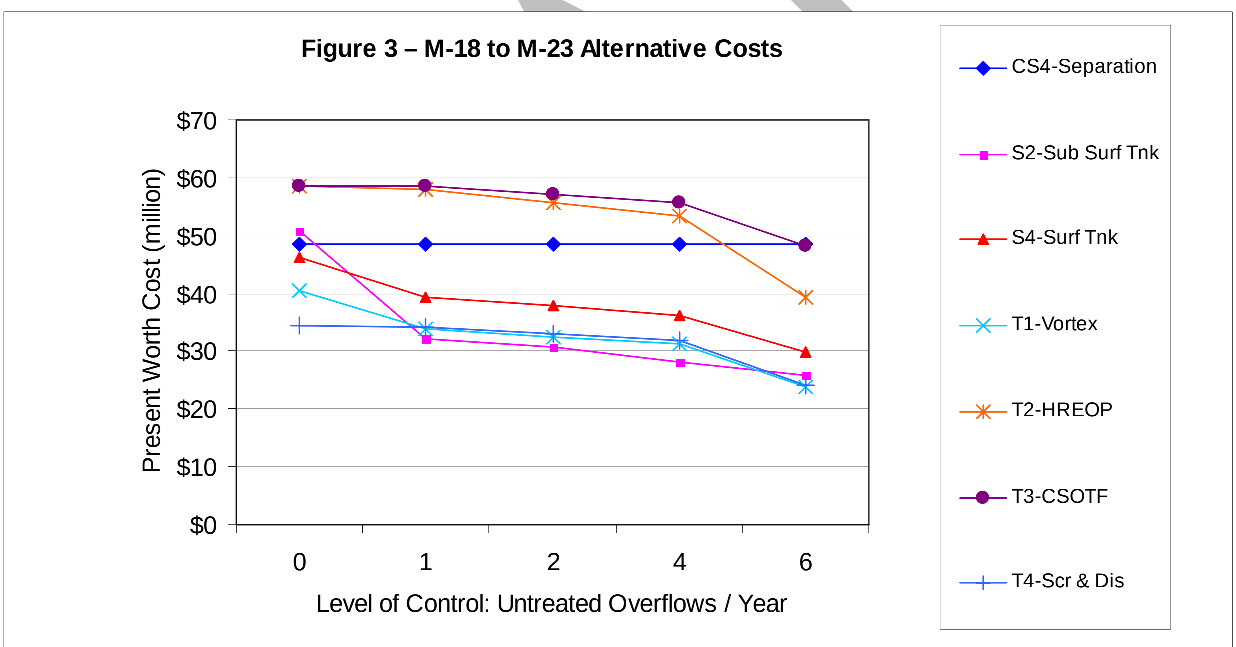
T4-M-18 TO M-23 REGION: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – M-18 to M-23 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

Recommendations

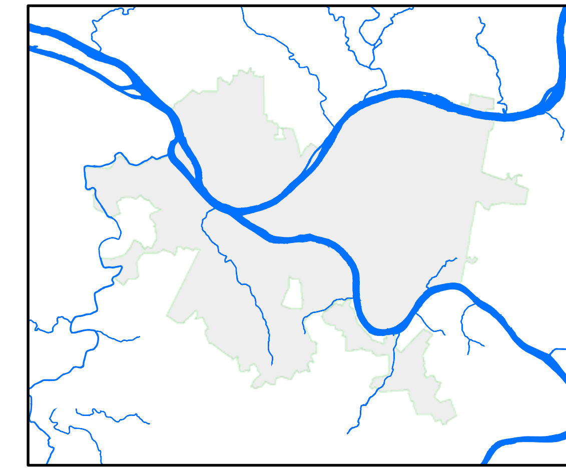
Based upon the above, for control level 0 through 6, it is recommended that Alternative S2-M-18 to M-23: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Several significant issues exist with the siting of a CSO storage and treatment facility. A site large enough to store control level 0 does not appear to be available in the vicinity of outfall 012CM21. Installing a structure with a deeper sidewater depth could reduce the size of footprint required for a storage facility. Construction of the consolidation sewers will also be a significant endeavor considering the congested infrastructure that exists along the river in this area.

Attachment 1 - Tributary Area Map



Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- PWSA Flow Divider
- Combined Sewer Outfall

500 0 500
Feet

Attachment 1
M-18 to M-23
Tributary Area Map
Arlington through 25th St.
Sewershed

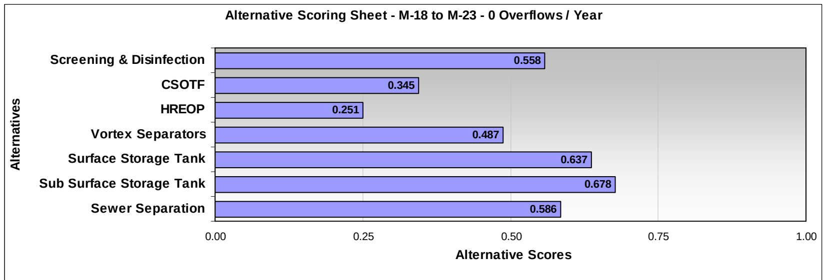
CSO Controls Alternatives

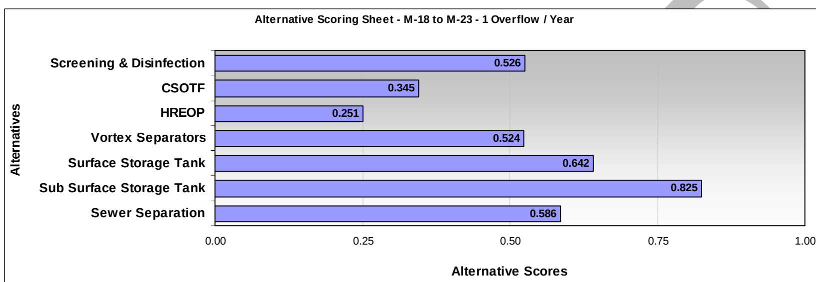
SW-D-0260.pdf

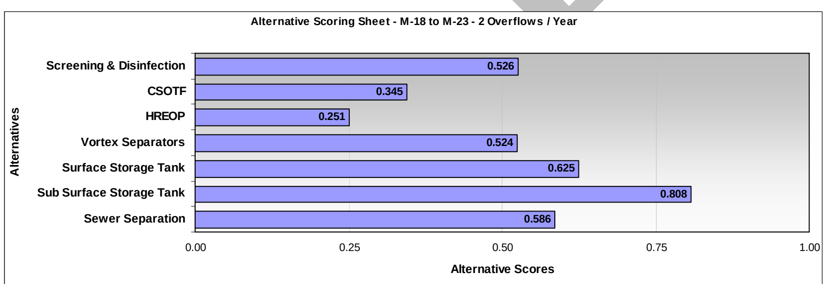
Attachment 2 - CSO Alternatives Development Worksheet

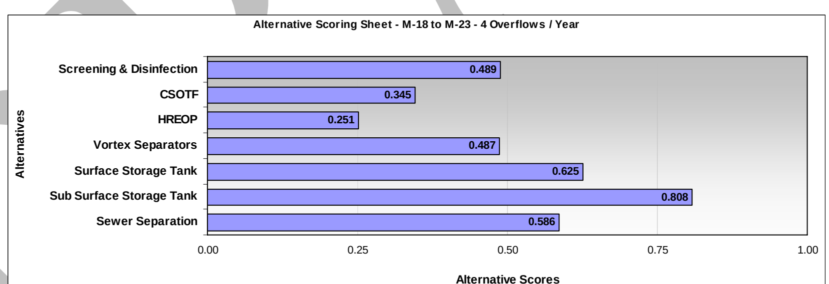
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will not be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

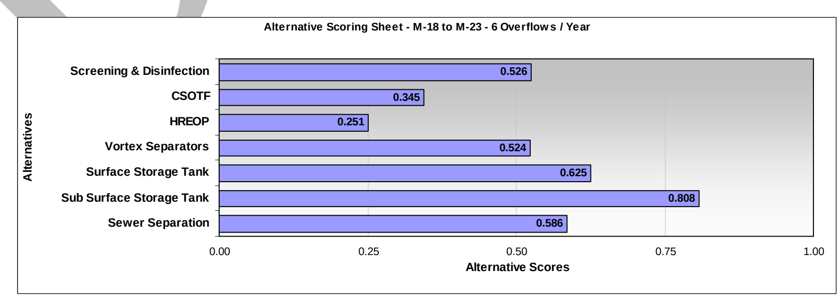
Attachment 3 – Alternative Scoring Sheet

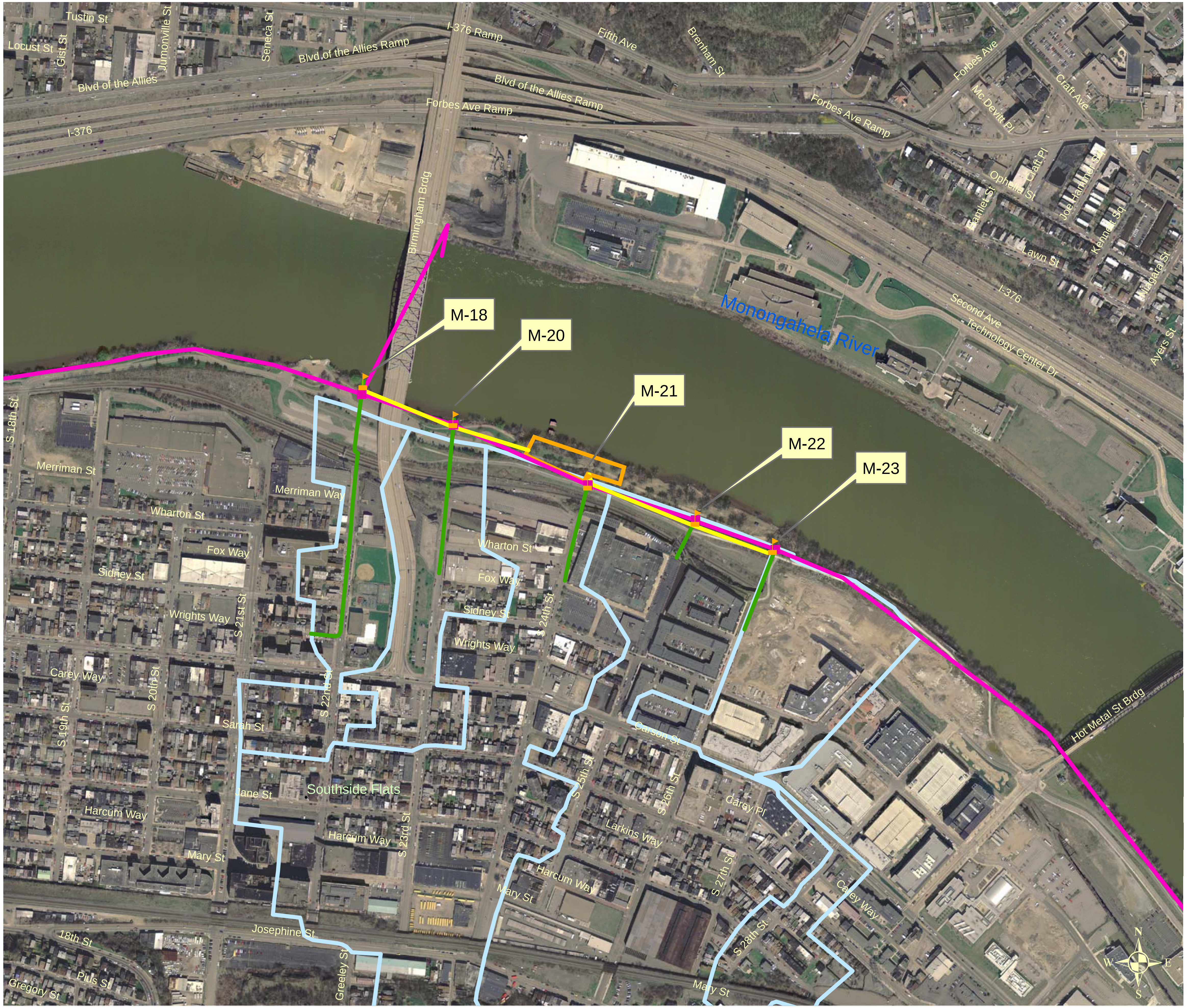


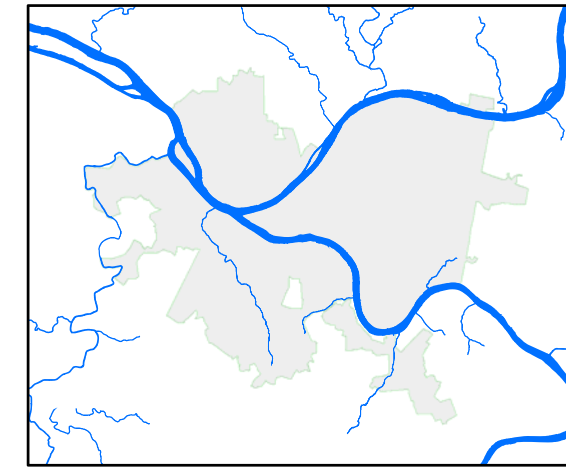












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 475 950 Feet

Attachment 4
M-18 to M-23
Facilities Boundary Map
Arlington through 25th St. Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0260.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req’s	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req’s	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req’s	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	5	5	5	5	5
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	3	4	4	3
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	3	3	3	2
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	4	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.					
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	2	2	2	2	2
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.586**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.614**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.751**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.771**

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.771**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.735**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.600**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.642**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.625**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.625**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.588**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	4	0.75	0.147	0.110
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.487**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.524**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.251**

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.377**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.345**

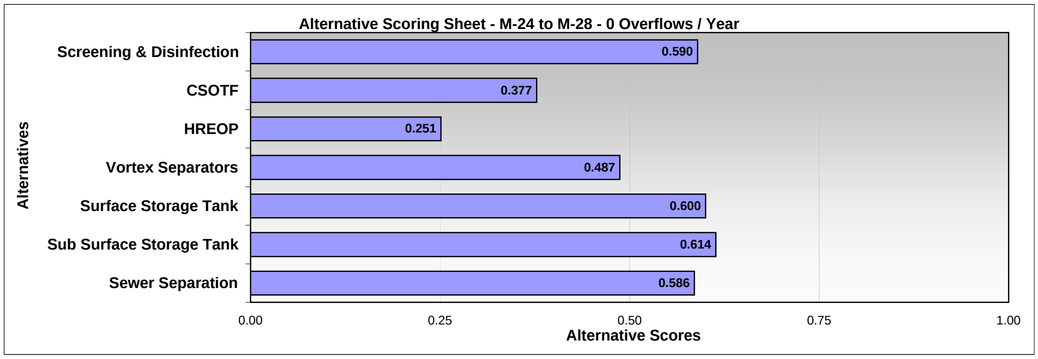
Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.590**

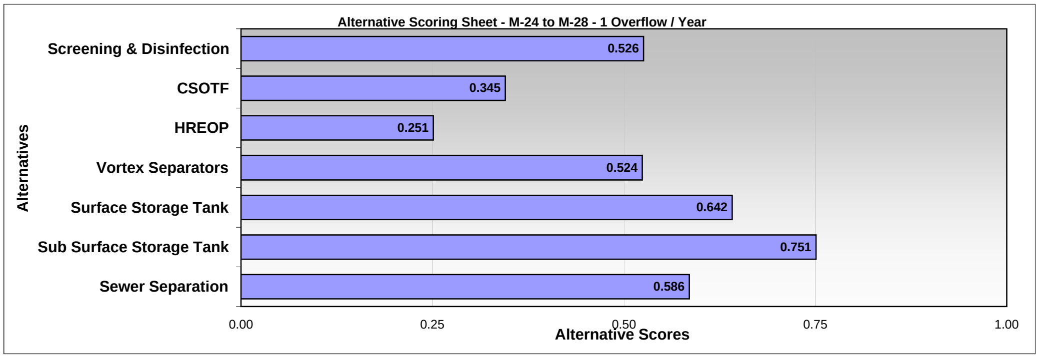
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

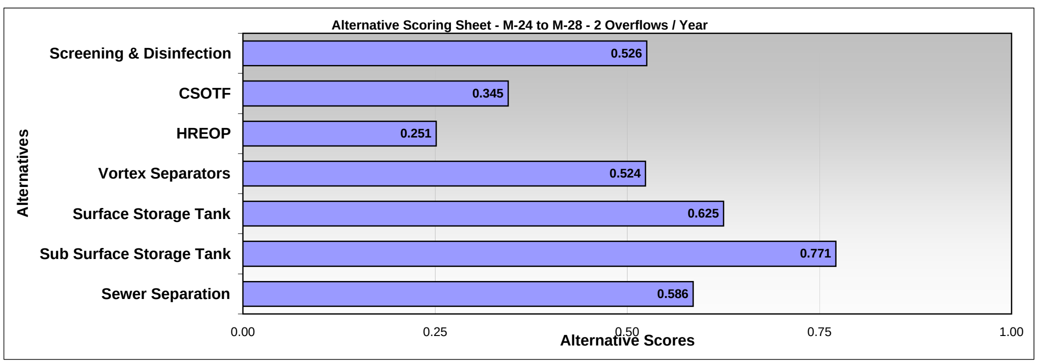
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

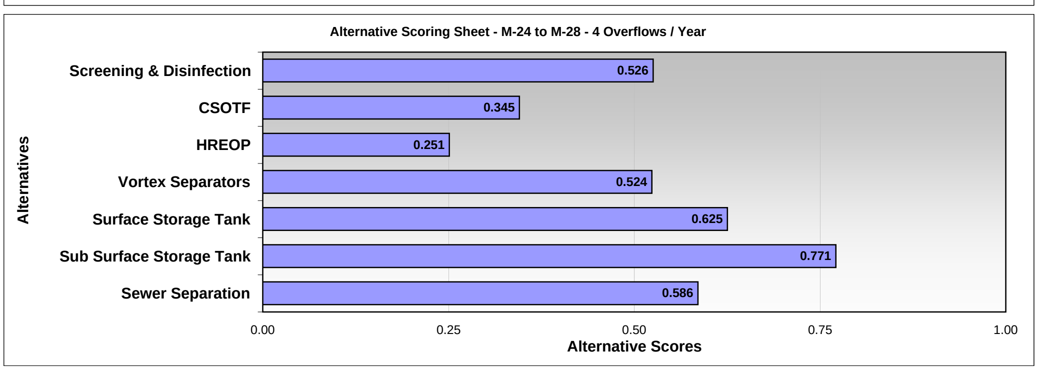
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**

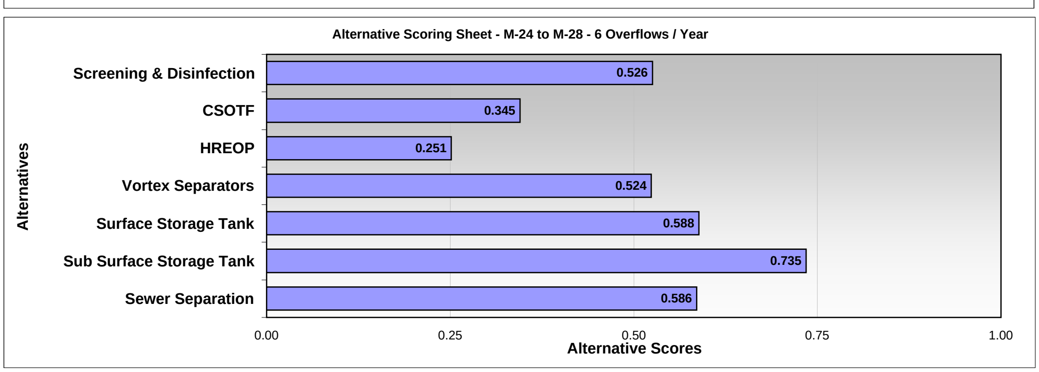
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.526**


Alternative Scoring Sheet - M-24 to M-28 - 0 Overflows / Year
Alternatives
Screening & Disinfection 0.590
CSOTF 0.377
HREOP 0.251
Vortex Separators 0.487
Surface Storage Tank 0.600
Sub Surface Storage Tank 0.614
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - M-24 to M-28 - 1 Overflow / Year
Alternatives
Screening & Disinfection 0.526
CSOTF 0.345
HREOP 0.251
Vortex Separators 0.524
Surface Storage Tank 0.642
Sub Surface Storage Tank 0.751
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - M-24 to M-28 - 2 Overflows / Year
Alternatives
Screening & Disinfection 0.526
CSOTF 0.345
HREOP 0.251
Vortex Separators 0.524
Surface Storage Tank 0.625
Sub Surface Storage Tank 0.771
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - M-24 to M-28 - 4 Overflows / Year
Alternatives
Screening & Disinfection 0.526
CSOTF 0.345
HREOP 0.251
Vortex Separators 0.524
Surface Storage Tank 0.625
Sub Surface Storage Tank 0.771
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - M-24 to M-28 - 6 Overflows / Year
Alternatives
Screening & Disinfection 0.526
CSOTF 0.345
HREOP 0.251
Vortex Separators 0.524
Surface Storage Tank 0.588
Sub Surface Storage Tank 0.735
Sewer Separation 0.586
0.00 0.25 0.50 0.75 1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	0	
Peak Volume	1,324,257	CF
	9.91	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	163.88	CFS
	105.91	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	0 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,110	Input by Engineer
Peak Flow (CFS)		40.97	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	442,000	
Peak Flow (CFS)		81.94	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	661,000	
Peak Flow (CFS)		122.91	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	842,000	
Peak Flow (CFS)		163.88	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,050,000	
Construction Cost (Consolidation Sewers)	**$**	**2,995,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST $	**3,147,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	0	
Peak Volume	1,324,257	CF
	9.91	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	163.88	CFS
	105.91	MGD

#N/A			
SEWER SEPARATION			
0 Overflows / Year			
1. Sewer Separation Parameters			
Drainage Area - Suburban Areas (Acres)			**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%	Complete Separation
Drainage Area - Urban Areas (Acres)		269	Ref: CSO Statistics
% Separation - Urban Areas		100%	Complete Separation
Construction Cost (Sewer Separation)	**$**	**53,800,000**	
2. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator** Reg Mod Only
Number Regulators			Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**	
3. Land Acquisition Parameters			
Land Acquisition - Sewer Separation (SF)		117,176	1% Drainage Area
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**234,000**	
		TOTAL CAPITAL COST	**$ 54,034,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	0	
Peak Volume	1,324,257	CF
	9.91	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	163.88	CFS
	105.91	MGD

	#N/A			
	SURFACE STORAGE TANK			
	0 Overflows / Year			
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		9.91	1,324,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		11.65	1,558,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		396		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		264		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		11.73	1,568,160	**Sufficient Volume**
Tank Area (SF)		105,000		= Length x Width
Construction Cost (Storage Tank)		**11,479,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		105.91	163.88	= Peak Rate
Force Main Diameter (In)		71		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,573,000**	**$ 86,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		163.88		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,337,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,690		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**629,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		105.91		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,316,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		9.91		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		4.95		= Peak Vol/DW Time
Construction Cost	**$**	**10,406,085**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		167,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**334,000**		
			TOTAL CAPITAL COST	**$ 46,269,085**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	0	
Peak Volume	1,324,257	CF
	9.91	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	163.88	CFS
	105.91	MGD

		#N/A		
		SUB-SURFACE STORAGE TANK		
		0 Overflows / Year		
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		9.91	1,324,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		11.65	1,558,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		396		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		264		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		11.73	1,568,160	**Sufficient Volume**
Tank Area (SF)		105,000		= Length x Width
Construction Cost (Storage Tank)		**31,419,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		9.91	15.33	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		22		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,798,000**	**$ 30,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		163.88		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,337,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		116,850		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**3,819,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		105.91		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,316,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		9.91		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		4.95		= Peak Vol/DW Time
Construction Cost	**$**	**10,406,085**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		167,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**334,000**		
			TOTAL CAPITAL COST	**$ 57,568,085**

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RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	0	
Peak Volume	1,324,257	CF
	9.91	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	163.88	CFS
	105.91	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
0 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		105.91		163.88	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		12			
Construction Cost (Swirl / Vortex)	**$**	**5,213,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		116.50		180.27	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		74			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,865,000**	**$**	**90,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		163.88			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		346,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		17,300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**855,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		105.91			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,316,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		116.50			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		169		81	
Passes / Detention (Min)		7		**15.19**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,152,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		110,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**220,000**			
			TOTAL CAPITAL COST	**$**	**33,157,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	0	
Peak Volume	1,324,257	CF
	9.91	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	163.88	CFS
	105.91	MGD

	#N/A			
	SEDIMENTATION BASIN (CSOTF)			
	0 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		105.91	163.88	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		17,700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		189	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		95	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.61	215,460	
Construction Cost (CSOTF)	**$**	**16,640,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		105.91	163.88	= Peak Rate
Force Main Diameter (In)		71		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,573,000**	**$ 86,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		163.88		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		323,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		16,150		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**810,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		105.91		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,316,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		105.91		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		161	77	
Passes / Detention (Min)		7	**15.13**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,043,000**		
7. Stored Volume Treatment				
Volume Requiring Treatment (MG)		1.61		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.81		= Peak Vol/DW Time
Construction Cost	**$**	**8,391,192**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
9. Land Acquisition Parameters				
Land Required - CSOTF (SF)		48,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**96,000**		
			TOTAL CAPITAL COST	**$ 51,401,192**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	0	
Peak Volume	1,324,257	CF
	9.91	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	163.88	CFS
	105.91	MGD

		#N/A			
		HIGH RATE END OF PIPE TREATMENT (HREOP)			
		0 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		105.91		163.88	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,250			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		51		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		26		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**18,845,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		116.50		180.27	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		74			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,865,000**	**$**	**90,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		163.88			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,600			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**132,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		105.91			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,316,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		116.50			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		169		81	
Passes / Detention (Min)		7		**15.19**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,152,000	$	2,647,000	
Construction Cost (Disinfection)	**$**	**4,799,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		71,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**142,000**			
				TOTAL CAPITAL COST	**$ 48,635,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	0	
Peak Volume	1,324,257	CF
	9.91	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	163.88	CFS
	105.91	MGD

#N/A					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		105.91		163.88	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,316,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		105.91		163.88	= Peak Flow x % Req Pump
Force Main Diameter (In)		71			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**14,573,000**	**$**	**86,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		163.88			Ref: CSO Statistics
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,800			=CFS x 200
Odor Control Flow Rate (CFM)		1,640			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**135,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		105.91			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		161		77	
Passes / Detention (Min)		7		15.13	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,043,000	$	2,463,000	
Construction Cost (Disinfection)	**$**	**4,506,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		34,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**			
				TOTAL CAPITAL COST	**$ 28,130,000**

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RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	1	
Peak Volume	699,932	CF
	5.24	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.91	CFS
	100.11	MGD

#N/A			
CONSOLIDATION SEWERS			
1 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,110	Width of Sewershed along Riverline
Peak Flow (CFS)		40.97	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	442,000	
Peak Flow (CFS)		81.94	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	661,000	
Peak Flow (CFS)		122.91	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	842,000	
Peak Flow (CFS)		163.88	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,050,000	
Construction Cost (Consolidation Sewers)	**$**	**2,995,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST $	**3,147,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	1	
Peak Volume	699,932	CF
	5.24	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.91	CFS
	100.11	MGD

		#N/A		
		SEWER SEPARATION		
		1 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		269		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**53,800,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		117,176		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**234,000**		
			TOTAL CAPITAL COST	**$ 54,034,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	1	
Peak Volume	699,932	CF
	5.24	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.91	CFS
	100.11	MGD

		#N/A			
		SURFACE STORAGE TANK			
		1 Overflows / Year			
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		5.24		700,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		6.16		824,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		288			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		192			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		6.20		829,440	**Sufficient Volume**
Tank Area (SF)		55,000			= Length x Width
Construction Cost (Storage Tank)		**5,729,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		100.11		154.91	= Peak Rate
Force Main Diameter (In)		69			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,865,000**	**$**	**83,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		154.91			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,236,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		6,180			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**381,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.11			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		5.24			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.62			= Peak Vol/DW Time
Construction Cost	**$**	**9,271,209**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		97,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**194,000**			
			TOTAL CAPITAL COST	**$**	**38,016,209**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	1	
Peak Volume	699,932	CF
	5.24	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.91	CFS
	100.11	MGD

#N/A					
SUB-SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		5.24		700,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		6.16		824,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		288			= $(\text{Vol / SWD * 1.5})^{1/2}$
Width (Ft)		192			= $(\text{Vol / SWD / 1.5})^{1/2}$
Total Volume (MG / CF)		6.20		829,440	**Sufficient Volume**
Tank Area (SF)		55,000			= Length x Width
Construction Cost (Storage Tank)		**17,038,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		5.24		8.10	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		16			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,238,000**	**$**	**25,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		154.91			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,236,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		61,800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,318,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.11			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		5.24			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.62			= Peak Vol/DW Time
Construction Cost	**$**	**9,271,209**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		97,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**194,000**			
				TOTAL CAPITAL COST	**$ 39,577,209**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	1	
Peak Volume	699,932	CF
	5.24	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.91	CFS
	100.11	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
1 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		100.11		154.91	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		110.12		170.40	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		72			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,087,000**	**$**	**88,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		154.91			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.11			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		110.12			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		164		79	
Passes		7		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,088,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		104,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**208,000**			
				TOTAL CAPITAL COST	**$ 25,964,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	1	
Peak Volume	699,932	CF
	5.24	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.91	CFS
	100.11	MGD

#N/A					
SEDIMENTATION BASIN (CSOTF)					
1 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		100.11		154.91	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		16,700			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		184		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		92		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.52		203,136	
Construction Cost (CSOTF)	**$**	**16,600,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		100.11		154.91	= Peak Rate
Force Main Diameter (In)		69			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,865,000**	**$**	**83,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		154.91			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		305,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		15,250			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**774,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.11			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		100.11			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		157		75	
Passes		7		**15.20**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,979,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		5.24			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.62			= Peak Vol/DW Time
Construction Cost	**$**	**9,271,209**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		45,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**90,000**			
				TOTAL CAPITAL COST	**$ 51,155,209**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	1	
Peak Volume	699,932	CF
	5.24	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.91	CFS
	100.11	MGD

#N/A

HIGH RATE END OF PIPE TREATMENT (HREOP)

1 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		100.11	154.91	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,180		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		50	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		25	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**17,821,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		110.12	170.40	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		72		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,087,000**	**$ 88,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		154.91		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		30,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**126,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		100.11		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		110.12		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		164	79	
Passes		7	15.21	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,088,000	$ 2,541,000	
Construction Cost (Disinfection)	**$**	**4,629,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		68,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**136,000**		
			TOTAL CAPITAL COST	**$ 46,380,000**

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RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	1	
Peak Volume	699,932	CF
	5.24	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.91	CFS
	100.11	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		1 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		100.11		154.91	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		100.11		154.91	= Peak Flow x % Req Pump
Force Main Diameter (In)		69			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,865,000**	**$**	**83,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		154.91			Ref: CSO Statistics
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		31,000			=CFS x 200
Odor Control Flow Rate (CFM)		1,550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**129,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		100.11			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		157		75	
Passes		7		**15.20**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,979,000	$	2,374,000	
Construction Cost (Disinfection)	**$**	**4,353,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		33,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**			
				TOTAL CAPITAL COST	**$ 26,989,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	2	
Peak Volume	548,485	CF
	4.10	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.88	CFS
	100.09	MGD

	#N/A		
	CONSOLIDATION SEWERS		
	2 Overflows / Year		
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,110	Width of Sewershed along Riverline
Peak Flow (CFS)		40.97	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	442,000	
Peak Flow (CFS)		81.94	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	661,000	
Peak Flow (CFS)		122.91	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	842,000	
Peak Flow (CFS)		163.88	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,050,000	
Construction Cost (Consolidation Sewers)	**$**	**2,995,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 3,147,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	2	
Peak Volume	548,485	CF
	4.10	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.88	CFS
	100.09	MGD

		#N/A		
		SEWER SEPARATION		
		2 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		269		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**53,800,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		117,176		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**234,000**		
			TOTAL CAPITAL COST **$**	**54,034,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	2	
Peak Volume	548,485	CF
	4.10	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.88	CFS
	100.09	MGD

		#N/A		
		SURFACE STORAGE TANK		
		2 Overflows / Year		
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.10	548,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.83	645,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		255		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		170		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.86	650,250	**Sufficient Volume**
Tank Area (SF)		43,000		= Length x Width
Construction Cost (Storage Tank)		**4,392,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		100.09	154.88	= Peak Rate
Force Main Diameter (In)		69		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,863,000**	**$ 83,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		154.88		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		968,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,840		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**315,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.09		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		4.10		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.05		= Peak Vol/DW Time
Construction Cost	**$**	**8,996,053**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		80,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**160,000**		
			TOTAL CAPITAL COST	**$ 36,302,053**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	2	
Peak Volume	548,485	CF
	4.10	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.88	CFS
	100.09	MGD

#N/A					
SUB-SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.10		548,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.83		645,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		255			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		170			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.86		650,250	**Sufficient Volume**
Tank Area (SF)		43,000			= Length x Width
Construction Cost (Storage Tank)		**13,549,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		4.10		6.35	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		14			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,066,000**	**$**	**23,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		154.88			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		968,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		48,400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,914,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.09			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		4.10			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.05			= Peak Vol/DW Time
Construction Cost	**$**	**8,996,053**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		80,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**160,000**			
				TOTAL CAPITAL COST	**$ 35,201,053**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	2	
Peak Volume	548,485	CF
	4.10	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.88	CFS
	100.09	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
2 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		100.09		154.88	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		110.10		170.37	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		72			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,084,000**	**$**	**88,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		154.88			Ref: Technical Parameters
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.09			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		110.10			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		164		79	
Passes		7		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**2,087,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		104,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**208,000**			
				TOTAL CAPITAL COST	**$ 25,960,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	2	
Peak Volume	548,485	CF
	4.10	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.88	CFS
	100.09	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
2 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		100.09	154.88	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		16,700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		184	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		92	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.52	203,136	
Construction Cost (CSOTF)	**$**	**16,600,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		100.09	154.88	= Peak Rate
Force Main Diameter (In)		69		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,863,000**	**$ 83,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		154.88		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		305,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		15,250		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**774,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		100.09		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		100.09		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		157	75	
Passes		7	**15.21**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,978,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		4.10		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		2.05		= Peak Vol/DW Time
Construction Cost	**$**	**8,996,053**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		45,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**90,000**		
			TOTAL CAPITAL COST	**$ 50,877,053**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	2	
Peak Volume	548,485	CF
	4.10	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.88	CFS
	100.09	MGD

	#N/A			
	HIGH RATE END OF PIPE TREATMENT (HREOP)			
	2 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		100.09	154.88	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,180		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		50	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		25	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**17,818,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		110.10	170.37	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		72		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**15,084,000**	**$ 88,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		154.88		Ref: Technical Parameters
Diameter (In)		90		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		30,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**126,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		100.09		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		110.10		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		164	79	
Passes		7	15.21	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	2,087,000	$ 2,541,000	
Construction Cost (Disinfection)	**$**	**4,628,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		68,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**136,000**		
			TOTAL CAPITAL COST	**$ 46,373,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	2	
Peak Volume	548,485	CF
	4.10	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	154.88	CFS
	100.09	MGD

#N/A					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		100.09		154.88	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**5,047,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		100.09		154.88	= Peak Flow x % Req Pump
Force Main Diameter (In)		69			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,863,000**	**$**	**83,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		154.88			Ref: CSO Statistics
Diameter (In)		90			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		31,000			=CFS x 200
Odor Control Flow Rate (CFM)		1,550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**129,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		100.09			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		157		75	
Passes		7		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,978,000	$	2,374,000	
Construction Cost (Disinfection)	**$**	**4,352,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		33,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**			
				TOTAL CAPITAL COST	**$ 26,986,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	4	
Peak Volume	487,059	CF
	3.64	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	132.45	CFS
	85.60	MGD

#N/A

CONSOLIDATION SEWERS

4 Overflows / Year

1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,110	Width of Sewershed along Riverline
Peak Flow (CFS)		40.97	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	442,000	
Peak Flow (CFS)		81.94	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	661,000	
Peak Flow (CFS)		122.91	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	842,000	
Peak Flow (CFS)		163.88	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,050,000	
Construction Cost (Consolidation Sewers)	**$**	**2,995,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 3,147,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	4	
Peak Volume	487,059	CF
	3.64	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	132.45	CFS
	85.60	MGD

		#N/A		
		SEWER SEPARATION		
		4 Overflows / Year		
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		269		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**53,800,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		117,176		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**234,000**		
			TOTAL CAPITAL COST	**$ 54,034,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	4	
Peak Volume	487,059	CF
	3.64	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	132.45	CFS
	85.60	MGD

	#N/A			
	SURFACE STORAGE TANK			
	4 Overflows / Year			
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.64	487,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.29	573,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		240		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		161		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.34	579,600	**Sufficient Volume**
Tank Area (SF)		39,000		= Length x Width
Construction Cost (Storage Tank)		**3,859,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		85.60	132.45	= Peak Rate
Force Main Diameter (In)		64		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**12,094,000**	**$ 77,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		132.45		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		860,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,300		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**287,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		85.60		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,375,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.64		Ref: CSO Statistics
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.82		= Peak Vol/DW Time
Construction Cost	**$**	**8,884,468**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		73,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**146,000**		
			TOTAL CAPITAL COST	**$ 33,168,468**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	4	
Peak Volume	487,059	CF
	3.64	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	132.45	CFS
	85.60	MGD

#N/A			
SUB-SURFACE STORAGE TANK			
4 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	3.64	487,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	4.29	573,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	240		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	161		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	4.34	579,600	**Sufficient Volume**
Tank Area (SF)	39,000		= Length x Width
Construction Cost (Storage Tank)	**12,134,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	3.64	5.64	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	13		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,992,000**	**$ 22,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	132.45		Ref: Technical Parameters
Diameter (In)	78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	860,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	43,000		= ACH x Volume / 60
Construction Cost (Odor Control) $	**1,745,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	85.60		Ref: CSO Statistics
Construction Cost (Screening) $	**4,375,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	3.64		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	1.82		= Peak Vol/DW Time
Construction Cost $	**8,884,468**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	73,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**146,000**		
		TOTAL CAPITAL COST	**$ 32,744,468**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	4	
Peak Volume	487,059	CF
	3.64	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	132.45	CFS
	85.60	MGD

#N/A					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		85.60		132.45	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		94.16		145.69	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		67			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,139,000**	**$**	**81,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		132.45			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		85.60			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,375,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		94.16			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		152		73	
Passes		7		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,909,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		89,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**178,000**			
			TOTAL CAPITAL COST	**$**	**23,128,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	4	
Peak Volume	487,059	CF
	3.64	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	132.45	CFS
	85.60	MGD

#N/A				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		85.60	132.45	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		14,300		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		170	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		85	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.30	173,400	
Construction Cost (CSOTF)	**$**	**16,518,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		85.60	132.45	= Peak Rate
Force Main Diameter (In)		64		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**12,094,000**	**$ 77,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		132.45		Ref: Technical Parameters
Diameter (In)		78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		260,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		13,000		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**683,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		85.60		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,375,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		85.60		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		145	69	
Passes		5	**15.11**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,803,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		3.64		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.82		= Peak Vol/DW Time
Construction Cost	**$**	**8,884,468**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		40,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**80,000**		
			TOTAL CAPITAL COST	**$ 47,960,468**

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RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	4	
Peak Volume	487,059	CF
	3.64	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	132.45	CFS
	85.60	MGD

#N/A					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
4 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		85.60		132.45	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,010			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		46		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		23		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**15,287,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		94.16		145.69	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		67			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**13,139,000**	**$**	**81,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		132.45			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		25,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,250			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**109,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		85.60			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,375,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		94.16			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		152		73	
Passes		7		**15.23**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,909,000	$	2,273,000	
Construction Cost (Disinfection)	**$**	**4,182,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		62,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**124,000**			
				TOTAL CAPITAL COST	**$ 40,743,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	4	
Peak Volume	487,059	CF
	3.64	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	132.45	CFS
	85.60	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		4 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		85.60		132.45	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**4,375,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		85.60		132.45	= Peak Flow x % Req Pump
Force Main Diameter (In)		64			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**12,094,000**	**$**	**77,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		132.45			Ref: CSO Statistics
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		26,500			=CFS x 200
Odor Control Flow Rate (CFM)		1,330			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**114,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		85.60			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		145		69	
Passes		5		**15.11**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,803,000	$	1,924,000	
Construction Cost (Disinfection)	**$**	**3,727,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		32,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**64,000**			
			TOTAL CAPITAL COST	**$**	**23,897,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	6	
Peak Volume	448,852	CF
	3.36	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	111.50	CFS
	72.06	MGD

#N/A			
CONSOLIDATION SEWERS			
6 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		2,110	Width of Sewershed along Riverline
Peak Flow (CFS)		40.97	25% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	442,000	
Peak Flow (CFS)		81.94	50% of Peak Flow Rate
Diameter (In)		66	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	661,000	
Peak Flow (CFS)		122.91	75% of Peak Flow Rate
Diameter (In)		78	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	842,000	
Peak Flow (CFS)		163.88	100% of Peak Flow Rate
Diameter (In)		90	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		528	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	1,050,000	
Construction Cost (Consolidation Sewers)	**$**	**2,995,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		-	Input by Engineer, Total 25"-48" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		90	
Number Connections		1	Input by Engineer, Total >73" Connx
Subtotal	$	152,000	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**152,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 3,147,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	6	
Peak Volume	448,852	CF
	3.36	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	111.50	CFS
	72.06	MGD

#N/A				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		0		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		269		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**53,800,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		117,176		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**234,000**		
			TOTAL CAPITAL COST $	**54,034,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	6	
Peak Volume	448,852	CF
	3.36	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	111.50	CFS
	72.06	MGD

		#N/A			
		SURFACE STORAGE TANK			
		6 Overflows / Year			
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		3.36		449,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		3.95		528,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		231			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		154			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		3.99		533,610	**Sufficient Volume**
Tank Area (SF)		36,000			= Length x Width
Construction Cost (Storage Tank)		**3,530,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		72.06		111.50	= Peak Rate
Force Main Diameter (In)		58			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,443,000**	**$**	**69,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		111.50			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		792,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,960			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**269,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		72.06			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,749,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		3.36			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.68			= Peak Vol/DW Time
Construction Cost	**$**	**8,815,065**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		69,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**138,000**			
				TOTAL CAPITAL COST	**$ 30,459,065**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	6	
Peak Volume	448,852	CF
	3.36	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	111.50	CFS
	72.06	MGD

#N/A			
SUB-SURFACE STORAGE TANK			
6 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	3.36	449,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	3.95	528,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	231		= $(\text{Vol / SWD} * 1.5)^{1/2}$
Width (Ft)	154		= $(\text{Vol / SWD} / 1.5)^{1/2}$
Total Volume (MG / CF)	3.99	533,610	**Sufficient Volume**
Tank Area (SF)	36,000		= Length x Width
Construction Cost (Storage Tank)	**11,254,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	3.36	5.20	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	13		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,945,000**	**$ 22,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	111.50		Ref: Technical Parameters
Diameter (In)	78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	792,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	39,600		= ACH x Volume / 60
Construction Cost (Odor Control) $	**1,636,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	72.06		Ref: CSO Statistics
Construction Cost (Screening) $	**3,749,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	3.36		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	1.68		= Peak Vol/DW Time
Construction Cost $	**8,815,065**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	69,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**138,000**		
		TOTAL CAPITAL COST $	**31,005,065**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	6	
Peak Volume	448,852	CF
	3.36	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	111.50	CFS
	72.06	MGD

#N/A			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
6 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	72.06	111.50	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	79.27	122.65	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	61		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**11,322,000**	**$ 73,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	111.50		Ref: Technical Parameters
Diameter (In)	78		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	-		Input by Engineer
Depth (Ft)	-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe) $	**-**	**$ 3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	72.06		Ref: CSO Statistics
Construction Cost (Screening) $	**3,749,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	79.27		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	140	67	
Passes	5	**15.30**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**1,719,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	75,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**150,000**		
		TOTAL CAPITAL COST $	**20,459,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	6	
Peak Volume	448,852	CF
	3.36	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	111.50	CFS
	72.06	MGD

#N/A					
SEDIMENTATION BASIN (CSOTF)					
6 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		72.06		111.50	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		12,100			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		157		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		78		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		1.10		146,952	
Construction Cost (CSOTF)	**$**	**16,460,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		72.06		111.50	= Peak Rate
Force Main Diameter (In)		58			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,443,000**	**$**	**69,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		111.50			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		220,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,000			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**599,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		72.06			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,749,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		72.06			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		133		64	
Passes		5		**15.27**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,620,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		3.36			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		1.68			= Peak Vol/DW Time
Construction Cost	**$**	**8,815,065**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		34,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**68,000**			
				TOTAL CAPITAL COST	**$ 45,269,065**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	6	
Peak Volume	448,852	CF
	3.36	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	111.50	CFS
	72.06	MGD

#N/A

HIGH RATE END OF PIPE TREATMENT (HREOP)

6 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		72.06		111.50	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		850			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		42		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		21		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Construction Cost (HREOP)	**$**	**12,962,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		79.27		122.65	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		61			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**11,322,000**	**$**	**73,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		111.50			Ref: Technical Parameters
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		21,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		1,050			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**95,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		72.06			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,749,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		79.27			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		140		67	
Passes		5		15.30	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,719,000	$	1,834,000	
Construction Cost (Disinfection)	**$**	**3,553,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		55,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**110,000**			
			TOTAL CAPITAL COST	**$**	**35,310,000**

RESULTS SUMMARY		
Number of Events / Year	115	
Number of Overflows / Year	6	
Peak Volume	448,852	CF
	3.36	MG
Total Volume	10,460,014	CF
	78.24	MG
Peak Rate	111.50	CFS
	72.06	MGD

		#N/A			
		SCREENING AND DISINFECTION			
		6 Overflows / Year			
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		72.06		111.50	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**3,749,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		72.06		111.50	= Peak Flow x % Req Pump
Force Main Diameter (In)		58			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**10,443,000**	**$**	**69,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		111.50			Ref: CSO Statistics
Diameter (In)		78			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**3,147,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		22,300			=CFS x 200
Odor Control Flow Rate (CFM)		1,120			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**100,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		72.06			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		133		64	
Passes		5		15.27	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,620,000	$	1,708,000	
Construction Cost (Disinfection)	**$**	**3,328,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		30,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**			
			TOTAL CAPITAL COST	**$**	**21,195,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	105.91	$423,598	20	10.910	$4,621,427
	Tank O&M	No. Events / Yr	115	$99,354	50	14.484	$1,438,996
		Const Cost ($)	$11,479,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	106	$18,262	20	10.910	$199,241
	Odor Control O&M	Capacity (cfm)	11,690	$40,915	20	10.910	$446,380
	Reserve / Replace	10% Gravity / 15% Pump					$75,628
			Total Annual O&M	**$583,000**		**Total PW O&M**	**$6,782,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	9.91	$86,982	20	10.910	$948,974
	Tank O&M	No. Events / Yr	115	$149,204	50	14.484	$2,161,003
		Const Cost ($)	$31,419,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	106	$18,262	20	10.910	$199,241
	Odor Control O&M	Capacity (cfm)	116,850	$408,975	20	10.910	$4,461,892
	Reserve / Replace	10% Gravity / 15% Pump					$36,263
			Total Annual O&M	**$664,000**		**Total PW O&M**	**$7,807,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	105.91	$423,598	20	10.910	$4,621,427
	Sed. Basin O&M	Flow Rate (mgd)	105.91	$11,915	50	14.484	$172,573
	Screening O&M	Flow Rate (mgd)	105.91	$18,262	20	10.910	$199,241
	Disinfection O&M	Flow Rate (mgd)	105.91	$275,348	20	10.910	$3,004,031
	Odor Control O&M	Capacity (cfm)	16,150.00	$56,525	20	10.910	$616,684
	Reserve / Replace	10% Gravity / 15% Pump					$81,678
			Total Annual O&M	**$786,000**		**Total PW O&M**	**$8,696,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	116.50	$451,448	20	10.910	$4,925,275
	HREP O&M	Flow Rate (mgd)	105.91	$361,473	20	10.910	$3,943,654
	Screening O&M	Flow Rate (mgd)	105.91	$18,262	20	10.910	$199,241
	Disinfection O&M	Flow Rate (mgd)	116.50	$291,809	20	10.910	$3,183,617
	Odor Control O&M	Capacity (cfm)	1,600.00	$5,600	20	10.910	$61,096
	Reserve / Replace	10% Gravity / 15% Pump					$136,660
			Total Annual O&M	**$1,129,000**		**Total PW O&M**	**$12,450,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	116.50	$451,448	20	10.910	$4,925,275
	Swirl / Vortex O&M	Flow Rate (mgd)	105.91	$11,915	20	10.910	$129,993
	Screening O&M	Flow Rate (mgd)	105.91	$18,262	20	10.910	$199,241
	Disinfection O&M	Flow Rate (mgd)	116.50	$291,809	20	10.910	$3,183,617
	Odor Control O&M	Capacity (cfm)	17,300.00	$60,550	20	10.910	$660,597
	Reserve / Replace	10% Gravity / 15% Pump					$94,457
			Total Annual O&M	**$834,000**		**Total PW O&M**	**$9,193,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	105.91	$423,598	20	10.910	$4,621,427
	Screening O&M	Flow Rate (mgd)	105.91	$18,262	20	10.910	$199,241
	Disinfection O&M	Flow Rate (mgd)	105.91	$275,348	20	10.910	$3,004,031
	Odor Control O&M	Capacity (cfm)	1,640.00	$5,740	20	10.910	$62,623
	Reserve / Replace	10% Gravity / 15% Pump					$79,842
			Total Annual O&M	**$723,000**		**Total PW O&M**	**$7,967,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	100.11	$407,956	20	10.910	$4,450,781
	Tank O&M	No. Events / Yr	115	$84,979	50	14.484	$1,230,794
		Const Cost ($)	$5,729,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	100	$17,563	20	10.910	$191,617
	Odor Control O&M	Capacity (cfm)	6,180	$21,630	20	10.910	$235,982
	Reserve / Replace	10% Gravity / 15% Pump					$71,333
			Total Annual O&M	**$533,000**		**Total PW O&M**	**$6,181,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	5.24	$56,810	20	10.910	$619,793
	Tank O&M	No. Events / Yr	115	$113,251	50	14.484	$1,640,281
		Const Cost ($)	$17,038,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	100	$17,563	20	10.910	$191,617
	Odor Control O&M	Capacity (cfm)	61,800	$216,300	20	10.910	$2,359,820
	Reserve / Replace	10% Gravity / 15% Pump					$29,164
			Total Annual O&M	**$404,000**		**Total PW O&M**	**$4,841,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	100.11	$407,956	20	10.910	$4,450,781
	Sed. Basin O&M	Flow Rate (mgd)	100.11	$11,263	50	14.484	$163,123
	Screening O&M	Flow Rate (mgd)	100.11	$17,563	20	10.910	$191,617
	Disinfection O&M	Flow Rate (mgd)	100.11	$266,062	20	10.910	$2,902,719
	Odor Control O&M	Capacity (cfm)	15,250.00	$53,375	20	10.910	$582,318
	Reserve / Replace	10% Gravity / 15% Pump					$77,785
			Total Annual O&M	**$757,000**		**Total PW O&M**	**$8,368,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	110.12	$434,779	20	10.910	$4,743,410
	HREP O&M	Flow Rate (mgd)	100.11	$349,698	20	10.910	$3,815,184
	Screening O&M	Flow Rate (mgd)	100.11	$17,563	20	10.910	$191,617
	Disinfection O&M	Flow Rate (mgd)	110.12	$281,968	20	10.910	$3,076,249
	Odor Control O&M	Capacity (cfm)	1,500.00	$5,250	20	10.910	$57,277
	Reserve / Replace	10% Gravity / 15% Pump					$129,778
			Total Annual O&M	**$1,090,000**		**Total PW O&M**	**$12,014,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	110.12	$434,779	20	10.910	$4,743,410
	Swirl / Vortex O&M	Flow Rate (mgd)	100.11	$11,263	20	10.910	$122,875
	Screening O&M	Flow Rate (mgd)	100.11	$17,563	20	10.910	$191,617
	Disinfection O&M	Flow Rate (mgd)	110.12	$281,968	20	10.910	$3,076,249
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$80,962
			Total Annual O&M	**$746,000**		**Total PW O&M**	**$8,215,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	100.11	$407,956	20	10.910	$4,450,781
	Screening O&M	Flow Rate (mgd)	100.11	$17,563	20	10.910	$191,617
	Disinfection O&M	Flow Rate (mgd)	100.11	$266,062	20	10.910	$2,902,719
	Odor Control O&M	Capacity (cfm)	1,550.00	$5,425	20	10.910	$59,186
	Reserve / Replace	10% Gravity / 15% Pump					$76,031
			Total Annual O&M	**$698,000**		**Total PW O&M**	**$7,680,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	100.09	$407,909	20	10.910	$4,450,264
	Tank O&M	No. Events / Yr	115	$81,636	50	14.484	$1,182,383
		Const Cost ($)	$4,392,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	100	$17,561	20	10.910	$191,594
	Odor Control O&M	Capacity (cfm)	4,840	$16,940	20	10.910	$184,814
	Reserve / Replace	10% Gravity / 15% Pump					$71,146
			Total Annual O&M	**$525,000**		**Total PW O&M**	**$6,080,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	4.10	$48,270	20	10.910	$526,624
	Tank O&M	No. Events / Yr	115	$104,529	50	14.484	$1,513,948
		Const Cost ($)	$13,549,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	100	$17,561	20	10.910	$191,594
	Odor Control O&M	Capacity (cfm)	48,400	$169,400	20	10.910	$1,848,144
	Reserve / Replace	10% Gravity / 15% Pump					$27,363
			Total Annual O&M	**$340,000**		**Total PW O&M**	**$4,108,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	100.09	$407,909	20	10.910	$4,450,264
	Sed. Basin O&M	Flow Rate (mgd)	100.09	$11,261	50	14.484	$163,095
	Screening O&M	Flow Rate (mgd)	100.09	$17,561	20	10.910	$191,594
	Disinfection O&M	Flow Rate (mgd)	100.09	$266,034	20	10.910	$2,902,412
	Odor Control O&M	Capacity (cfm)	15,250.00	$53,375	20	10.910	$582,318
	Reserve / Replace	10% Gravity / 15% Pump					$77,774
			Total Annual O&M	**$757,000**		**Total PW O&M**	**$8,367,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	110.10	$434,728	20	10.910	$4,742,860
	HREP O&M	Flow Rate (mgd)	100.09	$349,662	20	10.910	$3,814,794
	Screening O&M	Flow Rate (mgd)	100.09	$17,561	20	10.910	$191,594
	Disinfection O&M	Flow Rate (mgd)	110.10	$281,938	20	10.910	$3,075,923
	Odor Control O&M	Capacity (cfm)	1,500.00	$5,250	20	10.910	$57,277
	Reserve / Replace	10% Gravity / 15% Pump					$129,755
			Total Annual O&M	**$1,090,000**		**Total PW O&M**	**$12,012,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	110.10	$434,728	20	10.910	$4,742,860
	Swirl / Vortex O&M	Flow Rate (mgd)	100.09	$11,261	20	10.910	$122,853
	Screening O&M	Flow Rate (mgd)	100.09	$17,561	20	10.910	$191,594
	Disinfection O&M	Flow Rate (mgd)	110.10	$281,938	20	10.910	$3,075,923
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$80,947
			Total Annual O&M	**$746,000**		**Total PW O&M**	**$8,214,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	100.09	$407,909	20	10.910	$4,450,264
	Screening O&M	Flow Rate (mgd)	100.09	$17,561	20	10.910	$191,594
	Disinfection O&M	Flow Rate (mgd)	100.09	$266,034	20	10.910	$2,902,412
	Odor Control O&M	Capacity (cfm)	1,550.00	$5,425	20	10.910	$59,186
	Reserve / Replace	10% Gravity / 15% Pump					$76,020
			Total Annual O&M	**$697,000**		**Total PW O&M**	**$7,679,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	85.60	$367,418	20	10.910	$4,008,510
	Tank O&M	No. Events / Yr	115	$80,304	50	14.484	$1,163,083
		Const Cost ($)	$3,859,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	86	$15,868	20	10.910	$173,121
	Odor Control O&M	Capacity (cfm)	4,300	$15,050	20	10.910	$164,195
	Reserve / Replace	10% Gravity / 15% Pump					$62,024
			Total Annual O&M	**$479,000**		**Total PW O&M**	**$5,571,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.64	$44,588	20	10.910	$486,450
	Tank O&M	No. Events / Yr	115	$100,991	50	14.484	$1,462,712
		Const Cost ($)	$12,134,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	86	$15,868	20	10.910	$173,121
	Odor Control O&M	Capacity (cfm)	43,000	$150,500	20	10.910	$1,641,946
	Reserve / Replace	10% Gravity / 15% Pump					$24,774
			Total Annual O&M	**$312,000**		**Total PW O&M**	**$3,789,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	85.60	$367,418	20	10.910	$4,008,510
	Sed. Basin O&M	Flow Rate (mgd)	85.60	$9,630	50	14.484	$139,470
	Screening O&M	Flow Rate (mgd)	85.60	$15,868	20	10.910	$173,121
	Disinfection O&M	Flow Rate (mgd)	85.60	$241,845	20	10.910	$2,638,511
	Odor Control O&M	Capacity (cfm)	13,000.00	$45,500	20	10.910	$496,402
	Reserve / Replace	10% Gravity / 15% Pump					$68,005
			Total Annual O&M	**$681,000**		**Total PW O&M**	**$7,524,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	94.16	$391,575	20	10.910	$4,272,060
	HREP O&M	Flow Rate (mgd)	85.60	$318,921	20	10.910	$3,479,404
	Screening O&M	Flow Rate (mgd)	85.60	$15,868	20	10.910	$173,121
	Disinfection O&M	Flow Rate (mgd)	94.16	$256,303	20	10.910	$2,796,246
	Odor Control O&M	Capacity (cfm)	1,250.00	$4,375	20	10.910	$47,731
	Reserve / Replace	10% Gravity / 15% Pump					$112,577
			Total Annual O&M	**$988,000**		**Total PW O&M**	**$10,881,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	94.16	$391,575	20	10.910	$4,272,060
	Swirl / Vortex O&M	Flow Rate (mgd)	85.60	$9,630	20	10.910	$105,058
	Screening O&M	Flow Rate (mgd)	85.60	$15,868	20	10.910	$173,121
	Disinfection O&M	Flow Rate (mgd)	94.16	$256,303	20	10.910	$2,796,246
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$70,700
			Total Annual O&M	**$674,000**		**Total PW O&M**	**$7,417,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	85.60	$367,418	20	10.910	$4,008,510
	Screening O&M	Flow Rate (mgd)	85.60	$15,868	20	10.910	$173,121
	Disinfection O&M	Flow Rate (mgd)	85.60	$241,845	20	10.910	$2,638,511
	Odor Control O&M	Capacity (cfm)	1,330.00	$4,655	20	10.910	$50,786
	Reserve / Replace	10% Gravity / 15% Pump					$66,458
			Total Annual O&M	**$630,000**		**Total PW O&M**	**$6,937,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	72.06	$327,502	20	10.910	$3,573,025
	Tank O&M	No. Events / Yr	115	$79,481	50	14.484	$1,151,170
		Const Cost ($)	$3,530,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	72	$14,357	20	10.910	$156,630
	Odor Control O&M	Capacity (cfm)	3,960	$13,860	20	10.910	$151,212
	Reserve / Replace	10% Gravity / 15% Pump					$53,536
			Total Annual O&M	**$436,000**		**Total PW O&M**	**$5,086,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.36	$42,219	20	10.910	$460,611
	Tank O&M	No. Events / Yr	115	$98,791	50	14.484	$1,430,849
		Const Cost ($)	$11,254,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	72	$14,357	20	10.910	$156,630
	Odor Control O&M	Capacity (cfm)	39,600	$138,600	20	10.910	$1,512,118
	Reserve / Replace	10% Gravity / 15% Pump					$22,583
			Total Annual O&M	**$294,000**		**Total PW O&M**	**$3,583,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	72.06	$327,502	20	10.910	$3,573,025
	Sed. Basin O&M	Flow Rate (mgd)	72.06	$8,107	50	14.484	$117,415
	Screening O&M	Flow Rate (mgd)	72.06	$14,357	20	10.910	$156,630
	Disinfection O&M	Flow Rate (mgd)	72.06	$217,768	20	10.910	$2,375,830
	Odor Control O&M	Capacity (cfm)	11,000.00	$38,500	20	10.910	$420,033
	Reserve / Replace	10% Gravity / 15% Pump					$58,840
			Total Annual O&M	**$607,000**		**Total PW O&M**	**$6,702,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	79.27	$349,034	20	10.910	$3,807,944
	HREP O&M	Flow Rate (mgd)	72.06	$288,215	20	10.910	$3,144,408
	Screening O&M	Flow Rate (mgd)	72.06	$14,357	20	10.910	$156,630
	Disinfection O&M	Flow Rate (mgd)	79.27	$230,786	20	10.910	$2,517,862
	Odor Control O&M	Capacity (cfm)	1,050.00	$3,675	20	10.910	$40,094
	Reserve / Replace	10% Gravity / 15% Pump					$96,582
			Total Annual O&M	**$887,000**		**Total PW O&M**	**$9,764,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	79.27	$349,034	20	10.910	$3,807,944
	Swirl / Vortex O&M	Flow Rate (mgd)	72.06	$8,107	20	10.910	$88,444
	Screening O&M	Flow Rate (mgd)	72.06	$14,357	20	10.910	$156,630
	Disinfection O&M	Flow Rate (mgd)	79.27	$230,786	20	10.910	$2,517,862
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$61,067
			Total Annual O&M	**$603,000**		**Total PW O&M**	**$6,632,000**

#N/A	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	72.06	$327,502	20	10.910	$3,573,025
	Screening O&M	Flow Rate (mgd)	72.06	$14,357	20	10.910	$156,630
	Disinfection O&M	Flow Rate (mgd)	72.06	$217,768	20	10.910	$2,375,830
	Odor Control O&M	Capacity (cfm)	1,120.00	$3,920	20	10.910	$42,767
	Reserve / Replace	10% Gravity / 15% Pump					$57,483
			Total Annual O&M	**$564,000**		**Total PW O&M**	**$6,206,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$54.0	$54,034,000	$0
1	$54.0	$54,034,000	$0
2	$54.0	$54,034,000	$0
4	$54.0	$54,034,000	$0
6	$54.0	$54,034,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$65.4	$57,568,085	$7,807,000
1	$44.4	$39,577,209	$4,841,000
2	$39.3	$35,201,053	$4,108,000
4	$36.5	$32,744,468	$3,789,000
6	$34.6	$31,005,065	$3,583,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$53.1	$46,269,085	$6,782,000
1	$44.2	$38,016,209	$6,181,000
2	$42.4	$36,302,053	$6,080,000
4	$38.7	$33,168,468	$5,571,000
6	$35.5	$30,459,065	$5,086,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$42.4	$33,157,000	$9,193,000
1	$34.2	$25,964,000	$8,215,000
2	$34.2	$25,960,000	$8,214,000
4	$30.5	$23,128,000	$7,417,000
6	$27.1	$20,459,000	$6,632,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$61.1	$48,635,000	$12,450,000
1	$58.4	$46,380,000	$12,014,000
2	$58.4	$46,373,000	$12,012,000
4	$51.6	$40,743,000	$10,881,000
6	$45.1	$35,310,000	$9,764,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$60.1	$51,401,192	$8,696,000
1	$59.5	$51,155,209	$8,368,000
2	$59.2	$50,877,053	$8,367,000
4	$55.5	$47,960,468	$7,524,000
6	$52.0	$45,269,065	$6,702,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$36.1	$28,130,000	$7,967,000
1	$34.7	$26,989,000	$7,680,000
2	$34.7	$26,986,000	$7,679,000
4	$30.8	$23,897,000	$6,937,000
6	$27.4	$21,195,000	$6,206,000

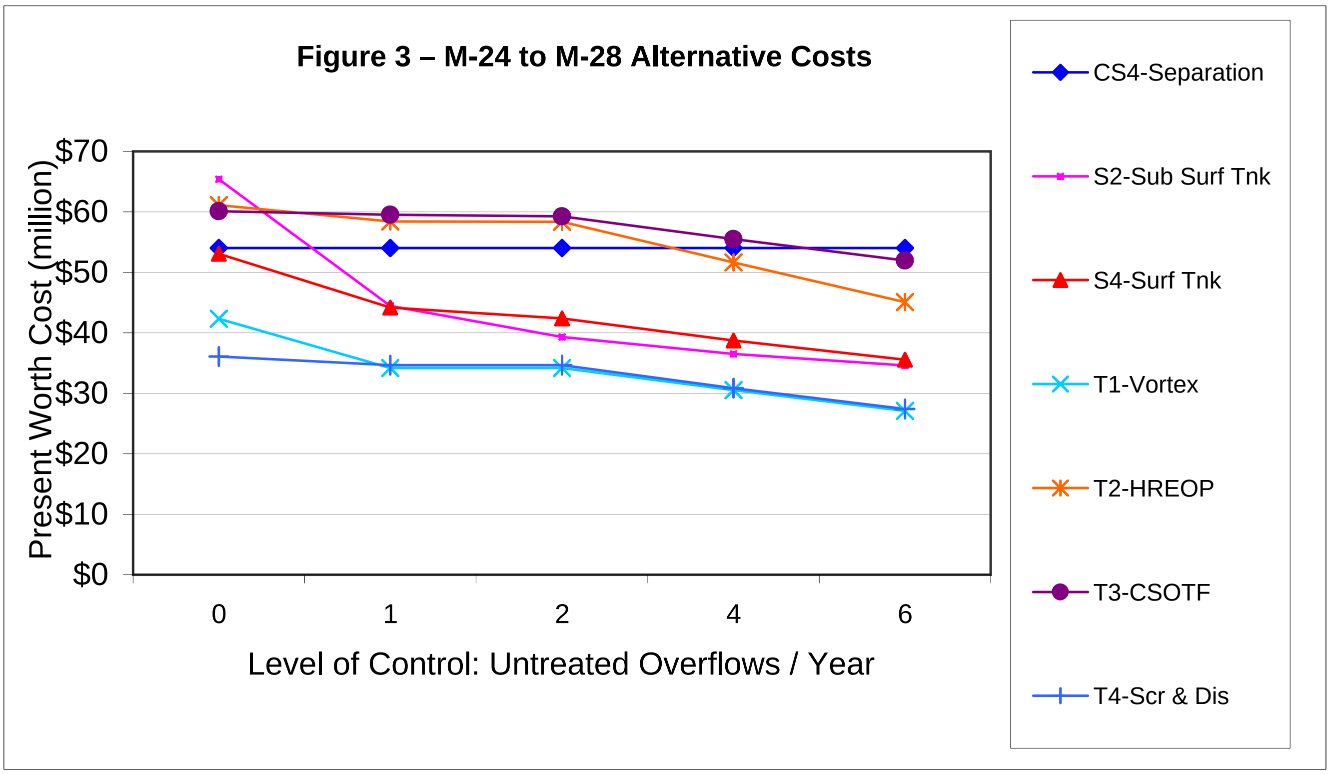


Figure 3 – M-24 to M-28 Alternative Costs
Present Worth Cost (million)
$70
$60
$50
$40
$30
$20
$10
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	M-24 to M-28
Structures within Region	M-24, M-26, M-27, and M-28
Model ID	M-24 to M-28.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Monongahela River
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	115	
Peak Volume:	1,324,257	ft^3
	9.91	MG
Total Volume:	10,460,014	ft^3
	78.25	MG
Peak Rate:	163.88	cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 0:27	5144	1/5/2005 14:45	1324256.59	9906.101	0	33.69	18
10/24/2005 2:00	3547	10/25/2005 3:45	699932.07	5235.842	1	19.50	34
2/14/2005 3:31	1842	2/14/2005 20:00	548484.95	4102.942	2	23.39	30
1/11/2005 8:20	1297	1/12/2005 1:30	506753.32	3790.768	3	38.72	15
11/29/2005 1:51	833	11/29/2005 7:00	487059.36	3643.448	4	38.10	16
1/3/2005 3:20	1460	1/3/2005 13:15	449215.87	3360.359	5	19.73	33
5/13/2005 22:30	1644	5/13/2005 22:45	448851.61	3357.634	6	131.11	5
10/21/2005 18:46	1432	10/22/2005 6:45	329173.01	2462.379	7	132.45	4
8/20/2005 18:15	179	8/20/2005 18:45	324167.04	2424.932	8	154.91	1
11/14/2005 21:30	605	11/15/2005 3:00	317124.99	2372.253	9	32.37	19
3/28/2005 7:34	1019	3/28/2005 19:00	315141.54	2357.416	10	29.01	24
4/1/2005 18:31	1376	4/2/2005 6:15	311820.02	2332.570	11	30.08	22
4/22/2005 14:46	1311	4/23/2005 4:15	296209.31	2215.794	12	150.20	3
12/15/2005 7:39	1125	12/15/2005 14:00	218664.87	1635.723	13	27.94	25
7/26/2005 19:45	102	7/26/2005 20:00	217220.82	1624.920	14	163.88	0
3/23/2005 1:17	1921	3/23/2005 2:45	213676.90	1598.410	15	18.65	35
1/13/2005 22:35	629	1/14/2005 2:30	188905.43	1413.107	16	21.74	32
2/20/2005 14:15	1914	2/20/2005 20:00	175216.36	1310.706	17	29.51	23
7/5/2005 16:30	159	7/5/2005 17:00	173910.27	1300.936	18	111.50	6
5/11/2005 22:30	157	5/11/2005 23:00	167939.79	1256.274	19	84.38	9
5/28/2005 7:46	710	5/28/2005 9:30	164692.52	1231.982	20	31.38	20
2/9/2005 8:01	808	2/9/2005 16:45	141279.14	1056.839	21	26.66	26
6/11/2005 17:30	93	6/11/2005 17:45	139372.65	1042.577	22	154.88	2
9/29/2005 5:00	143	9/29/2005 5:45	135733.77	1015.356	23	94.38	8
11/16/2005 4:00	509	11/16/2005 4:15	133156.89	996.080	24	45.20	13
10/7/2005 7:01	651	10/7/2005 10:45	131088.91	980.611	25	25.34	29
8/29/2005 8:37	447	8/29/2005 13:45	107130.95	801.393	26	44.44	14
11/9/2005 19:15	75	11/9/2005 19:45	99582.80	744.929	27	105.65	7
8/8/2005 8:25	139	8/8/2005 9:15	98384.02	735.962	28	50.09	11
1/12/2005 21:03	901	1/13/2005 5:00	74845.17	559.879	29	3.19	69
9/26/2005 5:08	421	9/26/2005 6:00	74501.10	557.305	30	15.52	38
9/16/2005 21:15	72	9/16/2005 21:45	71445.51	534.448	31	57.33	10
7/16/2005 11:15	216	7/16/2005 11:40	70020.00	523.785	32	25.89	27

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
11/1/2005 14:31	251	11/1/2005 16:30	67740.49	506.733	33	13.08	43
7/17/2005 16:15	105	7/17/2005 16:45	62117.49	464.670	34	25.80	28
5/19/2005 19:23	999	5/20/2005 6:30	60038.84	449.121	35	9.56	51
6/3/2005 5:52	302	6/3/2005 9:15	58752.12	439.495	36	15.91	36
1/25/2005 17:23	823	1/26/2005 5:00	57910.58	433.200	37	12.95	44
4/3/2005 0:31	910	4/3/2005 6:15	56632.33	423.638	38	9.21	52
2/16/2005 5:30	395	2/16/2005 8:00	54849.07	410.298	39	12.27	46
3/27/2005 16:06	339	3/27/2005 17:15	51437.57	384.779	40	13.40	41
5/23/2005 10:32	434	5/23/2005 16:45	47327.87	354.036	41	36.60	17
8/27/2005 15:15	59	8/27/2005 15:30	46043.58	344.429	42	49.65	12
4/24/2005 0:20	2054	4/24/2005 16:30	42517.66	318.053	43	2.59	72
12/25/2005 10:07	266	12/25/2005 12:45	42241.04	315.984	44	11.30	48
4/20/2005 18:30	395	4/20/2005 19:45	39269.58	293.756	45	11.38	47
11/8/2005 10:33	320	11/8/2005 15:15	34909.07	261.137	46	15.05	39
3/7/2005 21:15	575	3/8/2005 0:15	33751.55	252.478	47	3.09	70
12/26/2005 1:23	766	12/26/2005 6:15	33265.65	248.844	48	3.37	67
12/9/2005 3:07	274	12/9/2005 4:15	30673.55	229.453	49	14.37	40
7/25/2005 13:15	330	7/25/2005 13:45	30161.52	225.623	50	21.87	31
4/26/2005 19:37	424	4/27/2005 1:00	28494.76	213.155	51	7.41	55
5/7/2005 11:33	164	5/7/2005 13:30	28269.05	211.467	52	15.75	37
10/20/2005 22:53	606	10/21/2005 7:35	27908.44	208.769	53	13.36	42
4/30/2005 4:15	308	4/30/2005 7:00	27348.13	204.578	54	8.36	54
1/30/2005 10:52	235	1/30/2005 13:00	26777.87	200.312	55	9.82	50
11/24/2005 7:52	345	11/24/2005 9:30	26734.69	199.989	56	5.23	60
3/19/2005 22:50	1291	3/20/2005 7:30	26326.20	196.933	57	2.67	71
6/14/2005 18:45	77	6/14/2005 19:15	20302.17	151.870	58	12.92	45
3/11/2005 7:31	766	3/11/2005 14:00	19938.26	149.148	59	5.21	62
7/21/2005 14:39	46	7/21/2005 15:00	19523.59	146.046	60	30.44	21
3/12/2005 10:01	463	3/12/2005 12:30	19350.75	144.753	61	5.35	59
2/25/2005 9:50	667	2/25/2005 13:45	18580.97	138.995	62	3.25	68
6/17/2005 0:36	130	6/17/2005 1:30	17678.47	132.244	63	8.94	53
6/16/2005 11:00	364	6/16/2005 11:35	14137.34	105.754	64	4.22	64
11/23/2005 17:38	288	11/23/2005 20:15	13832.72	103.476	65	5.23	61
11/9/2005 4:15	96	11/9/2005 4:30	13467.14	100.741	66	10.42	49
8/26/2005 18:08	571	8/26/2005 21:45	11913.62	89.120	67	3.52	66
6/8/2005 21:00	68	6/8/2005 21:20	11867.18	88.772	68	5.71	56
2/8/2005 1:47	796	2/8/2005 12:30	11566.27	86.521	69	2.29	73
12/11/2005 11:24	420	12/11/2005 15:45	10024.48	74.988	70	2.18	74
8/16/2005 5:06	213	8/16/2005 8:15	9611.80	71.901	71	4.58	63
8/5/2005 10:47	82	8/5/2005 12:00	5399.39	40.390	72	1.96	75
9/23/2005 2:45	39	9/23/2005 3:05	5056.45	37.825	73	5.47	58
10/28/2005 11:57	55	10/28/2005 12:30	4760.40	35.610	74	5.68	57
3/1/2005 2:56	517	3/1/2005 10:15	4557.70	34.094	75	0.27	104
5/21/2005 14:22	76	5/21/2005 15:15	4428.86	33.130	76	3.73	65
2/26/2005 9:15	222	2/26/2005 12:45	2960.79	22.148	77	0.87	81
2/24/2005 10:20	330	2/24/2005 10:30	2940.55	21.997	78	0.19	111
2/22/2005 4:46	212	2/22/2005 6:05	2029.81	15.184	79	0.17	114
7/18/2005 18:30	34	7/18/2005 18:45	1966.53	14.711	80	1.27	77
6/6/2005 9:45	24	6/6/2005 10:00	1655.43	12.383	81	1.82	76
4/28/2005 18:18	211	4/28/2005 18:30	1510.90	11.302	82	0.32	99
2/3/2005 15:18	126	2/3/2005 17:15	1276.36	9.548	83	0.40	92
3/4/2005 13:16	53	3/4/2005 14:00	1081.29	8.089	84	0.68	82
5/24/2005 6:09	356	5/24/2005 6:30	1075.91	8.048	85	0.60	85
6/22/2005 5:06	28	6/22/2005 5:30	1066.52	7.978	86	0.94	79

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
3/25/2005 11:32	90	3/25/2005 12:15	1062.21	7.946	87	0.49	88

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
11/14/2005 0:00	19	11/14/2005 0:15	932.34	6.974	88	1.14	78
6/28/2005 18:46	20	6/28/2005 19:00	746.20	5.582	89	0.94	80
2/22/2005 20:45	25	2/22/2005 21:00	652.64	4.882	90	0.65	83
11/6/2005 9:51	252	11/6/2005 14:00	586.51	4.387	91	0.58	86
5/22/2005 20:04	28	5/22/2005 20:15	536.44	4.013	92	0.42	90
5/27/2005 20:46	18	5/27/2005 21:00	471.27	3.525	93	0.55	87
3/5/2005 11:00	24	3/5/2005 11:15	419.17	3.136	94	0.40	93
11/23/2005 0:06	13	11/23/2005 0:15	379.32	2.838	95	0.64	84
12/16/2005 14:32	17	12/16/2005 14:45	377.90	2.827	96	0.47	89
3/3/2005 13:01	22	3/3/2005 13:15	365.86	2.737	97	0.37	96
3/7/2005 13:16	22	3/7/2005 13:30	339.49	2.540	98	0.35	97
12/4/2005 14:16	29	12/4/2005 14:45	286.00	2.139	99	0.17	112
4/29/2005 6:02	18	4/29/2005 6:15	283.48	2.121	100	0.33	98
11/13/2005 15:04	26	11/13/2005 15:15	262.61	1.964	101	0.20	110
5/23/2005 3:22	15	5/23/2005 3:30	256.79	1.921	102	0.38	94
5/24/2005 20:54	113	5/24/2005 22:45	254.79	1.906	103	0.29	103
4/27/2005 14:19	15	4/27/2005 14:30	227.40	1.701	104	0.30	101
3/14/2005 10:18	18	3/14/2005 10:30	218.73	1.636	105	0.24	107
12/29/2005 9:52	12	12/29/2005 10:00	216.36	1.618	106	0.38	95
7/15/2005 17:22	11	7/15/2005 17:30	215.78	1.614	107	0.40	91
3/2/2005 15:34	17	3/2/2005 15:45	206.97	1.548	108	0.23	108
5/2/2005 4:22	11	5/2/2005 4:30	164.22	1.228	109	0.30	102
11/27/2005 6:37	10	11/27/2005 6:45	151.42	1.133	110	0.30	100
7/19/2005 5:38	10	7/19/2005 5:45	133.99	1.002	111	0.26	105
11/27/2005 17:08	8	11/27/2005 17:15	100.68	0.753	112	0.24	106
12/28/2005 15:24	7	12/28/2005 15:30	81.08	0.607	113	0.20	109
1/29/2005 22:39	7	1/29/2005 22:45	66.40	0.497	114	0.17	113

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	M-24 to M-28	**Results Summary**		
Structures within Region	M-24, M-26, M-27, and M-28	Number of Events:	115	
Model ID	M-24 to M-28.1	Peak Volume:	1,324,257	ft^3
Structure Type	Consolidation		9.91	MG
PWSA Sewershed	N/A	Total Volume:	10,460,014	ft^3
Stream of Discharge	Monongahela River		78.25	MG
NPDES Permit Number	N/A	Peak Rate:	163.88	cfs
Owner	N/A			

Model Network (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2

Model Run 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Figure 1 - M-24 to M-28 CSO Volume

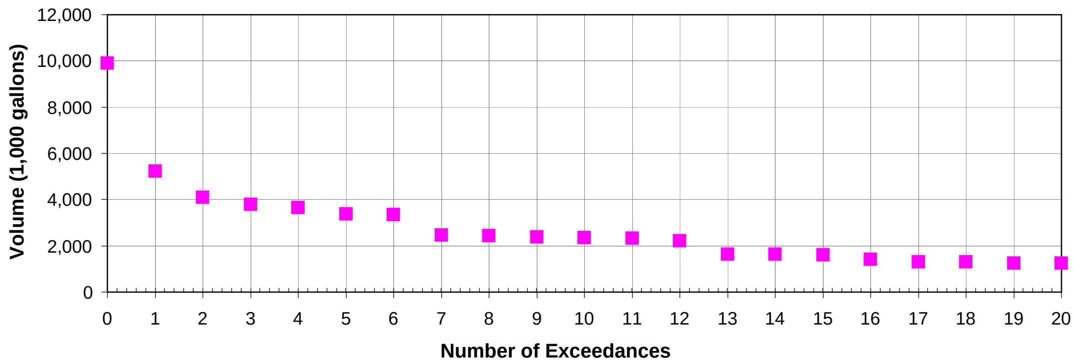
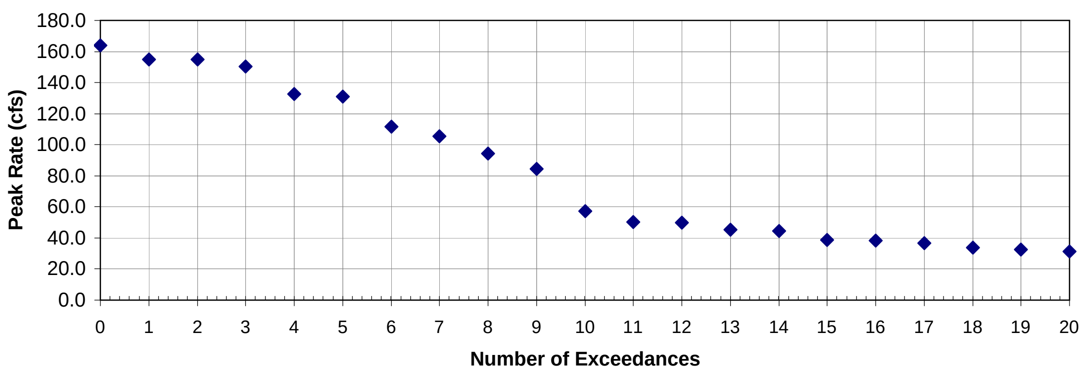


Figure 2 - M-24 to M-28 CSO Peak Flow Rate



D.35.4 M-24 TO M-28 REGION – ARLINGTON THROUGH 25TH STREET SEWERSHEDS – NPDES# 029KM24, 029KM26, 029PM27, AND 030CM28

Description of Outfalls

The Arlington through 25th Street Sewersheds are located in portions of Allentown, Arlington, Arlington Heights, Mount Washington, South Shore, Southside Flats and Southside Slopes sections in the City of Pittsburgh. These sewersheds include approximately 1,369 acres of residential, business and commercial users that contribute flow to twenty-two (22) ALCOSAN outfalls. The sewershed has been divided into four regions, regions 1 through 4. This region contains outfalls M-24, M-26, M-27 and M-28. The M-26 tributary area consists of 38 acres of combined sewers, M-26 tributary area consists of 41 acres of combined sewers, the M-27 tributary area consists of 123 acres of combined sewers and the M-28 tributary area consists of 67 acres of combined sewers. The Arlington through 25th Street Sewersheds are comprised of approximately 1,184 manholes and 269,713 linear feet (51.1 miles) of sewer up to 90 inches in diameter. Outfalls 029KM24 through 030CM28 currently convey overflows from each of the respective ALCOSAN diversion chambers to the Monongahela River.

Attachment 1, Tributary Area Map, shows the CSO locations and the tributary areas.

Outfalls 029KM24 to 030CM28 typically experiences 115 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 9.91 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from the outfalls is approximately 163.88 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

Figure 1 - M-24 to M-28 CSO Volume

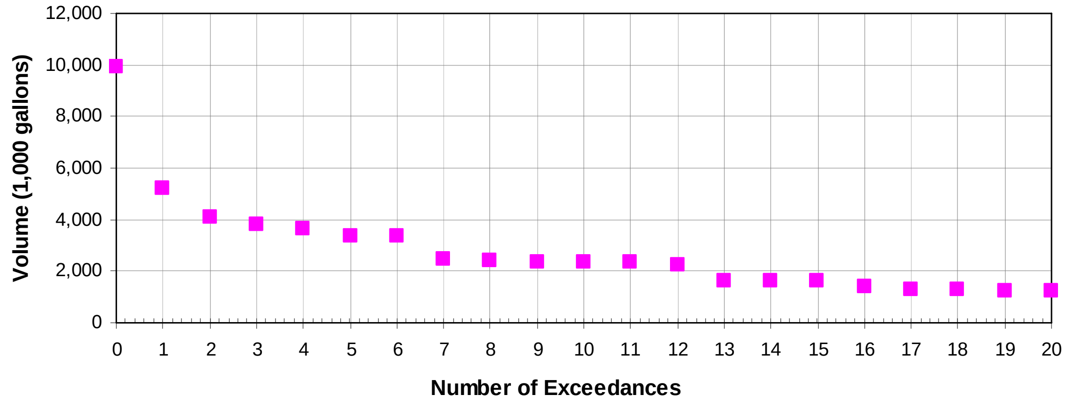
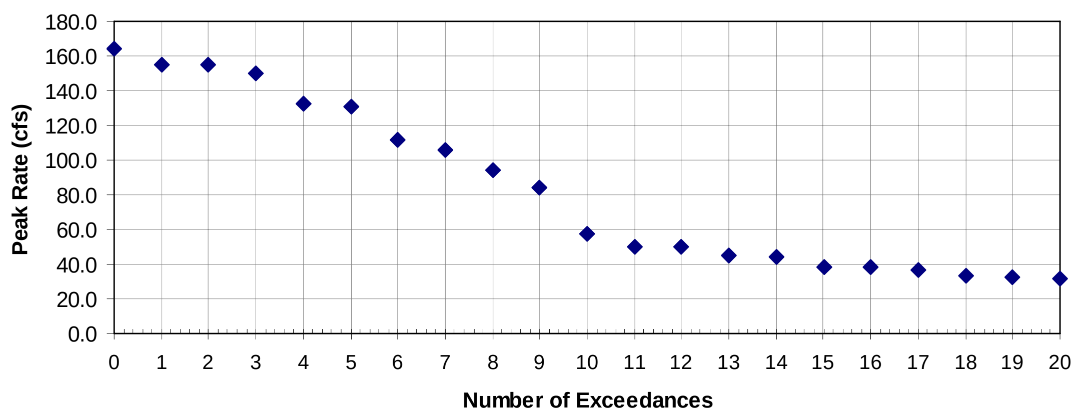


Figure 2 - M-24 to M-28 CSO Peak Flow Rate



A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers. The sewers are required to convey CSOs from outfalls 030CM28 and 029PM27 to the vicinity of outfall 029KM26. There appears to be a limited amount of available space for potential storage or treatment facilities to the southeast of this outfall on a vacant piece of property within an existing commercial development. The site is generally bounded by the Monongahela River to the east, private property to south, west and north.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Alternatives

CS4-M-24 TO M-28 REGION: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-M-24 TO M-28 REGION: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-M-24 TO M-28 REGION: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the the

collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-M-24 TO M-28 REGION: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-M-24 TO M-28 REGION: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-M-24 TO M-28 REGION: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

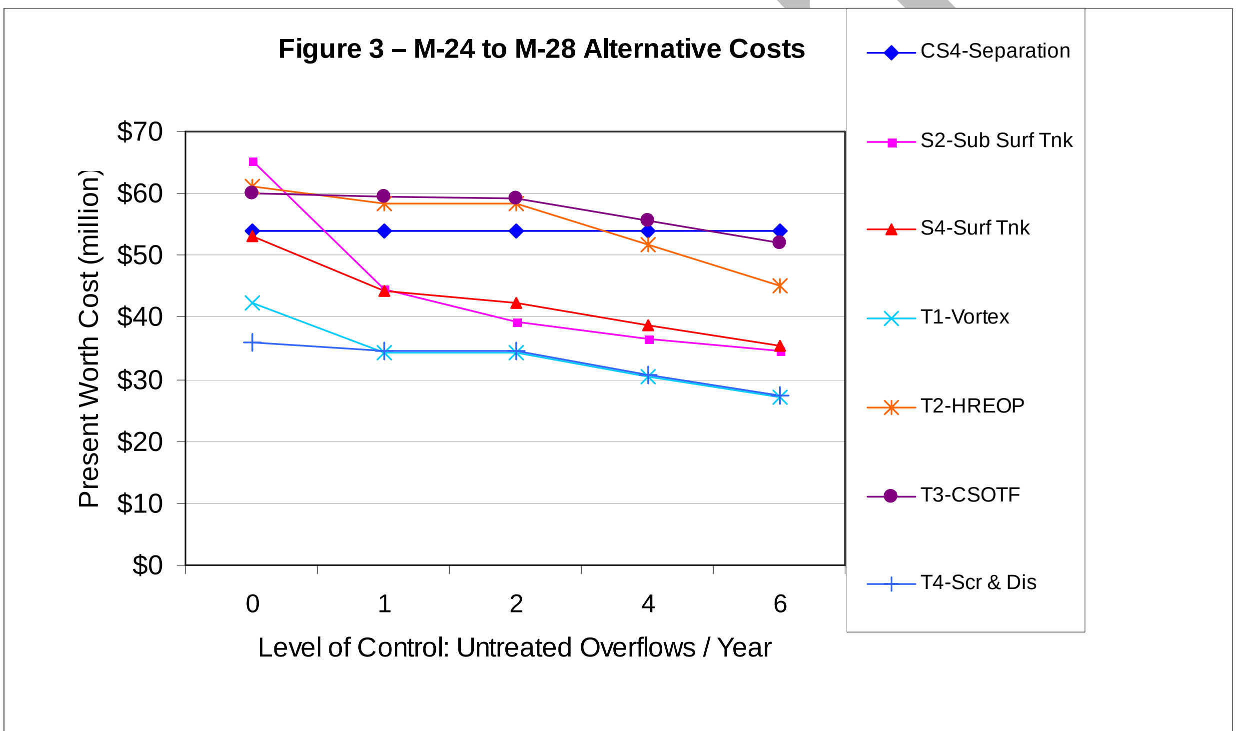
T4-M-24 TO M-28 REGION: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – M-46 to M-28 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

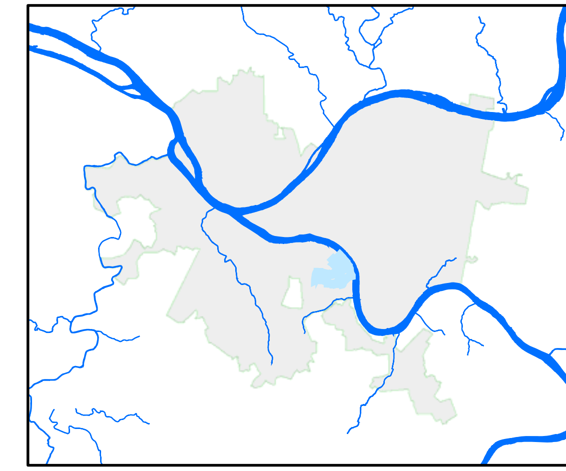
Recommendations

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-M-26 to M-28 Region: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Several significant issues exist with the siting of a CSO storage and treatment facility. A site large enough to store control level 0 does not appear to be available in the vicinity of outfall 029KM26. Installing a structure with a deeper sidewater depth could reduce the size of footprint required for a storage facility. Construction of the consolidation sewers will also be a significant endeavor considering the congested infrastructure that exists along the river in this area.



Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

500 0 500
Feet

Attachment 1
M-24 to M-28
Tributary Area Map
Arlington through 25th St.
Sewershed

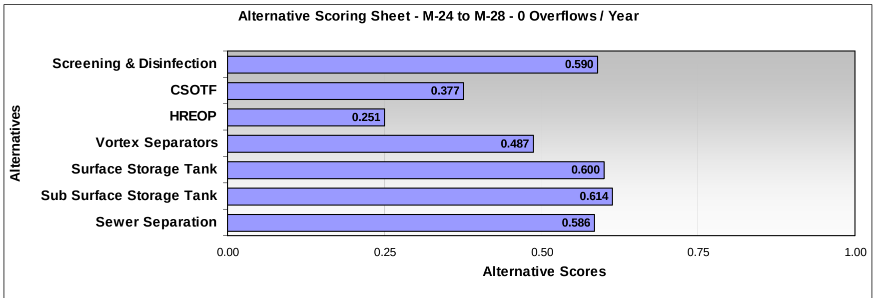
CSO Controls Alternatives

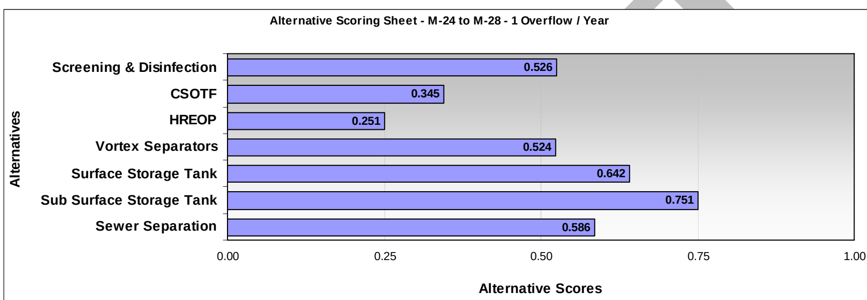
SW-D-0262.pdf

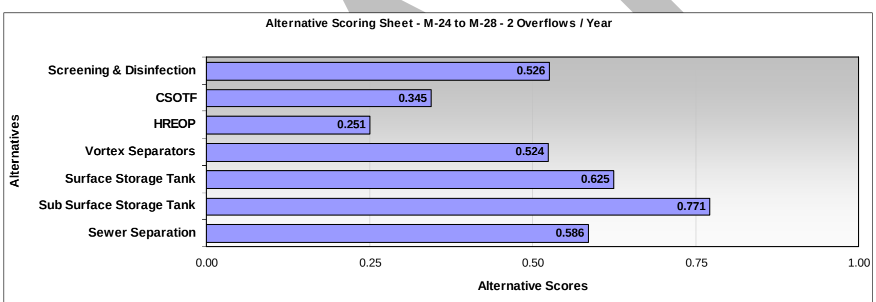
Attachment 2 - CSO Alternatives Development Worksheet

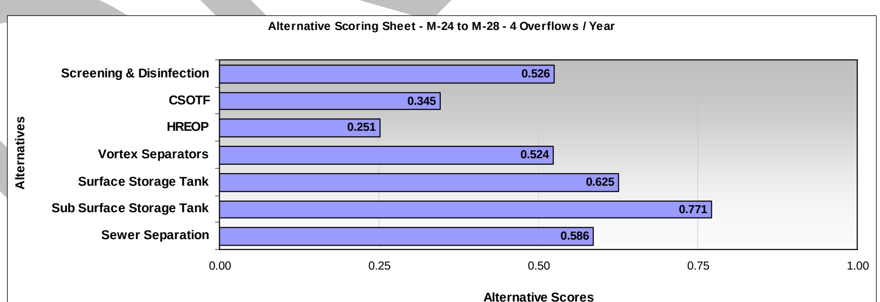
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will not be evaluated.
Sewer separation	Y	Sewer separation will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with all storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with all treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

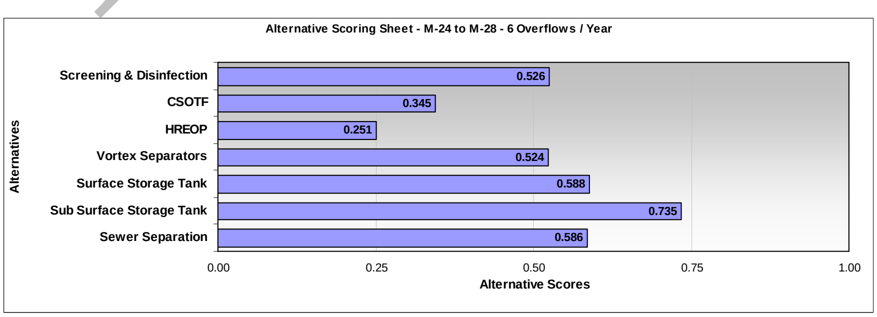
Attachment 3 – Alternative Scoring Sheet

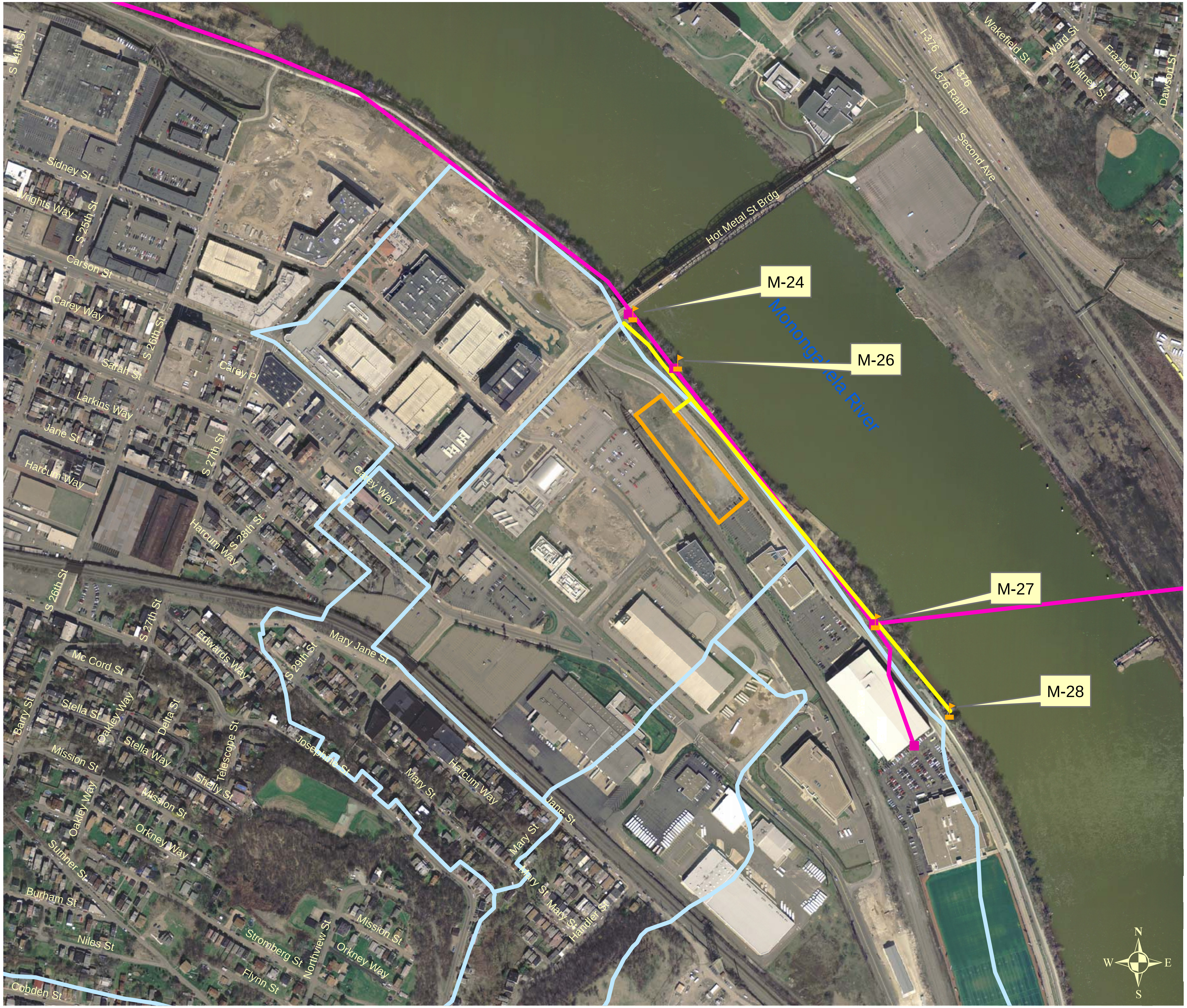


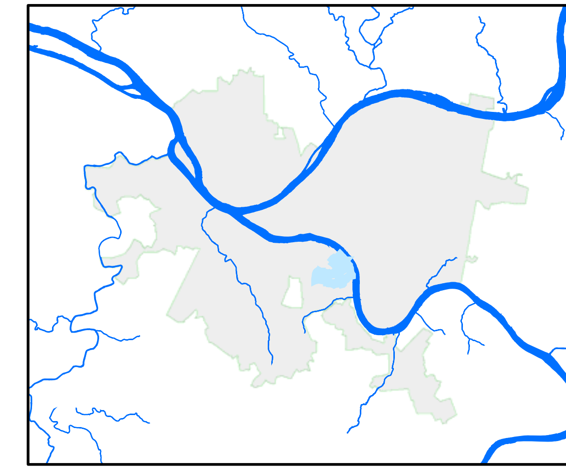












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 390 780 Feet

Attachment 4
M-24 to M-28
Facilities Boundary Map
Arlington through 25th St. Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0262.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	1	1	1	1	1
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.					
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	3	3	3	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	3	3	3	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	2	2
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	2	2	2	2	2
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T2-HREOP		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	1	1	1	1	1
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T3-CSOTF		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	2	2	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	2	3
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	2	2	2	2	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team

›f Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.570**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000

Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	**CS4-Separation**		**Control Level:**	**4 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	**CS4-Separation**		**Control Level:**	**6 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000

Objective Scoring

Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.817**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147

Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	**S2-Sub Surf Tnk**		**Control Level:**	**4 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	**S2-Sub Surf Tnk**		**Control Level:**	**6 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031

Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.800**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.663**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.663**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074

Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.647**

Alternative:	**S4-Surf Tnk**		**Control Level:**	**4 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.720**

Alternative:	**S4-Surf Tnk**		**Control Level:**	**6 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031

Objective Scoring

Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.688**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000

Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	**T1-Vortex**		**Control Level:**	**4 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

Alternative:	**T1-Vortex**		**Control Level:**	**6 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031

Objective Scoring

Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000

Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	**T2-HREOP**		**Control Level:**	**4 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	**T2-HREOP**		**Control Level:**	**6 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031

Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000

Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	**T3-CSOTF**		**Control Level:**	**4 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	**T3-CSOTF**		**Control Level:**	**6 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031

Objective Scoring

Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

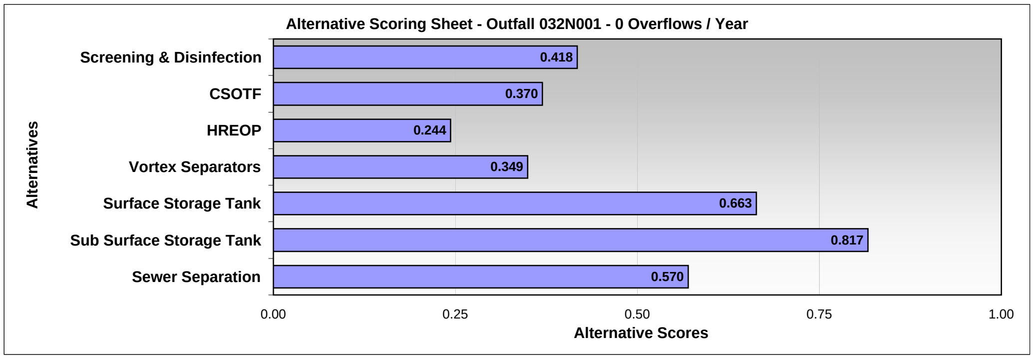
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000

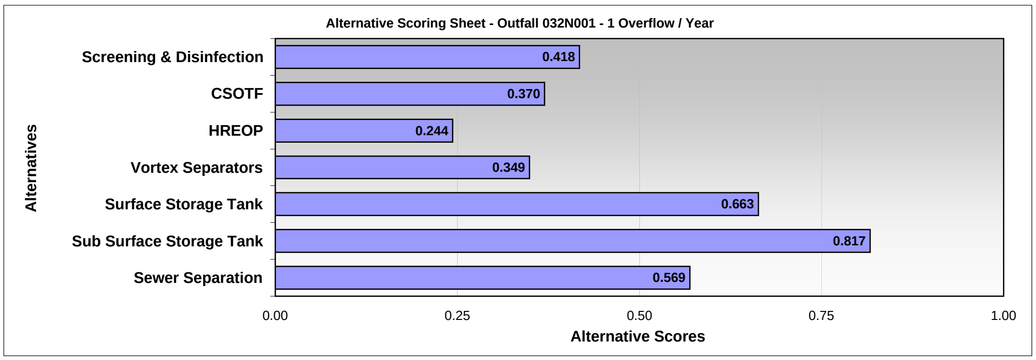
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.418**

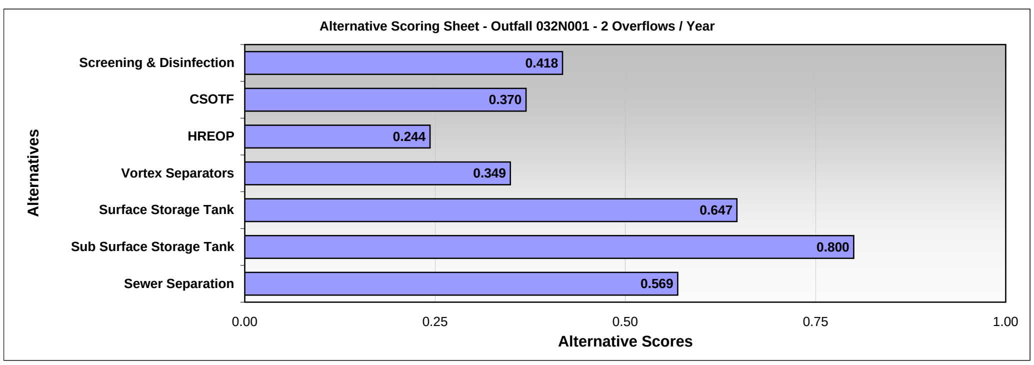
Alternative:	**T4-Scr & Dis**		**Control Level:**	**4 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.454**

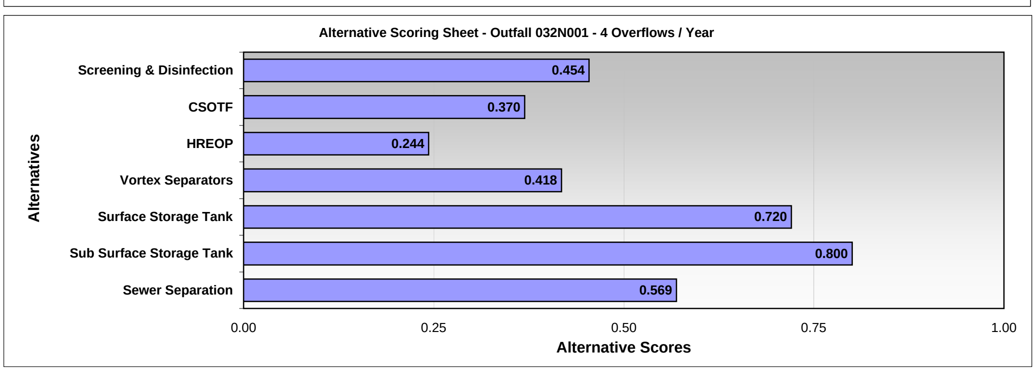
Alternative:	**T4-Scr & Dis**		**Control Level:**	**6 Overflows / Year**
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031

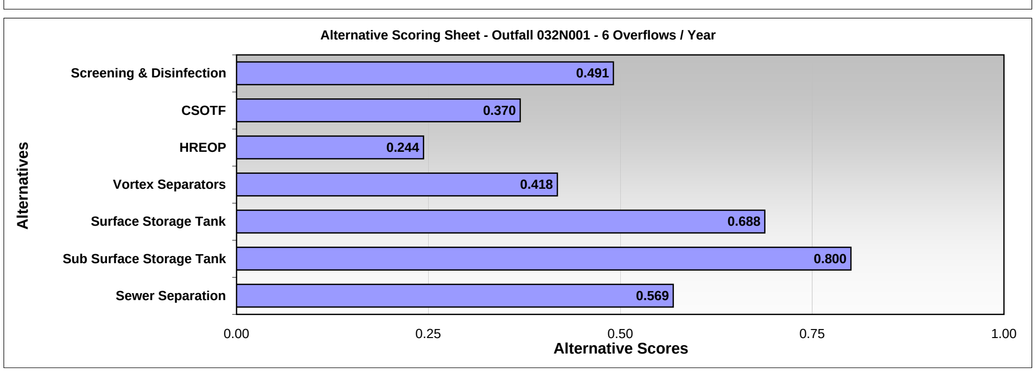
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.491**


Alternative Scoring Sheet - Outfall 032N001 - 0 Overflows / Year
Alternatives
Screening & Disinfection
0.418
CSOTF
0.370
HREOP
0.244
Vortex Separators
0.349
Surface Storage Tank
0.663
Sub Surface Storage Tank
0.817
Sewer Separation
0.570
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 032N001 - 1 Overflow / Year
Alternatives
Screening & Disinfection
0.418
CSOTF
0.370
HREOP
0.244
Vortex Separators
0.349
Surface Storage Tank
0.663
Sub Surface Storage Tank
0.817
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 032N001 - 2 Overflows / Year
Alternatives
Screening & Disinfection
0.418
CSOTF
0.370
HREOP
0.244
Vortex Separators
0.349
Surface Storage Tank
0.647
Sub Surface Storage Tank
0.800
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 032N001 - 4 Overflows / Year
Alternatives
Screening & Disinfection
0.454
CSOTF
0.370
HREOP
0.244
Vortex Separators
0.418
Surface Storage Tank
0.720
Sub Surface Storage Tank
0.800
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 032N001 - 6 Overflows / Year
Alternatives
Screening & Disinfection
0.491
CSOTF
0.370
HREOP
0.244
Vortex Separators
0.418
Surface Storage Tank
0.688
Sub Surface Storage Tank
0.800
Sewer Separation
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	0	
Peak Volume	5,506	CF
	0.04	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		44		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**6,600,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,166		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**6,677,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	0	
Peak Volume	5,506	CF
	0.04	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
SURFACE STORAGE TANK			
0 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.04	6,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.05	7,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	27		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	19		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.06	7,695	**Sufficient Volume**
Tank Area (SF)	1,000		= Length x Width
Construction Cost (Storage Tank)	**29,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	1.99	3.08	= Peak Rate
Force Main Diameter (In)	10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 1,708,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	3.08		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe)	**$ 63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	11,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	60		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$ 10,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	1.99		Ref: CSO Statistics
Construction Cost (Screening)	**$ 505,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes / Detention (Min)		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$ -	$ -	
Construction Cost (Disinfection)	**$ -**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators)	**$ 39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 40,000**		
		TOTAL CAPITAL COST $	**2,413,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	0	
Peak Volume	5,506	CF
	0.04	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001

SUB-SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank Default Value	
Sizing Basis: Peak Volume (MG / CF)		0.04	6,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.05	7,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		27		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		19		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.06	7,695	**Sufficient Volume**
Tank Area (SF)		1,000		= Length x Width
Construction Cost (Storage Tank)		**1,041,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.04	0.06	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		1		Input by Engineer
Force Main Velocity (FPS)		11.7	**Check:**	**Not OK**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**320,000**	**$ 12,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.08		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		11,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		550		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**57,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.99		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**505,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	**2,077,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	0	
Peak Volume	5,506	CF
	0.04	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
0 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.99		3.08	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		1			
Construction Cost (Swirl / Vortex)	**$**	**460,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.19		3.39	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		10			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,744,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.08			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		1,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**122,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.99			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**505,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		2.19			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		24		12	
Passes / Detention (Min)		3		**16.99**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**384,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		2,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**4,000**			
				TOTAL CAPITAL COST	**$ 3,600,000**

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RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	0	
Peak Volume	5,506	CF
	0.04	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
SEDIMENTATION BASIN (CSOTF)			
0 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	1.99	3.08	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	29	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	15	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.04	5,220	
Construction Cost (CSOTF) $	**16,395,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.99	3.08	= Peak Flow x % Req Pump
Force Main Diameter (In)	10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,708,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	3.08		Ref: CSO Statistics
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	8,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	400		= ACH x Volume / 60
Construction Cost (Odor Control) $	**45,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	1.99		Ref: CSO Statistics
Construction Cost (Screening) $	**505,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	1.99		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	23	11	
Passes / Detention (Min)	3	**16.41**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**380,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	6,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**12,000**		
		TOTAL CAPITAL COST $	**19,166,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	0	
Peak Volume	5,506	CF
	0.04	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
HIGH RATE END OF PIPE TREATMENT (HREOP)			
0 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	1.99	3.08	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	30		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	9	**OK**	Input by Engineer
Width (Ft)	4	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		Input by Engineer
Construction Cost (HREOP) $	**1,512,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	2.19	3.39	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	10		Input by Engineer
Force Main Velocity (FPS)	6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,744,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	3.08		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	1,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)	50		= ACH x Volume / 60
Construction Cost (Odor Control) $	**9,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Input by Engineer
Peak Flow, into facility (MGD)	1.99		Ref: CSO Statistics
Construction Cost (Screening) $	**505,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Input by Engineer
Peak Flow (MGD)	2.19		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	24	12	Input by Engineer
Passes / Detention (Min)	3	**16.99**	Input by Engineer / 12' SWD Basis
		OK Detn Time	
Construction Cost (Disinfection / CC Tank) $	384,000	$ 213,000	
Construction Cost (Disinfection) $	**597,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - HREOP (SF)	23,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**46,000**		
		TOTAL CAPITAL COST $	**4,534,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	0	
Peak Volume	5,506	CF
	0.04	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SCREENING AND DISINFECTION				
0 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		1.99	3.08	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**505,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		1.99	3.08	= Peak Flow x % Req Pump
Force Main Diameter (In)		10		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,708,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.08		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		600		=CFS x 200
Odor Control Flow Rate (CFM)		30		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**6,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		1.99		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		23	11	
Passes / Detention (Min)		3	**16.41**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	380,000	$ 205,000	
Construction Cost (Disinfection)	**$**	**585,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		23,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
		TOTAL CAPITAL COST	**$**	**2,971,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	1	
Peak Volume	3,743	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		44		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**6,600,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,166		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**6,677,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	1	
Peak Volume	3,743	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
SURFACE STORAGE TANK			
1 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.03	4,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.03	5,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	23		= $(\text{Vol / SWD * 1.5})^{1/2}$
Width (Ft)	16		= $(\text{Vol / SWD / 1.5})^{1/2}$
Total Volume (MG / CF)	0.04	5,520	**Sufficient Volume**
Tank Area (SF)	0		= Length x Width
Construction Cost (Storage Tank)	**19,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	1.99	3.08	= Peak Rate
Force Main Diameter (In)	10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,708,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	3.08		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	8,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	40		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**7,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	1.99		Ref: CSO Statistics
Construction Cost (Screening) $	**505,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**40,000**		
		TOTAL CAPITAL COST $	**2,400,000**

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RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	1	
Peak Volume	3,743	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SUB-SURFACE STORAGE TANK				
1 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.03	4,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.03	5,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		23		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		16		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.04	5,520	**Sufficient Volume**
Tank Area (SF)		0		= Length x Width
Construction Cost (Storage Tank)		**1,000,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.03	0.04	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		1		Input by Engineer
Force Main Velocity (FPS)		7.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**308,000**	**$ 12,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.08		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		400		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.99		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**505,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	**2,012,000**

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RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	1	
Peak Volume	3,743	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
1 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	1.99	3.08	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	2.19	3.39	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,744,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	3.08		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	1.99		Ref: CSO Statistics
Construction Cost (Screening) $	**505,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	2.19		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	24	12	
Passes	3	**16.99**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**384,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	2,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**4,000**		
		TOTAL CAPITAL COST $	**3,018,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	1	
Peak Volume	3,743	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SEDIMENTATION BASIN (CSOTF)				
1 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		1.99	3.08	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		29	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		15	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.04	5,220	
Construction Cost (CSOTF)	**$**	**16,395,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		1.99	3.08	= Peak Flow x % Req Pump
Force Main Diameter (In)		10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.7	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,708,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.08		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		400		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		1.99		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**505,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		1.99		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		23	11	
Passes		3	16.41	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**380,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		6,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**		
			TOTAL CAPITAL COST $	**19,166,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	1	
Peak Volume	3,743	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
HIGH RATE END OF PIPE TREATMENT (HREOP)			
1 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	1.99	3.08	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	30		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	9	OK	Input by Engineer
Width (Ft)	4	Area OK	= Area Req'd / Length
Max Length : Width Ratio	3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		Input by Engineer
Construction Cost (HREOP) $	**1,512,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)	2.19	3.39	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	10		Input by Engineer
Force Main Velocity (FPS)	6.2	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,744,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	3.08		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	1,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)	50		= ACH x Volume / 60
Construction Cost (Odor Control) $	**9,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Input by Engineer
Peak Flow, into facility (MGD)	1.99		Ref: CSO Statistics
Construction Cost (Screening) $	**505,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Input by Engineer
Peak Flow (MGD)	2.19		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	24	12	Input by Engineer
Passes	3	16.99	Input by Engineer / 12' SWD Basis
		OK Detn Time	
Construction Cost (Disinfection / CC Tank) $	384,000	$ 213,000	
Construction Cost (Disinfection) $	**597,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - HREOP (SF)	23,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**46,000**		
		TOTAL CAPITAL COST $	**4,534,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	1	
Peak Volume	3,743	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	3.08	CFS
	1.99	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SCREENING AND DISINFECTION				
1 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		1.99	3.08	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**505,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		1.99	3.08	= Peak Flow x % Req Pump
Force Main Diameter (In)		10		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,708,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		3.08		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		600		=CFS x 200
Odor Control Flow Rate (CFM)		30		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**6,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		1.99		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		23	11	
Passes		3	**16.41**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	380,000	$ 205,000	
Construction Cost (Disinfection)	**$**	**585,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		23,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST $	**2,971,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	2	
Peak Volume	3,522	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	2.87	CFS
	1.86	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		44		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**6,600,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,166		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**6,677,000**

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RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	2	
Peak Volume	3,522	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	2.87	CFS
	1.86	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001

SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.03	4,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.03	5,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		23		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		16		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		0.04	5,520	**Sufficient Volume**
Tank Area (SF)		0		= Length x Width
Construction Cost (Storage Tank)		**18,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		1.86	2.87	= Peak Rate
Force Main Diameter (In)		9		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.5	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,683,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		2.87		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		40		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**7,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		1.86		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**498,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		20,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**		
			TOTAL CAPITAL COST $	2,367,000

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	2	
Peak Volume	3,522	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	2.87	CFS
	1.86	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001					
SUB-SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.03		4,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.03		5,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		23			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		16			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.04		5,520	**Sufficient Volume**
Tank Area (SF)		0			= Length x Width
Construction Cost (Storage Tank)		**995,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.03		0.04	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		1			Input by Engineer
Force Main Velocity (FPS)		7.5		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**307,000**	**$**	**12,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		2.87			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.86			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**498,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST	**$ 1,999,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	2	
Peak Volume	3,522	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	2.87	CFS
	1.86	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
2 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		1.86	2.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.04	3.16	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,717,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		2.87		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.86		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**498,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		2.04		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		23	11	
Passes		3	**16.02**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**381,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		2,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**4,000**		
			TOTAL CAPITAL COST $	**2,981,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	2	
Peak Volume	3,522	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	2.87	CFS
	1.86	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SEDIMENTATION BASIN (CSOTF)				
2 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		1.86	2.87	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		400		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		29	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		15	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.04	5,220	
Construction Cost (CSOTF)	**$**	**16,395,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		1.86	2.87	= Peak Flow x % Req Pump
Force Main Diameter (In)		9		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.5	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,683,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		2.87		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		400		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		1.86		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**498,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		1.86		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		22	11	
Passes		3	16.85	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**377,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		6,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**		
			TOTAL CAPITAL COST $	**19,131,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	2	
Peak Volume	3,522	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	2.87	CFS
	1.86	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
2 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		1.86	2.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		30		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		9	OK	Input by Engineer
Width (Ft)		4	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**1,491,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		2.04	3.16	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		10		Input by Engineer
Force Main Velocity (FPS)		5.8	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,717,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		2.87		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		1.86		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**498,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		2.04		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		23	11	Input by Engineer
Passes		3	16.02	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	381,000	$ 205,000	
Construction Cost (Disinfection)	**$**	**586,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		23,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST $	**4,468,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	2	
Peak Volume	3,522	CF
	0.03	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	2.87	CFS
	1.86	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001						
SCREENING AND DISINFECTION						
2 Overflows / Year						
1. Screening Parameters						
Screening Required (Yes = 1; No = 2)		1				Default Value
Peak Flow, into facility (MGD)		1.86			2.87	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**498,000**				
2. Pump Station / Force Main Parameters						
Volume Requiring Pumping (%)		100%				Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		1.86			2.87	= Peak Flow x % Req Pump
Force Main Diameter (In)		9				DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.5			**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100				Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,683,000**	**$**	**19,000**		
3. Consolidation and/or Outfall Pipe Parameters						
Peak Flow (CFS)		2.87				Ref: CSO Statistics
Diameter (In)		36				<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100				Input by Engineer
Depth (Ft)		20				Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**				
4. Odor Control Parameters						
Air Changes / Hour (ACH)		3				Ref: Technical Parameters
Volume of Ventilated Space (CF)		600				=CFS x 200
Odor Control Flow Rate (CFM)		30				= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**6,000**				
5. Disinfection Parameters						
Disinfection Required (Yes = 1; No = 2)		1				Default Value
Peak Flow (MGD)		1.86				Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		22			11	
Passes		3			**16.85**	Ref: Tech Param-15 min minimum
					OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	377,000	$	200,000		
Construction Cost (Disinfection)	**$**	**577,000**				
6. Regulator Parameters						
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4			**Modify Regulator**	Input by Engineer
Number Regulators		1				Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**				
7. Land Acquisition Parameters						
Land Required - Screening & Disinfection (SF)		23,000				=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2				Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**				
				TOTAL CAPITAL COST	**$**	**2,931,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	4	
Peak Volume	2,744	CF
	0.02	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		44		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**6,600,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,166		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**6,677,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	4	
Peak Volume	2,744	CF
	0.02	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.02	3,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.02	4,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		21		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		14		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.03	4,410	**Sufficient Volume**
Tank Area (SF)		0		= Length x Width
Construction Cost (Storage Tank)		**14,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		1.21	1.87	= Peak Rate
Force Main Diameter (In)		8		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,311,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		1.87		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		30		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**6,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		1.21		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**468,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**1,957,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	4	
Peak Volume	2,744	CF
	0.02	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
SUB-SURFACE STORAGE TANK			
4 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.02	3,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.02	4,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	21		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)	14		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)	0.03	4,410	**Sufficient Volume**
Tank Area (SF)	0		= Length x Width
Construction Cost (Storage Tank)	**977,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.02	0.03	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	1		Input by Engineer
Force Main Velocity (FPS)	5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**302,000**	**$ 12,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	1.87		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	6,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	300		= ACH x Volume / 60
Construction Cost (Odor Control) $	**36,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	1.21		Ref: CSO Statistics
Construction Cost (Screening) $	**468,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**38,000**		
		TOTAL CAPITAL COST $	**1,935,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	4	
Peak Volume	2,744	CF
	0.02	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.21		1.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.33		2.06	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		8			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,414,000**	**$**	**18,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.87			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**468,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		1.33			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		19		9	
Passes		3		**16.64**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**366,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		1,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**2,000**			
				TOTAL CAPITAL COST	**$ 2,630,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	4	
Peak Volume	2,744	CF
	0.02	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		1.21	1.87	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		300		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		25	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		13	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.03	3,900	
Construction Cost (CSOTF)	**$**	**16,397,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		1.21	1.87	= Peak Flow x % Req Pump
Force Main Diameter (In)		8		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.4	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,311,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		1.87		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		300		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		1.21		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**468,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		1.21		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		18	9	
Passes		3	17.34	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**363,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		5,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**		
			TOTAL CAPITAL COST $	**18,705,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	4	
Peak Volume	2,744	CF
	0.02	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
4 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.21		1.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		20			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		7		OK	Input by Engineer
Width (Ft)		4		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,390,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.33		2.06	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		8			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,414,000**	**$**	**18,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.87			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		1.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**468,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		1.33			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		19		9	Input by Engineer
Passes		3		16.64	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	366,000	$	179,000	
Construction Cost (Disinfection)	**$**	**545,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		22,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
			TOTAL CAPITAL COST	**$**	**3,990,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	4	
Peak Volume	2,744	CF
	0.02	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001

SCREENING AND DISINFECTION

4 Overflows / Year

1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		1.21	1.87	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**468,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		1.21	1.87	= Peak Flow x % Req Pump
Force Main Diameter (In)		8		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,311,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		1.87		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		400		=CFS x 200
Odor Control Flow Rate (CFM)		20		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**4,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		1.21		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		18	9	
Passes		3	**17.34**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	363,000	$ 175,000	
Construction Cost (Disinfection)	**$**	**538,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		23,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST $	**2,487,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	6	
Peak Volume	1,915	CF
	0.01	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.57	CFS
	1.02	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		44		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**6,600,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		19,166		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**6,677,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	6	
Peak Volume	1,915	CF
	0.01	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.57	CFS
	1.02	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
SURFACE STORAGE TANK			
6 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.01	2,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.02	2,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	15		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	10		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.02	2,250	**Insufficient Volume**
Tank Area (SF)	0		= Length x Width
Construction Cost (Storage Tank)	**9,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	1.02	1.57	= Peak Rate
Force Main Diameter (In)	7		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,149,000**	**$ 17,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	1.57		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	3,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	20		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**4,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	1.02		Ref: CSO Statistics
Construction Cost (Screening) $	**459,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**38,000**		
		TOTAL CAPITAL COST $	**1,778,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	6	
Peak Volume	1,915	CF
	0.01	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.57	CFS
	1.02	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
SUB-SURFACE STORAGE TANK			
6 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.01	2,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.02	2,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	15		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	10		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.02	2,250	**Insufficient Volume**
Tank Area (SF)	0		= Length x Width
Construction Cost (Storage Tank)	**958,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.01	0.02	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	1		Input by Engineer
Force Main Velocity (FPS)	4.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**297,000**	**$ 12,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	1.57		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	3,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	150		= ACH x Volume / 60
Construction Cost (Odor Control) $	**21,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	1.02		Ref: CSO Statistics
Construction Cost (Screening) $	**459,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**38,000**		
		TOTAL CAPITAL COST $	**1,887,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	6	
Peak Volume	1,915	CF
	0.01	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.57	CFS
	1.02	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
6 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	1.02	1.57	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.12	1.73	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	7		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.5	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,236,000**	**$ 17,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	1.57		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	1.02		Ref: CSO Statistics
Construction Cost (Screening) $	**459,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	1.12		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	17	9	
Passes	3	**17.68**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**361,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	1,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**2,000**		
		TOTAL CAPITAL COST $	**2,437,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	6	
Peak Volume	1,915	CF
	0.01	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.57	CFS
	1.02	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001

SEDIMENTATION BASIN (CSOTF)

6 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	1.02	1.57	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	200		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	21	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	11	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.02	2,772	
Construction Cost (CSOTF) $	**16,398,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.02	1.57	= Peak Flow x % Req Pump
Force Main Diameter (In)	7		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,149,000**	**$ 17,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	1.57		Ref: CSO Statistics
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	4,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	200		= ACH x Volume / 60
Construction Cost (Odor Control) $	**26,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	1.02		Ref: CSO Statistics
Construction Cost (Screening) $	**459,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	1.02		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	17	8	
Passes	3	**17.28**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**359,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	5,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**10,000**		
		TOTAL CAPITAL COST $	**18,520,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	6	
Peak Volume	1,915	CF
	0.01	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.57	CFS
	1.02	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001			
HIGH RATE END OF PIPE TREATMENT (HREOP)			
6 Overflows / Year			
1. High Rate End of Pipe Treatment (HREOP) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	1.02	1.57	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	20		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	7	**OK**	Input by Engineer
Width (Ft)	4	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		Input by Engineer
Construction Cost (HREOP) $	**1,360,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.12	1.73	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	7		Input by Engineer
Force Main Velocity (FPS)	6.5	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,236,000**	**$ 17,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	1.57		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	1,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)	50		= ACH x Volume / 60
Construction Cost (Odor Control) $	**9,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Input by Engineer
Peak Flow, into facility (MGD)	1.02		Ref: CSO Statistics
Construction Cost (Screening) $	**459,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Input by Engineer
Peak Flow (MGD)	1.12		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	17	9	Input by Engineer
Passes	3	**17.68**	Input by Engineer / 12' SWD Basis
		OK Detn Time	
Construction Cost (Disinfection / CC Tank) $	361,000	$ 171,000	
Construction Cost (Disinfection) $	**532,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - HREOP (SF)	22,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**44,000**		
		TOTAL CAPITAL COST $	**3,759,000**

RESULTS SUMMARY		
Number of Events / Year	26	
Number of Overflows / Year	6	
Peak Volume	1,915	CF
	0.01	MG
Total Volume	30,620	CF
	0.23	MG
Peak Rate	1.57	CFS
	1.02	MGD

Capital Costs - 032N001 / Sewershed CSO 032N001					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		1.02		1.57	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**459,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		1.02		1.57	= Peak Flow x % Req Pump
Force Main Diameter (In)		7			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,149,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.57			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		300			=CFS x 200
Odor Control Flow Rate (CFM)		20			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**4,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		1.02			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		17		8	
Passes		3		**17.28**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	359,000	$	167,000	
Construction Cost (Disinfection)	**$**	**526,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		22,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST $	**2,301,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.99	$29,791	20	10.910	$325,022
	Tank O&M	No. Events / Yr	26	$16,047	50	14.484	$232,417
		Const Cost ($)	$29,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,601	20	10.910	$82,931
	Odor Control O&M	Capacity (cfm)	60	$210	20	10.910	$2,291
	Reserve / Replace	10% Gravity / 15% Pump					$8,369
			Total Annual O&M	**$54,000**		**Total PW O&M**	**$651,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.04	$2,231	20	10.910	$24,345
	Tank O&M	No. Events / Yr	26	$18,577	50	14.484	$269,060
		Const Cost ($)	$1,041,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,601	20	10.910	$82,931
	Odor Control O&M	Capacity (cfm)	550	$1,925	20	10.910	$21,002
	Reserve / Replace	10% Gravity / 15% Pump					$2,834
			Total Annual O&M	**$31,000**		**Total PW O&M**	**$400,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	1.99	$29,791	20	10.910	$325,022
	Sed. Basin O&M	Flow Rate (mgd)	1.99	$224	50	14.484	$3,246
	Screening O&M	Flow Rate (mgd)	1.99	$7,601	20	10.910	$82,931
	Disinfection O&M	Flow Rate (mgd)	1.99	$24,471	20	10.910	$266,980
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$9,498
			Total Annual O&M	**$64,000**		**Total PW O&M**	**$703,000**

Operation and Maintenance Costs

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	2.19	$31,750	20	10.910	$346,392
	HREP O&M	Flow Rate (mgd)	1.99	$34,935	20	10.910	$381,138
	Screening O&M	Flow Rate (mgd)	1.99	$7,601	20	10.910	$82,931
	Disinfection O&M	Flow Rate (mgd)	2.19	$25,934	20	10.910	$282,940
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$13,671
			Total Annual O&M	**$101,000**		**Total PW O&M**	**$1,109,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	2.19	$31,750	20	10.910	$346,392
	Swirl / Vortex O&M	Flow Rate (mgd)	1.99	$224	20	10.910	$2,445
	Screening O&M	Flow Rate (mgd)	1.99	$7,601	20	10.910	$82,931
	Disinfection O&M	Flow Rate (mgd)	2.19	$25,934	20	10.910	$282,940
	Odor Control O&M	Capacity (cfm)	1,450.00	$5,075	20	10.910	$55,368
	Reserve / Replace	10% Gravity / 15% Pump					$10,491
			Total Annual O&M	**$71,000**		**Total PW O&M**	**$781,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	1.99	$29,791	20	10.910	$325,022
	Screening O&M	Flow Rate (mgd)	1.99	$7,601	20	10.910	$82,931
	Disinfection O&M	Flow Rate (mgd)	1.99	$24,471	20	10.910	$266,980
	Odor Control O&M	Capacity (cfm)	30.00	$105	20	10.910	$1,146
	Reserve / Replace	10% Gravity / 15% Pump					$9,392
			Total Annual O&M	**$62,000**		**Total PW O&M**	**$685,000**

Operation and Maintenance Costs

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.99	$29,791	20	10.910	$325,022
	Tank O&M	No. Events / Yr	26	$16,022	50	14.484	$232,055
		Const Cost ($)	$19,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,601	20	10.910	$82,931
	Odor Control O&M	Capacity (cfm)	40	$140	20	10.910	$1,527
	Reserve / Replace	10% Gravity / 15% Pump					$8,361
			Total Annual O&M	**$54,000**		**Total PW O&M**	**$650,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.03	$1,724	20	10.910	$18,813
	Tank O&M	No. Events / Yr	26	$18,474	50	14.484	$267,576
		Const Cost ($)	$1,000,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,601	20	10.910	$82,931
	Odor Control O&M	Capacity (cfm)	400	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$2,753
			Total Annual O&M	**$30,000**		**Total PW O&M**	**$387,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	1.99	$29,791	20	10.910	$325,022
	Sed. Basin O&M	Flow Rate (mgd)	1.99	$224	50	14.484	$3,246
	Screening O&M	Flow Rate (mgd)	1.99	$7,601	20	10.910	$82,931
	Disinfection O&M	Flow Rate (mgd)	1.99	$24,471	20	10.910	$266,980
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$9,498
			Total Annual O&M	**$64,000**		**Total PW O&M**	**$703,000**

Operation and Maintenance Costs

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	2.19	$31,750	20	10.910	$346,392
	HREP O&M	Flow Rate (mgd)	1.99	$34,935	20	10.910	$381,138
	Screening O&M	Flow Rate (mgd)	1.99	$7,601	20	10.910	$82,931
	Disinfection O&M	Flow Rate (mgd)	2.19	$25,934	20	10.910	$282,940
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$13,671
			Total Annual O&M	**$101,000**		**Total PW O&M**	**$1,109,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	2.19	$31,750	20	10.910	$346,392
	Swirl / Vortex O&M	Flow Rate (mgd)	1.99	$224	20	10.910	$2,445
	Screening O&M	Flow Rate (mgd)	1.99	$7,601	20	10.910	$82,931
	Disinfection O&M	Flow Rate (mgd)	2.19	$25,934	20	10.910	$282,940
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$9,534
			Total Annual O&M	**$66,000**		**Total PW O&M**	**$724,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	1.99	$29,791	20	10.910	$325,022
	Screening O&M	Flow Rate (mgd)	1.99	$7,601	20	10.910	$82,931
	Disinfection O&M	Flow Rate (mgd)	1.99	$24,471	20	10.910	$266,980
	Odor Control O&M	Capacity (cfm)	30.00	$105	20	10.910	$1,146
	Reserve / Replace	10% Gravity / 15% Pump					$9,392
			Total Annual O&M	**$62,000**		**Total PW O&M**	**$685,000**

Operation and Maintenance Costs

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.86	$28,413	20	10.910	$309,989
	Tank O&M	No. Events / Yr	26	$16,019	50	14.484	$232,018
		Const Cost ($)	$18,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,590	20	10.910	$82,806
	Odor Control O&M	Capacity (cfm)	40	$140	20	10.910	$1,527
	Reserve / Replace	10% Gravity / 15% Pump					$8,240
			Total Annual O&M	**$53,000**		**Total PW O&M**	**$635,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.03	$1,656	20	10.910	$18,064
	Tank O&M	No. Events / Yr	26	$18,462	50	14.484	$267,395
		Const Cost ($)	$995,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,590	20	10.910	$82,806
	Odor Control O&M	Capacity (cfm)	400	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$2,730
			Total Annual O&M	**$30,000**		**Total PW O&M**	**$386,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	1.86	$28,413	20	10.910	$309,989
	Sed. Basin O&M	Flow Rate (mgd)	1.86	$209	50	14.484	$3,024
	Screening O&M	Flow Rate (mgd)	1.86	$7,590	20	10.910	$82,806
	Disinfection O&M	Flow Rate (mgd)	1.86	$23,437	20	10.910	$255,696
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$9,369
			Total Annual O&M	**$62,000**		**Total PW O&M**	**$676,000**

Operation and Maintenance Costs

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	2.04	$30,282	20	10.910	$330,370
	HREP O&M	Flow Rate (mgd)	1.86	$33,509	20	10.910	$365,576
	Screening O&M	Flow Rate (mgd)	1.86	$7,590	20	10.910	$82,806
	Disinfection O&M	Flow Rate (mgd)	2.04	$24,838	20	10.910	$270,982
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$13,476
			Total Annual O&M	**$97,000**		**Total PW O&M**	**$1,065,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	2.04	$30,282	20	10.910	$330,370
	Swirl / Vortex O&M	Flow Rate (mgd)	1.86	$209	20	10.910	$2,278
	Screening O&M	Flow Rate (mgd)	1.86	$7,590	20	10.910	$82,806
	Disinfection O&M	Flow Rate (mgd)	2.04	$24,838	20	10.910	$270,982
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$9,396
			Total Annual O&M	**$63,000**		**Total PW O&M**	**$696,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	1.86	$28,413	20	10.910	$309,989
	Screening O&M	Flow Rate (mgd)	1.86	$7,590	20	10.910	$82,806
	Disinfection O&M	Flow Rate (mgd)	1.86	$23,437	20	10.910	$255,696
	Odor Control O&M	Capacity (cfm)	30.00	$105	20	10.910	$1,146
	Reserve / Replace	10% Gravity / 15% Pump					$9,263
			Total Annual O&M	**$60,000**		**Total PW O&M**	**$659,000**

Operation and Maintenance Costs

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.21	$21,322	20	10.910	$232,621
	Tank O&M	No. Events / Yr	26	$16,009	50	14.484	$231,874
		Const Cost ($)	$14,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,536	20	10.910	$82,216
	Odor Control O&M	Capacity (cfm)	30	$105	20	10.910	$1,146
	Reserve / Replace	10% Gravity / 15% Pump					$6,638
			Total Annual O&M	**$45,000**		**Total PW O&M**	**$554,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.02	$1,401	20	10.910	$15,287
	Tank O&M	No. Events / Yr	26	$18,417	50	14.484	$266,743
		Const Cost ($)	$977,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,536	20	10.910	$82,216
	Odor Control O&M	Capacity (cfm)	300	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$2,603
			Total Annual O&M	**$29,000**		**Total PW O&M**	**$378,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	1.21	$21,322	20	10.910	$232,621
	Sed. Basin O&M	Flow Rate (mgd)	1.21	$136	50	14.484	$1,968
	Screening O&M	Flow Rate (mgd)	1.21	$7,536	20	10.910	$82,216
	Disinfection O&M	Flow Rate (mgd)	1.21	$18,038	20	10.910	$196,798
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$7,707
			Total Annual O&M	**$49,000**		**Total PW O&M**	**$533,000**

Operation and Maintenance Costs

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	1.33	$22,724	20	10.910	$247,915
	HREP O&M	Flow Rate (mgd)	1.21	$26,025	20	10.910	$283,930
	Screening O&M	Flow Rate (mgd)	1.21	$7,536	20	10.910	$82,216
	Disinfection O&M	Flow Rate (mgd)	1.33	$19,117	20	10.910	$208,563
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$11,843
			Total Annual O&M	**$76,000**		**Total PW O&M**	**$836,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	1.33	$22,724	20	10.910	$247,915
	Swirl / Vortex O&M	Flow Rate (mgd)	1.21	$136	20	10.910	$1,482
	Screening O&M	Flow Rate (mgd)	1.21	$7,536	20	10.910	$82,216
	Disinfection O&M	Flow Rate (mgd)	1.33	$19,117	20	10.910	$208,563
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$8,038
			Total Annual O&M	**$50,000**		**Total PW O&M**	**$548,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	1.21	$21,322	20	10.910	$232,621
	Screening O&M	Flow Rate (mgd)	1.21	$7,536	20	10.910	$82,216
	Disinfection O&M	Flow Rate (mgd)	1.21	$18,038	20	10.910	$196,798
	Odor Control O&M	Capacity (cfm)	20.00	$70	20	10.910	$764
	Reserve / Replace	10% Gravity / 15% Pump					$7,620
			Total Annual O&M	**$47,000**		**Total PW O&M**	**$520,000**

Operation and Maintenance Costs

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.02	$19,010	20	10.910	$207,398
	Tank O&M	No. Events / Yr	26	$15,997	50	14.484	$231,693
		Const Cost ($)	$9,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,520	20	10.910	$82,043
	Odor Control O&M	Capacity (cfm)	20	$70	20	10.910	$764
	Reserve / Replace	10% Gravity / 15% Pump					$5,947
			Total Annual O&M	**$43,000**		**Total PW O&M**	**$528,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.01	$1,102	20	10.910	$12,021
	Tank O&M	No. Events / Yr	26	$18,369	50	14.484	$266,055
		Const Cost ($)	$958,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,520	20	10.910	$82,043
	Odor Control O&M	Capacity (cfm)	150	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$2,517
			Total Annual O&M	**$28,000**		**Total PW O&M**	**$368,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	1.02	$19,010	20	10.910	$207,398
	Sed. Basin O&M	Flow Rate (mgd)	1.02	$114	50	14.484	$1,657
	Screening O&M	Flow Rate (mgd)	1.02	$7,520	20	10.910	$82,043
	Disinfection O&M	Flow Rate (mgd)	1.02	$16,246	20	10.910	$177,244
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$6,984
			Total Annual O&M	**$44,000**		**Total PW O&M**	**$483,000**

Operation and Maintenance Costs

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	1.12	$20,260	20	10.910	$221,034
	HREP O&M	Flow Rate (mgd)	1.02	$23,524	20	10.910	$256,648
	Screening O&M	Flow Rate (mgd)	1.02	$7,520	20	10.910	$82,043
	Disinfection O&M	Flow Rate (mgd)	1.12	$17,217	20	10.910	$187,840
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$10,997
			Total Annual O&M	**$69,000**		**Total PW O&M**	**$760,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	1.12	$20,260	20	10.910	$221,034
	Swirl / Vortex O&M	Flow Rate (mgd)	1.02	$114	20	10.910	$1,248
	Screening O&M	Flow Rate (mgd)	1.02	$7,520	20	10.910	$82,043
	Disinfection O&M	Flow Rate (mgd)	1.12	$17,217	20	10.910	$187,840
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$7,273
			Total Annual O&M	**$46,000**		**Total PW O&M**	**$499,000**

CSO 032N001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	1.02	$19,010	20	10.910	$207,398
	Screening O&M	Flow Rate (mgd)	1.02	$7,520	20	10.910	$82,043
	Disinfection O&M	Flow Rate (mgd)	1.02	$16,246	20	10.910	$177,244
	Odor Control O&M	Capacity (cfm)	20.00	$70	20	10.910	$764
	Reserve / Replace	10% Gravity / 15% Pump					$6,924
			Total Annual O&M	**$43,000**		**Total PW O&M**	**$474,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$6.7	$6,677,000	$0
1	$6.7	$6,677,000	$0
2	$6.7	$6,677,000	$0
4	$6.7	$6,677,000	$0
6	$6.7	$6,677,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$2.5	$2,077,000	$400,000
1	$2.4	$2,012,000	$387,000
2	$2.4	$1,999,000	$386,000
4	$2.3	$1,935,000	$378,000
6	$2.3	$1,887,000	$368,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$3.1	$2,413,000	$651,000
1	$3.1	$2,400,000	$650,000
2	$3.0	$2,367,000	$635,000
4	$2.5	$1,957,000	$554,000
6	$2.3	$1,778,000	$528,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$4.4	$3,600,000	$781,000
1	$3.7	$3,018,000	$724,000
2	$3.7	$2,981,000	$696,000
4	$3.2	$2,630,000	$548,000
6	$2.9	$2,437,000	$499,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$5.6	$4,534,000	$1,109,000
1	$5.6	$4,534,000	$1,109,000
2	$5.5	$4,468,000	$1,065,000
4	$4.8	$3,990,000	$836,000
6	$4.5	$3,759,000	$760,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$19.9	$19,166,000	$703,000
1	$19.9	$19,166,000	$703,000
2	$19.8	$19,131,000	$676,000
4	$19.2	$18,705,000	$533,000
6	$19.0	$18,520,000	$483,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$3.7	$2,971,000	$685,000
1	$3.7	$2,971,000	$685,000
2	$3.6	$2,931,000	$659,000
4	$3.0	$2,487,000	$520,000
6	$2.8	$2,301,000	$474,000

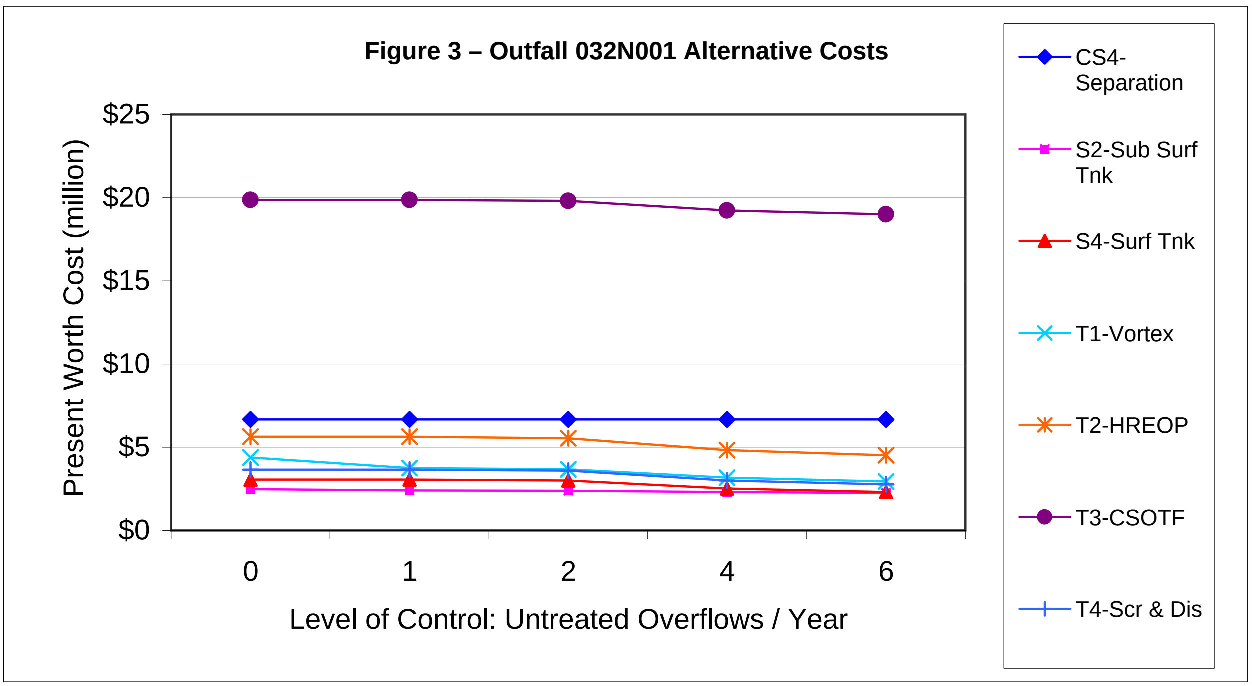


Figure 3 – Outfall 032N001 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	CSO 032N001
Location Name	Mountain Avenue
Model ID	DC 032K001-W.1
Structure Type	Outfall
PWSA Sewershed	Becks Run
Stream of Discharge	Monongahela River
NPDES Permit Number	032N001
Owner	PWSA
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	26
Peak Volume:	5,506 ft^3
	0.04 MG
Total Volume:	30,620 ft^3
	0.23 MG
Peak Rate:	3.08 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
8/20/2005 18:30	88	8/20/2005 18:40	5505.90	41.187	0	3.08	1
7/26/2005 19:50	38	7/26/2005 20:00	3743.19	28.001	1	2.87	2
10/22/2005 6:25	39	10/22/2005 6:40	3522.45	26.350	2	3.08	0
7/5/2005 16:35	44	7/5/2005 17:00	2880.92	21.551	3	2.42	3
5/13/2005 22:35	93	5/13/2005 22:45	2743.65	20.524	4	1.79	5
1/5/2005 13:51	1256	1/5/2005 14:30	2203.37	16.482	5	0.47	13
5/11/2005 22:40	33	5/11/2005 23:00	1914.62	14.322	6	1.57	6
9/29/2005 5:27	41	9/29/2005 5:45	1794.82	13.426	7	1.87	4
11/29/2005 6:52	262	11/29/2005 7:15	1018.84	7.621	8	0.36	15
1/11/2005 11:16	367	1/11/2005 11:30	1001.75	7.494	9	0.72	10
8/27/2005 15:20	23	8/27/2005 15:30	802.60	6.004	10	1.45	7
11/14/2005 22:52	317	11/15/2005 4:00	766.38	5.733	11	0.89	8
9/16/2005 21:26	28	9/16/2005 21:45	730.05	5.461	12	0.76	9
1/12/2005 1:12	33	1/12/2005 1:30	364.75	2.729	13	0.36	16
7/21/2005 14:55	15	7/21/2005 15:00	314.49	2.353	14	0.67	11
5/23/2005 16:35	18	5/23/2005 16:45	286.78	2.145	15	0.56	12
11/16/2005 4:10	14	11/16/2005 4:15	218.57	1.635	16	0.46	14
8/8/2005 9:02	21	8/8/2005 9:15	169.39	1.267	17	0.23	19
2/20/2005 20:01	32	2/20/2005 20:30	159.65	1.194	18	0.12	21
3/28/2005 19:05	18	3/28/2005 19:15	155.00	1.160	19	0.25	17
4/23/2005 4:10	14	4/23/2005 4:15	122.47	0.916	20	0.24	18
5/28/2005 9:20	14	5/28/2005 9:30	69.13	0.517	21	0.12	20
3/28/2005 11:38	10	3/28/2005 11:45	43.23	0.323	22	0.11	22
1/8/2005 5:37	10	1/8/2005 5:45	31.74	0.237	23	0.07	25
10/7/2005 10:40	9	10/7/2005 10:45	28.80	0.215	24	0.08	24
8/29/2005 13:41	7	8/29/2005 13:45	27.66	0.207	25	0.10	23

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	CSO 032N001
Location Name	Mountain Avenue
Model ID	DC 032K001-W.1
Structure Type	Outfall
PWSA Sewershed	Becks Run
Stream of Discharge	Monongahela River
NPDES Permit Number	032N001
Owner	PWSA
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	26
Peak Volume:	5,506 ft^3
	0.04 MG
Total Volume:	30,620 ft^3
	0.23 MG
Peak Rate:	3.08 cfs

Figure 1 - Outfall 032N001 CSO Volume

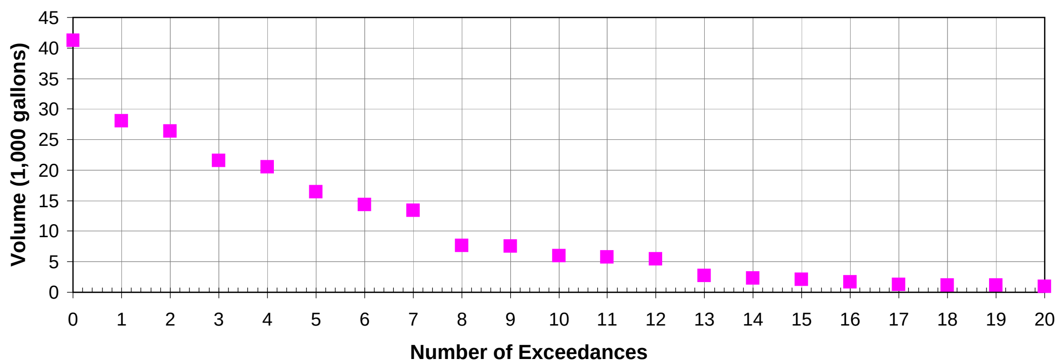
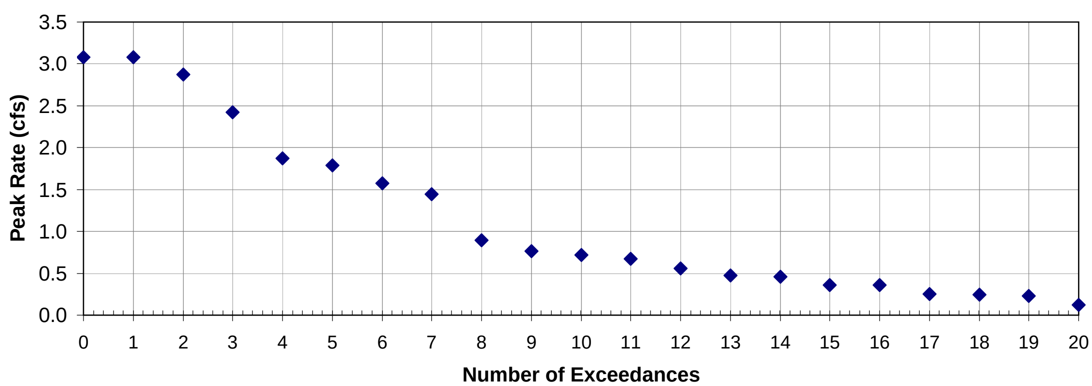


Figure 2 - Outfall 032N001 CSO Peak Flow Rate



D.36.1 032N001 – BECKS RUN – NPDES #032N001

Description of Outfall

Outfall 032N001 conveys overflows from the PWSA diversion chamber 032K001 to a tributary to Becks Run. Ultimately, the flow is received by the Monongahela River. The outfall is located near Mountain Avenue in the City of Pittsburgh. The Becks Run Sewershed consists of 1,635 acres of residential, business, and commercial users. The Becks Run Sewershed is comprised of approximately 1,350 manholes and 231,122 linear feet (43.8 miles) of sewer up to 48 inches in diameter. The sewershed is located in portions of Arlington, Arlington Heights, Carrick, Hays, Mount Oliver and St. Clair portions of the City and Baldwin Borough. The tributary area for this outfall is 44 acres.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 032N001 typically experiences 26 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 032N001 is approximately 0.04 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 032N001 is approximately 3.08 CFS. *Figure 1 – Outfall 032N001 CSO Volume* and *Figure 2 – Outfall 032N001 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 19 largest CSO events during the typical year baseline conditions simulation.

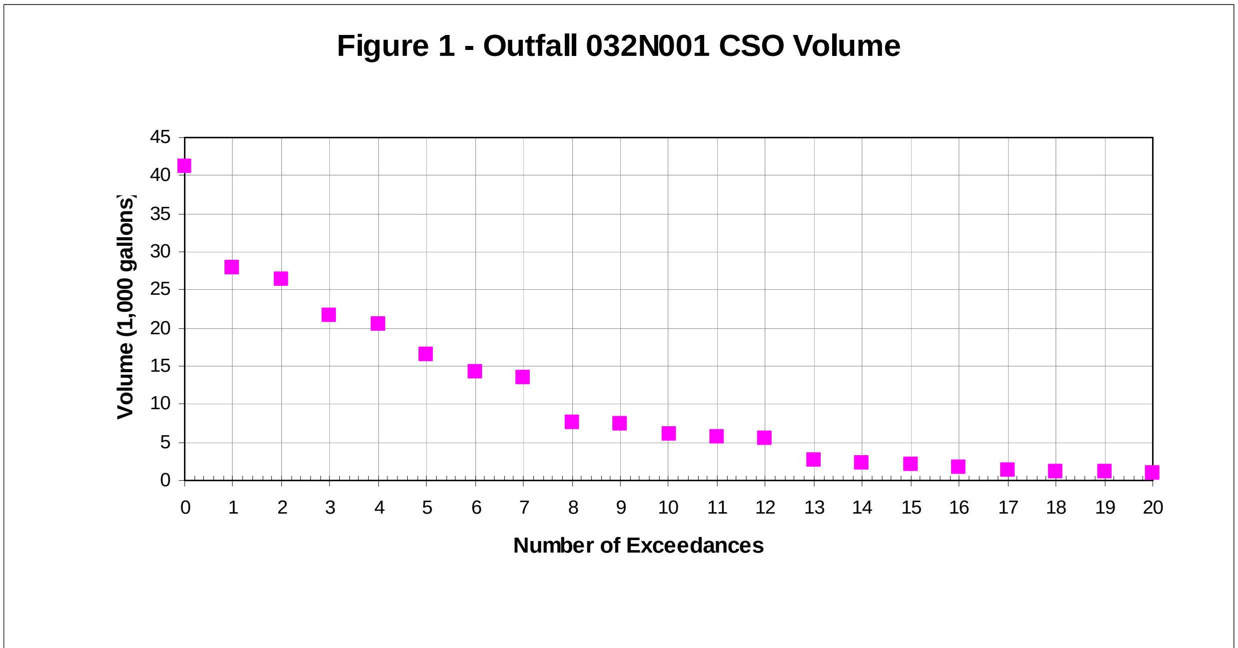


Figure 1 - Outfall 032N001 CSO Volume
Volume (1,000 gallons)
45
40
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

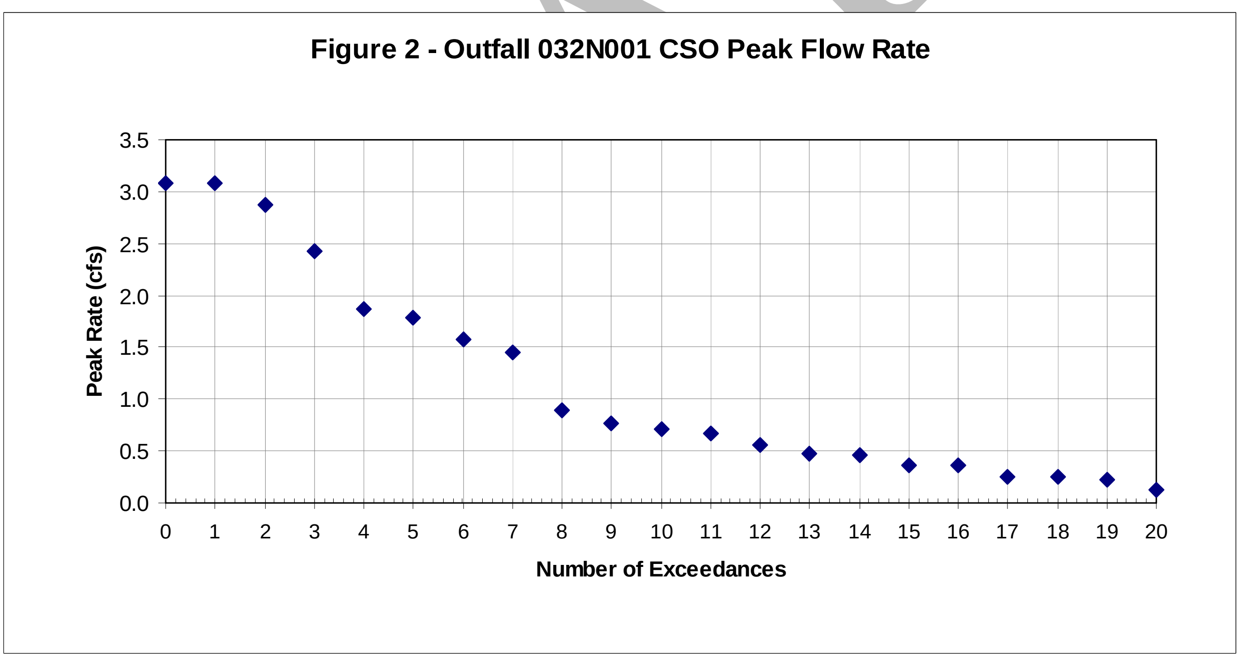


Figure 2 - Outfall 032N001 CSO Peak Flow Rate
Peak Rate (cfs)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

There appears to be limited space available for potential storage or treatment facilities due to steep slopes. The land in the vicinity of both the diversion chamber and the outfall is undeveloped but steep. To the north of the diversion chamber, there is a flat area which appears to be a ball field on school property. Flow would have to be pumped to this location from the diversion chamber, or new pipe and diversion structure constructed to divert flow to this location.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 032N001. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-032N001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-032N001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-032N001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-032N001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-032N001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-032N001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-032N001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 032N001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.

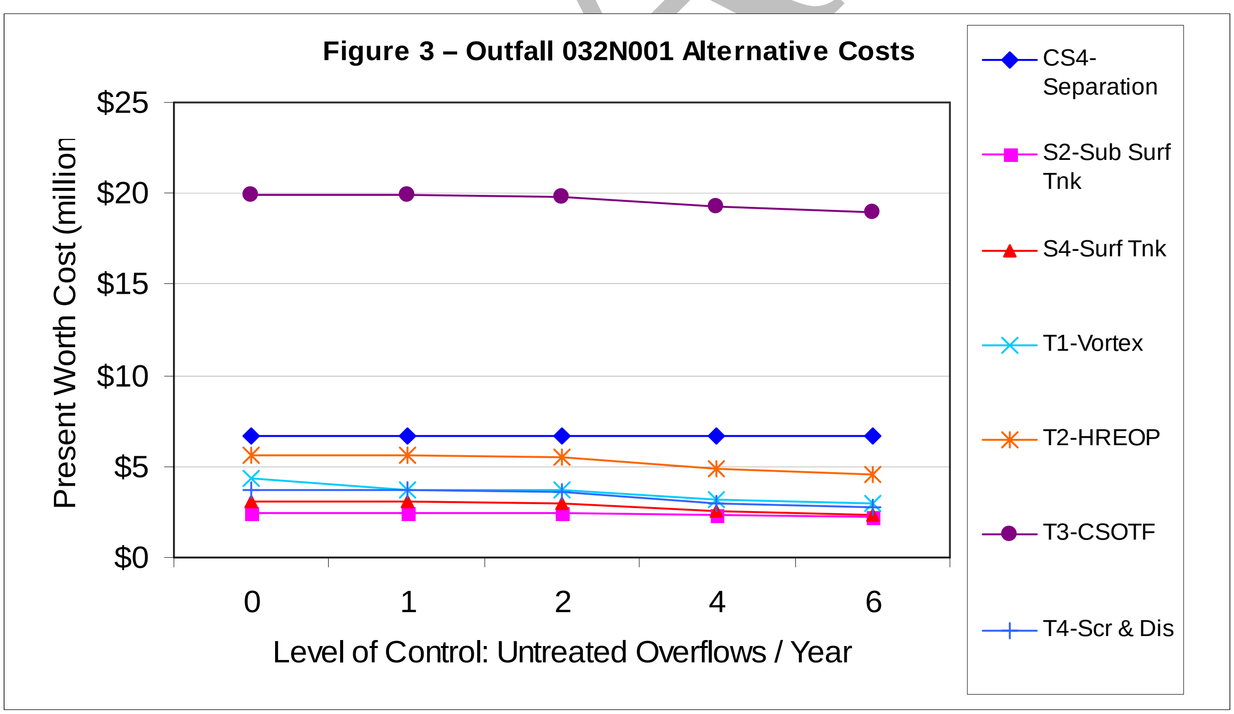


Figure 3 – Outfall 032N001 Alternative Costs

The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall “ranking” of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

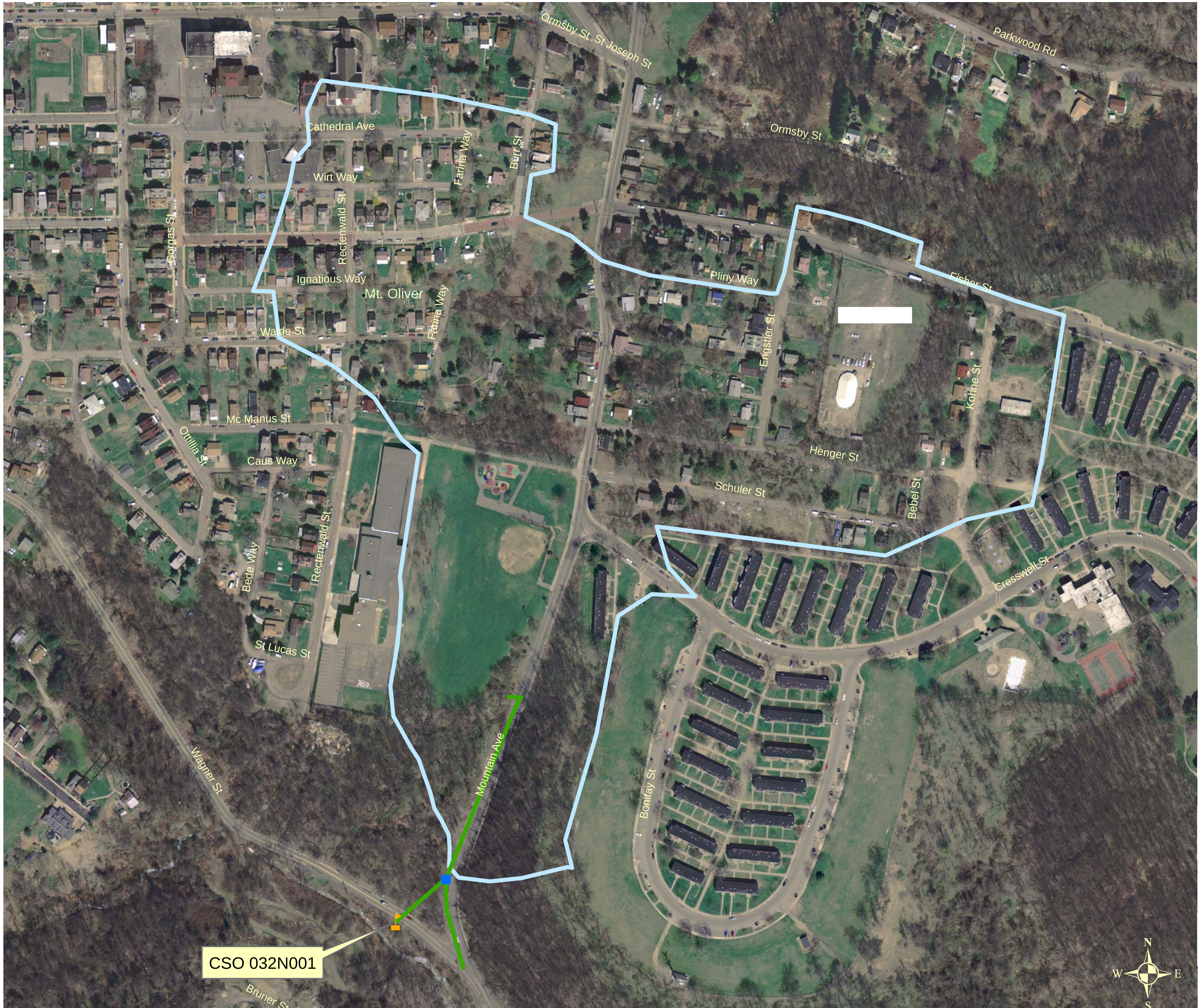
Recommendations

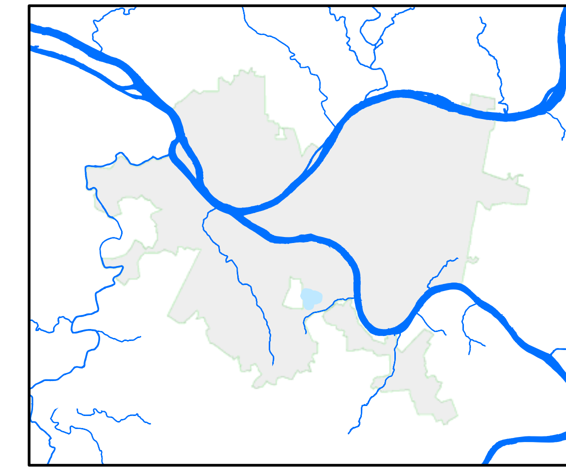
Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-032N001: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Limited space is available in the vicinity of the outfall. Steep slopes may limit construction of a storage or treatment facility near the outfall or diversion structure. There is an open flat area just north of the diversion chamber. However, it appears to be a ball field on school property. Flow would have to be diverted to this area for storage or treatment.





Area Overview

Legend

Sewershed Boundary

Trunk Sewer

PWSA Diversion Structure

Combined Sewer Outfall

200 0 200 Feet

Attachment 1 CSO 032N001 Tributary Area Map Becks Run Sewershed

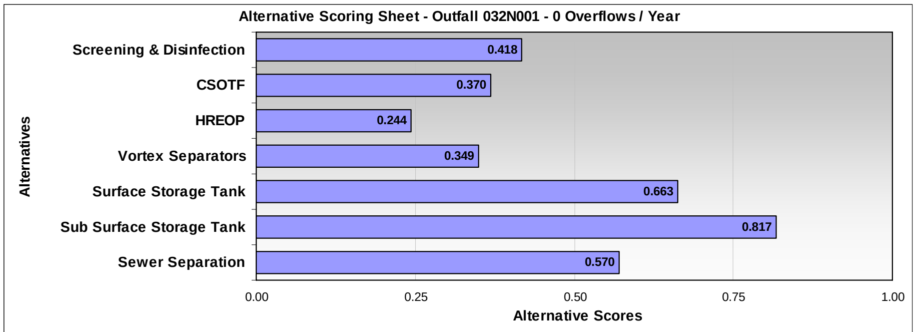
CSO Controls Alternatives

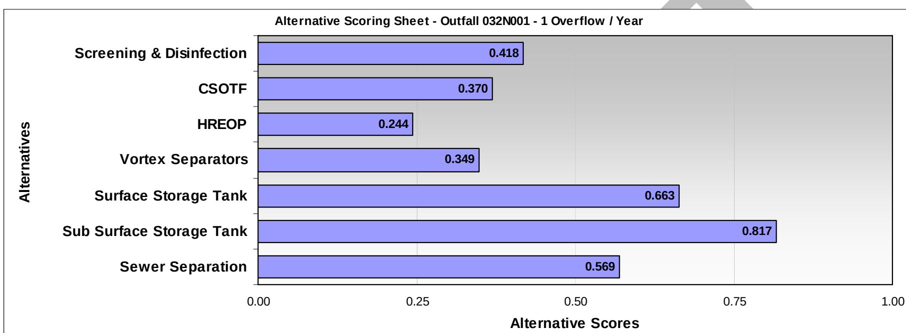
SW-D-0264.pdf

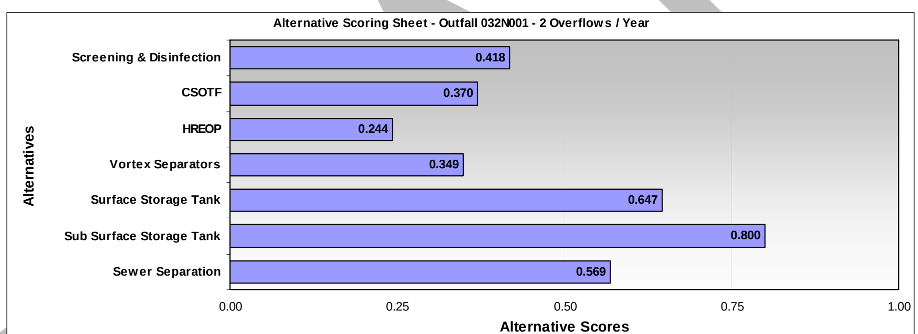
Attachment 2 - CSO Alternatives Development Worksheet

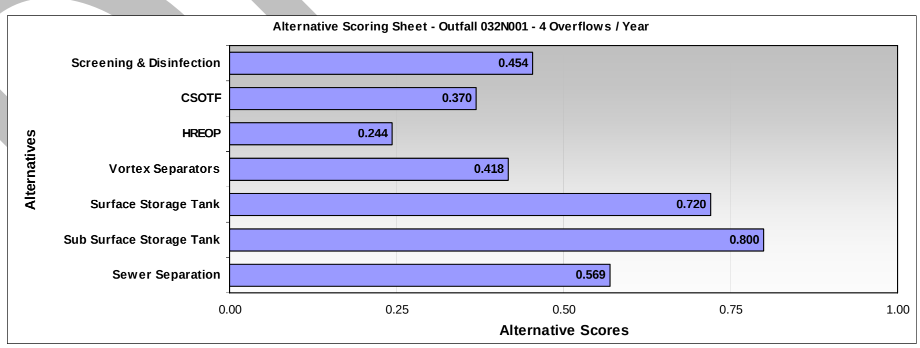
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only.
Sewer separation	Y	Sewer separation within the 1,681 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated for up to 55.38 CFS.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

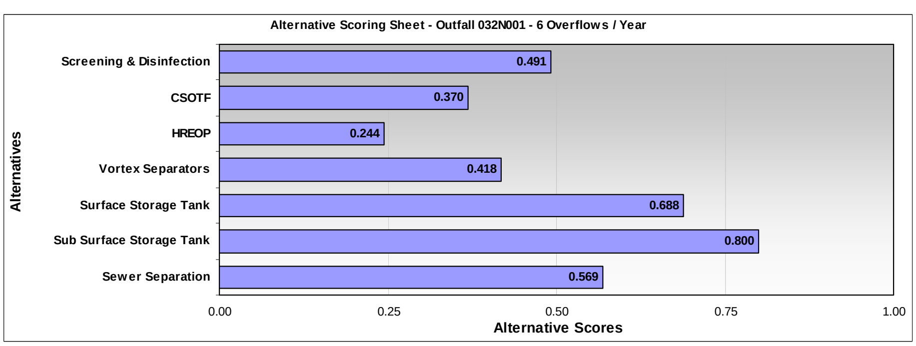
Attachment 3 – Alternative Scoring Sheet

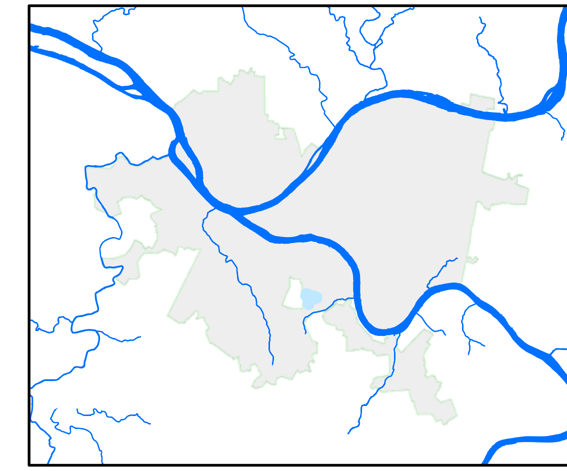












Area Overview

Legend

- Combined Sewer Outfall
- **Trunk Sewer**
- **ALCOSAN Diversion Structure**
- **PWSA Diversion Structure**
- **Combined Sewer Outfall**

100 0 100 Feet

Attachment 4
CSO 032N001
Facilities Boundary Map
Becks Run
Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0264.pdf

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req’s	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req’s	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req’s	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	4	4	4	4
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	3	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	2	2	2	2	2
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T2-HREOP		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	1	1	1	1	1
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T3-CSOTF		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative: T3-CSOTF		Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative: T3-CSOTF		Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative: T3-CSOTF		Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	3	3	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	3	3	3	3	3
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	2	2	2	2	2
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.					
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.	5	3	3	3	3
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Box = Objective scores determined by PWSA / Consultant Team
of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.570**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.542**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.542**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.525**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.525**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.525**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.622**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.622**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.605**

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.605**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.605**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.519**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.560**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.560**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.560**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.560**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.434**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.402**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.402**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.402**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.402**

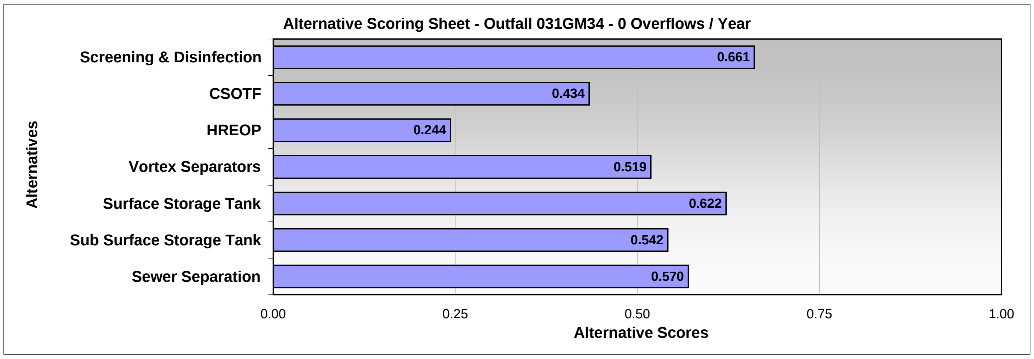
Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.661**

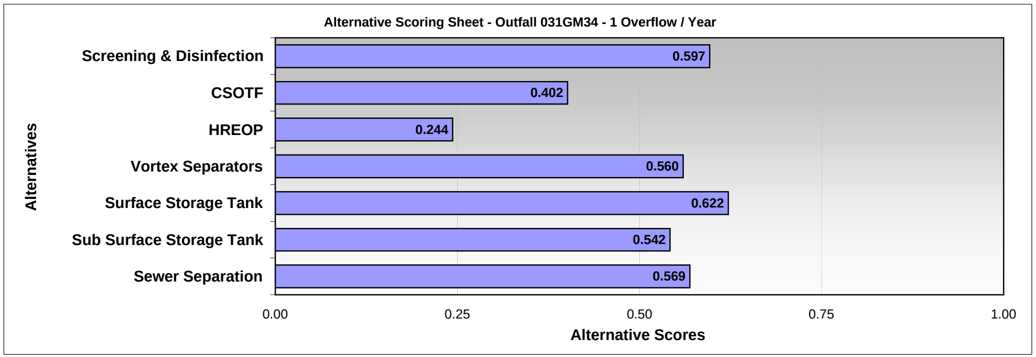
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.597**

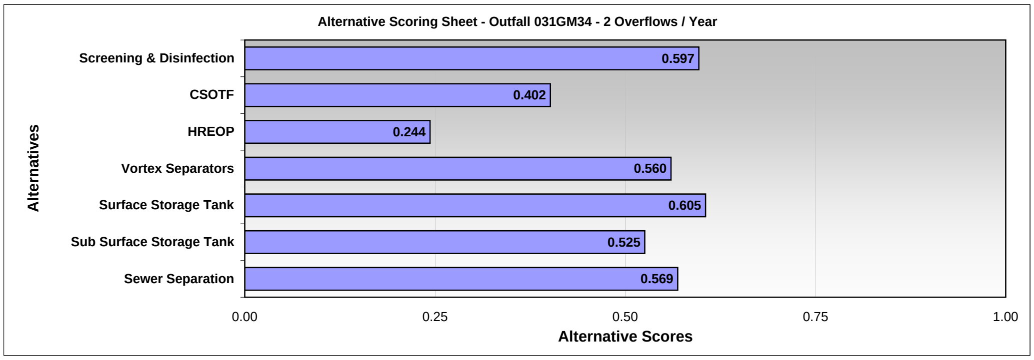
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.597**

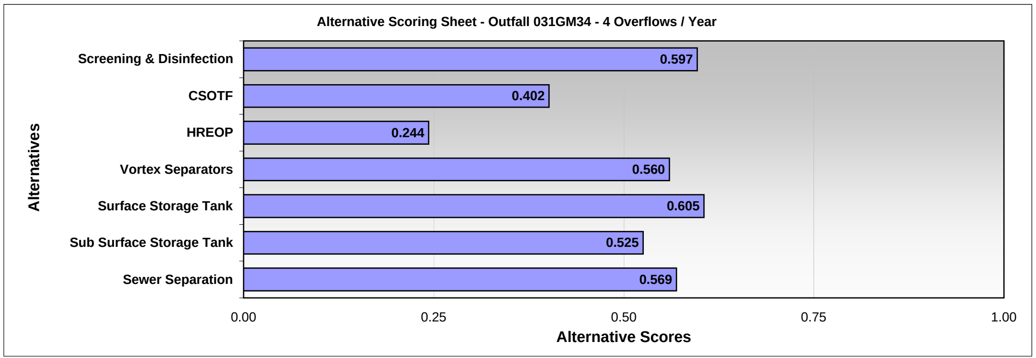
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.597**

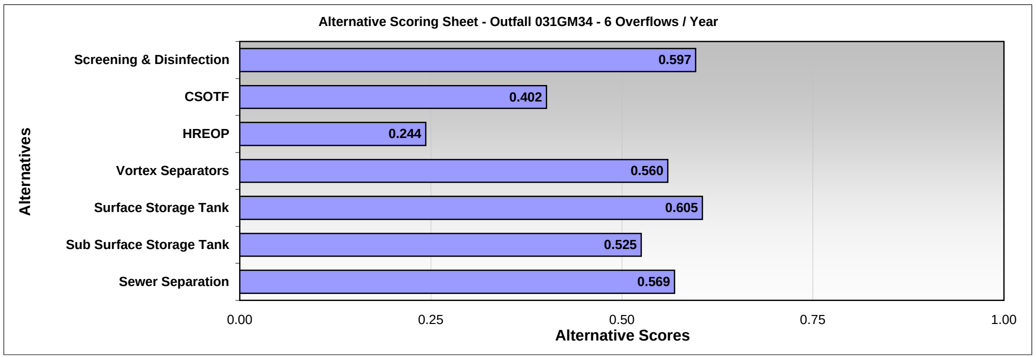
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.597**


Alternative Scoring Sheet - Outfall 031GM34 - 0 Overflows / Year
Alternatives
Screening & Disinfection 0.661
CSOTF 0.434
HREOP 0.244
Vortex Separators 0.519
Surface Storage Tank 0.622
Sub Surface Storage Tank 0.542
Sewer Separation 0.570
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 031GM34 - 1 Overflow / Year
Alternatives
Screening & Disinfection 0.597
CSOTF 0.402
HREOP 0.244
Vortex Separators 0.560
Surface Storage Tank 0.622
Sub Surface Storage Tank 0.542
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 031GM34 - 2 Overflows / Year
Alternatives
Screening & Disinfection 0.597
CSOTF 0.402
HREOP 0.244
Vortex Separators 0.560
Surface Storage Tank 0.605
Sub Surface Storage Tank 0.525
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 031GM34 - 4 Overflows / Year
Alternatives
Screening & Disinfection 0.597
CSOTF 0.402
HREOP 0.244
Vortex Separators 0.560
Surface Storage Tank 0.605
Sub Surface Storage Tank 0.525
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 031GM34 - 6 Overflows / Year
Alternatives
Screening & Disinfection 0.597
CSOTF 0.402
HREOP 0.244
Vortex Separators 0.560
Surface Storage Tank 0.605
Sub Surface Storage Tank 0.525
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	0	
Peak Volume	2,740,077	CF
	20.50	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	55.63	CFS
	35.95	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		1,681		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**252,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		732,244		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**1,464,000**		
			TOTAL CAPITAL COST $	**253,653,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	0	
Peak Volume	2,740,077	CF
	20.50	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	55.63	CFS
	35.95	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34

SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		20.50	2,740,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		24.11	3,224,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		569		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		380		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		24.26	3,243,300	**Sufficient Volume**
Tank Area (SF)		216,000		= Length x Width
Construction Cost (Storage Tank)		**25,356,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		35.95	55.63	= Peak Rate
Force Main Diameter (In)		41		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,038,000**	**$ 49,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		55.63		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,836,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		24,180		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**1,111,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		35.95		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,077,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		325,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**650,000**		
			TOTAL CAPITAL COST $	**35,445,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	0	
Peak Volume	2,740,077	CF
	20.50	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	55.63	CFS
	35.95	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SUB-SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value	
Sizing Basis: Peak Volume (MG / CF)	20.50	2,740,000	Ref: CSO Statistics	
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters	
Required Storage Volume (MG / CF)	24.11	3,224,000	= Peak Vol / Available Capacity	
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**	
Length (Ft)	569		= (Vol / SWD * 1.5)$^{1/2}$	
Width (Ft)	380		= (Vol / SWD / 1.5)$^{1/2}$	
Total Volume (MG / CF)	24.26	3,243,300	**Sufficient Volume**	
Tank Area (SF)	216,000		= Length x Width	
Construction Cost (Storage Tank)	**64,034,000**			
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters	
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**	
Dewatering Pumping Rate (MGD / CFS)	20.50	31.71	= Peak Vol / DW Time x %Req Pump	
Force Main Diameter (In)	31		Input by Engineer	
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**	
Force Main Length (Ft)	100		Input by Engineer	
Construction Cost (PS / Force Main)	**$ 4,152,000**	**$ 39,000**		
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)	55.63		Ref: Technical Parameters	
Diameter (In)	66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"	
Length (Ft)	100		Input by Engineer	
Depth (Ft)	20		Input by Engineer	
Construction Cost (Pipe)	**$ 125,000**			
4. Odor Control Parameters				
Air Changes / Hour (ACH)	3		Ref: Technical Parameters	
Volume of Ventilated Space (CF)	4,836,000		=Required Storage Vol x 1.5	
Odor Control Flow Rate (CFM)	241,800		= ACH x Volume / 60	
Construction Cost (Odor Control)	**$ 6,753,000**			
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**	
Peak Flow, into facility (MGD)	35.95		Ref: CSO Statistics	
Construction Cost (Screening)	**$ 2,077,000**			
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**	
Peak Flow (MGD)	0.00		Ref: Peak flow of PS	
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)		**No Disnfctn**	Ref: Tech Param-15 min minimum	
Construction Cost (Disinfection / CC Tank)	$ -	$ -		
Construction Cost (Disinfection)	**$ -**		**No Disinfection**	
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer	
Number Regulators	1		Input by Engineer	
Construction Cost (Regulators)	**$ 39,000**			
8. Land Acquisition Parameters				
Land Required - Tank (SF)	325,000		=(0.291 x Vol (MG) + 0.439) x 43560	
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters	
Land Acquisition Cost	**$ 650,000**			
		TOTAL CAPITAL COST	**$**	**77,869,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	0	
Peak Volume	2,740,077	CF
	20.50	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	55.63	CFS
	35.95	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
0 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		35.95	55.63	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		4		
Construction Cost (Swirl / Vortex)	$	2,694,000		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		39.55	61.19	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		43		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	$	6,476,000	$ 52,000	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		55.63		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	$	125,000		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		115,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		5,750		= ACH x Volume / 60
Construction Cost (Odor Control)	$	361,000		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		35.95		Ref: CSO Statistics
Construction Cost (Screening)	$	2,077,000		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		39.55		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		99	47	
Passes / Detention (Min)		3	15.21	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	$	1,105,000		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	$	299,000		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		37,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	$	74,000		
			TOTAL CAPITAL COST $	**13,263,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	0	
Peak Volume	2,740,077	CF
	20.50	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	55.63	CFS
	35.95	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SEDIMENTATION BASIN (CSOTF)				
0 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		35.95	55.63	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		6,000		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		111	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		55	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.55	73,260	
Construction Cost (CSOTF)	**$**	**16,374,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		35.95	55.63	= Peak Flow x % Req Pump
Force Main Diameter (In)		41		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,038,000**	**$ 49,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		55.63		Ref: CSO Statistics
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		110,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		5,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**348,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		35.95		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,077,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		35.95		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		94	45	
Passes / Detention (Min)		3	15.21	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**1,042,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		19,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**26,130,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	0	
Peak Volume	2,740,077	CF
	20.50	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	55.63	CFS
	35.95	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
0 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		35.95	55.63	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		430		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		30	OK	Input by Engineer
Width (Ft)		15	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**6,939,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		39.55	61.19	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		43		Input by Engineer
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,476,000**	**$ 52,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		55.63		Ref: Technical Parameters
Diameter (In)		66		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		11,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		550		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**57,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		35.95		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,077,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		39.55		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		99	47	Input by Engineer
Passes / Detention (Min)		3	15.21	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,105,000	$ 980,000	
Construction Cost (Disinfection)	**$**	**2,085,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		38,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**76,000**		
		TOTAL CAPITAL COST	**$**	**17,926,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	0	
Peak Volume	2,740,077	CF
	20.50	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	55.63	CFS
	35.95	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		35.95		55.63	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**2,077,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		35.95		55.63	= Peak Flow x % Req Pump
Force Main Diameter (In)		41			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**6,038,000**	**$**	**49,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		55.63			Ref: CSO Statistics
Diameter (In)		66			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**125,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		11,100			=CFS x 200
Odor Control Flow Rate (CFM)		560			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**58,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		35.95			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		94		45	
Passes / Detention (Min)		3		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	1,042,000	$	915,000	
Construction Cost (Disinfection)	**$**	**1,957,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		26,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST $	**10,395,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	1	
Peak Volume	1,247,325	CF
	9.33	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.38	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		1,681		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**252,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		732,244		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**1,464,000**		
			TOTAL CAPITAL COST $	**253,653,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	1	
Peak Volume	1,247,325	CF
	9.33	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.38	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34					
SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		9.33		1,247,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		10.98		1,467,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		384			= $(\text{Vol / SWD} * 1.5)^{1/2}$
Width (Ft)		256			= $(\text{Vol / SWD / } 1.5)^{1/2}$
Total Volume (MG / CF)		11.03		1,474,560	**Sufficient Volume**
Tank Area (SF)		98,000			= Length x Width
Construction Cost (Storage Tank)		**10,754,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		28.68		44.38	= Peak Rate
Force Main Diameter (In)		37			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,150,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.38			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,201,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		11,010			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**600,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		28.68			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		158,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**316,000**			
				TOTAL CAPITAL COST $	**18,728,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	1	
Peak Volume	1,247,325	CF
	9.33	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.38	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SUB-SURFACE STORAGE TANK				
1 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		9.33	1,247,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		10.98	1,467,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		384		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		256		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		11.03	1,474,560	**Sufficient Volume**
Tank Area (SF)		98,000		= Length x Width
Construction Cost (Storage Tank)		**29,647,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		9.33	14.44	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		21		Input by Engineer
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,742,000**	**$ 29,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		44.38		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,201,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		110,050		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**3,644,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		158,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**316,000**		
			TOTAL CAPITAL COST $	**38,241,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	1	
Peak Volume	1,247,325	CF
	9.33	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.38	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
1 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		28.68	44.38	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		31.55	48.81	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		39		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,500,000**	**$ 47,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		44.38		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		31.55		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		88	43	
Passes		3	**15.50**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**963,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		30,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST $	**8,693,000**

Capital Costs

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	1	
Peak Volume	1,247,325	CF
	9.33	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.38	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34			
SEDIMENTATION BASIN (CSOTF)			
1 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	28.68	44.38	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	4,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	99	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)	49	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio	3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)	0.44	58,212	
Construction Cost (CSOTF) $	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	28.68	44.38	= Peak Flow x % Req Pump
Force Main Diameter (In)	37		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**5,150,000**	**$ 45,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	44.38		Ref: CSO Statistics
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	87,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	4,350		= ACH x Volume / 60
Construction Cost (Odor Control) $	**290,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	28.68		Ref: CSO Statistics
Construction Cost (Screening) $	**1,740,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	28.68		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	84	41	
Passes	3	**15.52**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**910,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	17,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**34,000**		
		TOTAL CAPITAL COST $	**24,663,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	1	
Peak Volume	1,247,325	CF
	9.33	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.38	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		28.68		44.38	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		340			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		27		OK	Input by Engineer
Width (Ft)		14		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**5,757,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		31.55		48.81	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		39			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,500,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.38			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		28.68			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		31.55			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		88		43	Input by Engineer
Passes		3		15.50	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	963,000	$	845,000	
Construction Cost (Disinfection)	**$**	**1,808,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		35,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**			
				TOTAL CAPITAL COST $	**15,094,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	1	
Peak Volume	1,247,325	CF
	9.33	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.38	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		28.68		44.38	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		28.68		44.38	= Peak Flow x % Req Pump
Force Main Diameter (In)		37			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,150,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.38			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,900			=CFS x 200
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		28.68			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		84		41	
Passes		3		**15.52**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	910,000	$	793,000	
Construction Cost (Disinfection)	**$**	**1,703,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		25,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST $	**8,860,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	2	
Peak Volume	1,009,610	CF
	7.55	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.37	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		1,681		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**252,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		732,244		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**1,464,000**		
			TOTAL CAPITAL COST $	**253,653,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	2	
Peak Volume	1,009,610	CF
	7.55	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.37	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		7.55	1,010,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		8.88	1,188,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		346		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		231		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		8.97	1,198,890	**Sufficient Volume**
Tank Area (SF)		80,000		= Length x Width
Construction Cost (Storage Tank)		**8,541,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		28.68	44.37	= Peak Rate
Force Main Diameter (In)		37		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,150,000**	**$ 45,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		44.37		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,782,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		8,910		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**508,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		28.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		132,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**264,000**		
			TOTAL CAPITAL COST $	**16,371,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	2	
Peak Volume	1,009,610	CF
	7.55	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.37	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SUB-SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		7.55	1,010,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		8.88	1,188,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		346		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		231		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		8.97	1,198,890	**Sufficient Volume**
Tank Area (SF)		80,000		= Length x Width
Construction Cost (Storage Tank)		**24,171,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		7.55	11.69	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		19		Input by Engineer
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,546,000**	**$ 27,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		44.37		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,782,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		89,100		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**3,088,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		132,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**264,000**		
			TOTAL CAPITAL COST $	**31,959,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	2	
Peak Volume	1,009,610	CF
	7.55	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.37	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34

SWIRL CONCENTRATOR / VORTEX SEPARATOR

2 Overflows / Year

1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		28.68	44.37	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		31.55	48.81	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		39		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,500,000**	**$ 47,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		44.37		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		28.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		31.55		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		88	43	
Passes		3	**15.50**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**963,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		30,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST $	**8,693,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	2	
Peak Volume	1,009,610	CF
	7.55	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.37	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SEDIMENTATION BASIN (CSOTF)				
2 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		28.68	44.37	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		4,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		99	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		49	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.44	58,212	
Construction Cost (CSOTF)	**$**	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		28.68	44.37	= Peak Flow x % Req Pump
Force Main Diameter (In)		37		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,150,000**	**$ 45,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		44.37		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		87,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**290,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		28.68		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		28.68		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		84	41	
Passes		3	15.52	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**910,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		17,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**34,000**		
			TOTAL CAPITAL COST $	**24,663,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	2	
Peak Volume	1,009,610	CF
	7.55	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.37	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		28.68		44.37	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		340			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		27		OK	Input by Engineer
Width (Ft)		14		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**5,757,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		31.55		48.81	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		39			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,500,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.37			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		28.68			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		31.55			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		88		43	Input by Engineer
Passes		3		15.50	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	963,000	$	845,000	
Construction Cost (Disinfection)	**$**	**1,808,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		35,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**70,000**			
			TOTAL CAPITAL COST	**$**	**15,094,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	2	
Peak Volume	1,009,610	CF
	7.55	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	44.37	CFS
	28.68	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		28.68		44.37	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,740,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		28.68		44.37	= Peak Flow x % Req Pump
Force Main Diameter (In)		37			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,150,000**	**$**	**45,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		44.37			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,900			=CFS x 200
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		28.68			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		84		41	
Passes		3		**15.52**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	910,000	$	793,000	
Construction Cost (Disinfection)	**$**	**1,703,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		25,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
			TOTAL CAPITAL COST	**$**	**8,860,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	4	
Peak Volume	811,607	CF
	6.07	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	33.90	CFS
	21.91	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		1,681		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**252,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		732,244		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**1,464,000**		
			TOTAL CAPITAL COST $	**253,653,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	4	
Peak Volume	811,607	CF
	6.07	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	33.90	CFS
	21.91	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		6.07	812,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		7.14	955,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		310		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		207		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		7.20	962,550	**Sufficient Volume**
Tank Area (SF)		64,000		= Length x Width
Construction Cost (Storage Tank)		**6,732,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		21.91	33.90	= Peak Rate
Force Main Diameter (In)		32		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,325,000**	**$ 40,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		33.90		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,433,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		7,170		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**429,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		21.91		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,427,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		110,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**220,000**		
			TOTAL CAPITAL COST $	**13,296,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	4	
Peak Volume	811,607	CF
	6.07	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	33.90	CFS
	21.91	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SUB-SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		6.07	812,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		7.14	955,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		310		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		207		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		7.20	962,550	**Sufficient Volume**
Tank Area (SF)		64,000		= Length x Width
Construction Cost (Storage Tank)		**19,610,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		6.07	9.39	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		17		Input by Engineer
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,356,000**	**$ 25,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		33.90		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,433,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		71,650		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,603,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		21.91		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,427,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		110,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**220,000**		
			TOTAL CAPITAL COST $	**26,364,000**

RESULTS SUMMARY			
Number of Events / Year	54		
Number of Overflows / Year	4		
Peak Volume	811,607	CF	
	6.07	MG	
Total Volume	13,470,710	CF	
	100.76	MG	
Peak Rate	33.90	CFS	
	21.91	MGD	

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
4 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		21.91	33.90	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		24.10	37.29	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		34		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,592,000**	**$ 42,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		33.90		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		21.91		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,427,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		24.10		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		77	37	
Passes		3	**15.28**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**824,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		23,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST $	**7,314,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	4	
Peak Volume	811,607	CF
	6.07	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	33.90	CFS
	21.91	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		21.91	33.90	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		3,700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		87	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		44	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.34	45,936	
Construction Cost (CSOTF)	**$**	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		21.91	33.90	= Peak Flow x % Req Pump
Force Main Diameter (In)		32		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,325,000**	**$ 40,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		33.90		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		69,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,450		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**242,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		21.91		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,427,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		21.91		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		74	35	
Passes		3	**15.28**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**782,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		14,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**28,000**		
			TOTAL CAPITAL COST $	**23,338,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	4	
Peak Volume	811,607	CF
	6.07	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	33.90	CFS
	21.91	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
4 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		21.91		33.90	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		260			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		24		OK	Input by Engineer
Width (Ft)		12		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**4,667,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		24.10		37.29	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		34			Input by Engineer
Force Main Velocity (FPS)		5.9		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,592,000**	**$**	**42,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		33.90			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		350			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**40,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		21.91			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,427,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		24.10			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		77		37	Input by Engineer
Passes		3		15.28	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	824,000	$	700,000	
Construction Cost (Disinfection)	**$**	**1,524,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		32,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**64,000**			
				TOTAL CAPITAL COST $	**12,479,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	4	
Peak Volume	811,607	CF
	6.07	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	33.90	CFS
	21.91	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34

SCREENING AND DISINFECTION

4 Overflows / Year

1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		21.91		33.90	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,427,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		21.91		33.90	= Peak Flow x % Req Pump
Force Main Diameter (In)		32			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,325,000**	**$**	**40,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		33.90			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,800			=CFS x 200
Odor Control Flow Rate (CFM)		340			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**39,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		21.91			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		74		35	
Passes		3		**15.28**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	782,000	$	660,000	
Construction Cost (Disinfection)	**$**	**1,442,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		25,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST $	**7,446,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	6	
Peak Volume	665,738	CF
	4.98	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	27.08	CFS
	17.50	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		1,681		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**252,150,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		732,244		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**1,464,000**		
			TOTAL CAPITAL COST $	**253,653,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	6	
Peak Volume	665,738	CF
	4.98	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	27.08	CFS
	17.50	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34			
SURFACE STORAGE TANK			
6 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	4.98	666,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	5.86	784,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	281		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	188		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	5.93	792,420	**Sufficient Volume**
Tank Area (SF)	53,000		= Length x Width
Construction Cost (Storage Tank)	**5,425,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	17.50	27.08	= Peak Rate
Force Main Diameter (In)	29		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**3,787,000**	**$ 37,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	27.08		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	1,176,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	5,880		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**367,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	17.50		Ref: CSO Statistics
Construction Cost (Screening) $	**1,223,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	93,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**186,000**		
		TOTAL CAPITAL COST $	**11,148,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	6	
Peak Volume	665,738	CF
	4.98	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	27.08	CFS
	17.50	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34			
SUB-SURFACE STORAGE TANK			
6 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	4.98	666,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	5.86	784,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	Sufficient Depth	Ref: Tech Parameters, Rev as Req'd
Length (Ft)	281		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	188		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	5.93	792,420	Sufficient Volume
Tank Area (SF)	53,000		= Length x Width
Construction Cost (Storage Tank)	**16,250,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)	4.98	7.71	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	15		Input by Engineer
Force Main Velocity (FPS)	6.3	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**2,200,000**	**$ 24,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	27.08		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	1,176,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	58,800		= ACH x Volume / 60
Construction Cost (Odor Control) $	**2,230,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	17.50		Ref: CSO Statistics
Construction Cost (Screening) $	**1,223,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		Typ 2, Rev as Req'd
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		No Disinfection
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	93,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**186,000**		
		TOTAL CAPITAL COST $	**22,236,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	6	
Peak Volume	665,738	CF
	4.98	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	27.08	CFS
	17.50	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
6 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	17.50	27.08	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	-		Not Applicable - Insufficient Volume
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)	19.25	29.79	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	30		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**4,000,000**	**$ 38,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	27.08		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**84,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	-		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	17.50		Ref: CSO Statistics
Construction Cost (Screening) $	**1,223,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow (MGD)	19.25		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	69	33	
Passes	3	15.29	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**731,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	18,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**36,000**		
		TOTAL CAPITAL COST $	**6,411,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	6	
Peak Volume	665,738	CF
	4.98	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	27.08	CFS
	17.50	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
SEDIMENTATION BASIN (CSOTF)				
6 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		17.50	27.08	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		3,000		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		78	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		39	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.27	36,504	
Construction Cost (CSOTF)	**$**	**16,374,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		17.50	27.08	= Peak Flow x % Req Pump
Force Main Diameter (In)		29		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,787,000**	**$ 37,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		27.08		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		55,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,750		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**202,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		17.50		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,223,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		17.50		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		66	32	
Passes		3	**15.60**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**697,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		12,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**24,000**		
			TOTAL CAPITAL COST $	**22,467,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	6	
Peak Volume	665,738	CF
	4.98	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	27.08	CFS
	17.50	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
6 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		17.50	27.08	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		210		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21	OK	Input by Engineer
Width (Ft)		11	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**3,962,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		19.25	29.79	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		30		Input by Engineer
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,000,000**	**$ 38,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		27.08		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		300		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		17.50		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,223,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		19.25		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		69	33	Input by Engineer
Passes		3	15.29	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	731,000	$ 607,000	
Construction Cost (Disinfection)	**$**	**1,338,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		30,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST $	**10,780,000**

RESULTS SUMMARY		
Number of Events / Year	54	
Number of Overflows / Year	6	
Peak Volume	665,738	CF
	4.98	MG
Total Volume	13,470,710	CF
	100.76	MG
Peak Rate	27.08	CFS
	17.50	MGD

Capital Costs - 031GM34 / Sewershed ACSO 031GM34					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		17.50		27.08	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,223,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		17.50		27.08	= Peak Flow x % Req Pump
Force Main Diameter (In)		29			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,787,000**	**$**	**37,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		27.08			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**84,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		5,400			=CFS x 200
Odor Control Flow Rate (CFM)		270			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**33,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		17.50			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		66		32	
Passes		3		**15.60**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	697,000	$	578,000	
Construction Cost (Disinfection)	**$**	**1,275,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		24,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**			
				TOTAL CAPITAL COST $	**6,526,000**

Operation and Maintenance Costs

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	35.95	$205,806	20	10.910	$2,245,326
	Tank O&M	No. Events / Yr	54	$96,568	50	14.484	$1,398,646
		Const Cost ($)	$25,356,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	36	$10,652	20	10.910	$116,208
	Odor Control O&M	Capacity (cfm)	24,180	$84,630	20	10.910	$923,308
	Reserve / Replace	10% Gravity / 15% Pump					$33,306
			Total Annual O&M	**$398,000**		**Total PW O&M**	**$4,717,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	20.50	$141,388	20	10.910	$1,542,531
	Tank O&M	No. Events / Yr	54	$193,263	50	14.484	$2,799,137
		Const Cost ($)	$64,034,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	36	$10,652	20	10.910	$116,208
	Odor Control O&M	Capacity (cfm)	241,800	$846,300	20	10.910	$9,233,082
	Reserve / Replace	10% Gravity / 15% Pump					$40,958
			Total Annual O&M	**$1,192,000**		**Total PW O&M**	**$13,732,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	35.95	$205,806	20	10.910	$2,245,326
	Sed. Basin O&M	Flow Rate (mgd)	35.95	$4,044	50	14.484	$58,578
	Screening O&M	Flow Rate (mgd)	35.95	$10,652	20	10.910	$116,208
	Disinfection O&M	Flow Rate (mgd)	35.95	$142,568	20	10.910	$1,555,413
	Odor Control O&M	Capacity (cfm)	5,500.00	$19,250	20	10.910	$210,016
	Reserve / Replace	10% Gravity / 15% Pump					$34,065
			Total Annual O&M	**$383,000**		**Total PW O&M**	**$4,220,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	39.55	$219,337	20	10.910	$2,392,952
	HREP O&M	Flow Rate (mgd)	35.95	$191,478	20	10.910	$2,089,013
	Screening O&M	Flow Rate (mgd)	35.95	$10,652	20	10.910	$116,208
	Disinfection O&M	Flow Rate (mgd)	39.55	$151,091	20	10.910	$1,648,398
	Odor Control O&M	Capacity (cfm)	550.00	$1,925	20	10.910	$21,002
	Reserve / Replace	10% Gravity / 15% Pump					$54,106
			Total Annual O&M	**$575,000**		**Total PW O&M**	**$6,322,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	39.55	$219,337	20	10.910	$2,392,952
	Swirl / Vortex O&M	Flow Rate (mgd)	35.95	$4,044	20	10.910	$44,125
	Screening O&M	Flow Rate (mgd)	35.95	$10,652	20	10.910	$116,208
	Disinfection O&M	Flow Rate (mgd)	39.55	$151,091	20	10.910	$1,648,398
	Odor Control O&M	Capacity (cfm)	5,750.00	$20,125	20	10.910	$219,563
	Reserve / Replace	10% Gravity / 15% Pump					$39,723
			Total Annual O&M	**$406,000**		**Total PW O&M**	**$4,461,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	35.95	$205,806	20	10.910	$2,245,326
	Screening O&M	Flow Rate (mgd)	35.95	$10,652	20	10.910	$116,208
	Disinfection O&M	Flow Rate (mgd)	35.95	$142,568	20	10.910	$1,555,413
	Odor Control O&M	Capacity (cfm)	560.00	$1,960	20	10.910	$21,383
	Reserve / Replace	10% Gravity / 15% Pump					$33,276
			Total Annual O&M	**$361,000**		**Total PW O&M**	**$3,972,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	28.68	$176,962	20	10.910	$1,930,647
	Tank O&M	No. Events / Yr	54	$60,063	50	14.484	$869,922
		Const Cost ($)	$10,754,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	29	$9,963	20	10.910	$108,695
	Odor Control O&M	Capacity (cfm)	11,010	$38,535	20	10.910	$420,415
	Reserve / Replace	10% Gravity / 15% Pump					$27,377
			Total Annual O&M	**$286,000**		**Total PW O&M**	**$3,357,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	9.33	$83,573	20	10.910	$911,777
	Tank O&M	No. Events / Yr	54	$107,295	50	14.484	$1,554,018
		Const Cost ($)	$29,647,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	29	$9,963	20	10.910	$108,695
	Odor Control O&M	Capacity (cfm)	110,050	$385,175	20	10.910	$4,202,236
	Reserve / Replace	10% Gravity / 15% Pump					$25,832
			Total Annual O&M	**$587,000**		**Total PW O&M**	**$6,803,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	28.68	$176,962	20	10.910	$1,930,647
	Sed. Basin O&M	Flow Rate (mgd)	28.68	$3,226	50	14.484	$46,729
	Screening O&M	Flow Rate (mgd)	28.68	$9,963	20	10.910	$108,695
	Disinfection O&M	Flow Rate (mgd)	28.68	$124,230	20	10.910	$1,355,347
	Odor Control O&M	Capacity (cfm)	4,350.00	$15,225	20	10.910	$166,104
	Reserve / Replace	10% Gravity / 15% Pump					$29,009
			Total Annual O&M	**$330,000**		**Total PW O&M**	**$3,637,000**

Operation and Maintenance Costs

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	31.55	$188,597	20	10.910	$2,057,583
	HREP O&M	Flow Rate (mgd)	28.68	$167,646	20	10.910	$1,829,013
	Screening O&M	Flow Rate (mgd)	28.68	$9,963	20	10.910	$108,695
	Disinfection O&M	Flow Rate (mgd)	31.55	$131,657	20	10.910	$1,436,372
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$45,584
			Total Annual O&M	**$500,000**		**Total PW O&M**	**$5,494,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	31.55	$188,597	20	10.910	$2,057,583
	Swirl / Vortex O&M	Flow Rate (mgd)	28.68	$3,226	20	10.910	$35,199
	Screening O&M	Flow Rate (mgd)	28.68	$9,963	20	10.910	$108,695
	Disinfection O&M	Flow Rate (mgd)	31.55	$131,657	20	10.910	$1,436,372
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$29,792
			Total Annual O&M	**$334,000**		**Total PW O&M**	**$3,668,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	28.68	$176,962	20	10.910	$1,930,647
	Screening O&M	Flow Rate (mgd)	28.68	$9,963	20	10.910	$108,695
	Disinfection O&M	Flow Rate (mgd)	28.68	$124,230	20	10.910	$1,355,347
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$28,353
			Total Annual O&M	**$313,000**		**Total PW O&M**	**$3,440,000**

Operation and Maintenance Costs

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	28.68	$176,960	20	10.910	$1,930,625
	Tank O&M	No. Events / Yr	54	$54,530	50	14.484	$789,792
		Const Cost ($)	$8,541,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	29	$9,963	20	10.910	$108,694
	Odor Control O&M	Capacity (cfm)	8,910	$31,185	20	10.910	$340,226
	Reserve / Replace	10% Gravity / 15% Pump					$27,127
			Total Annual O&M	**$273,000**		**Total PW O&M**	**$3,196,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	7.55	$72,563	20	10.910	$791,661
	Tank O&M	No. Events / Yr	54	$93,605	50	14.484	$1,355,738
		Const Cost ($)	$24,171,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	29	$9,963	20	10.910	$108,694
	Odor Control O&M	Capacity (cfm)	89,100	$311,850	20	10.910	$3,402,265
	Reserve / Replace	10% Gravity / 15% Pump					$23,520
			Total Annual O&M	**$488,000**		**Total PW O&M**	**$5,682,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)							
ACSO 031GM34	**Requirement**	**Input Parameter**	**Input Value**	**Annual O&M Cost**	**Service Life (Yr)**	**Present Worth Factor**	**Present Worth**
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	28.68	$176,960	20	10.910	$1,930,625
	Sed. Basin O&M	Flow Rate (mgd)	28.68	$3,226	50	14.484	$46,728
	Screening O&M	Flow Rate (mgd)	28.68	$9,963	20	10.910	$108,694
	Disinfection O&M	Flow Rate (mgd)	28.68	$124,229	20	10.910	$1,355,333
	Odor Control O&M	Capacity (cfm)	4,350.00	$15,225	20	10.910	$166,104
	Reserve / Replace	10% Gravity / 15% Pump					$29,009
			Total Annual O&M	**$330,000**		**Total PW O&M**	**$3,636,000**

Operation and Maintenance Costs

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	31.55	$188,595	20	10.910	$2,057,559
	HREP O&M	Flow Rate (mgd)	28.68	$167,645	20	10.910	$1,828,995
	Screening O&M	Flow Rate (mgd)	28.68	$9,963	20	10.910	$108,694
	Disinfection O&M	Flow Rate (mgd)	31.55	$131,656	20	10.910	$1,436,357
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$45,584
			Total Annual O&M	**$500,000**		**Total PW O&M**	**$5,494,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	31.55	$188,595	20	10.910	$2,057,559
	Swirl / Vortex O&M	Flow Rate (mgd)	28.68	$3,226	20	10.910	$35,198
	Screening O&M	Flow Rate (mgd)	28.68	$9,963	20	10.910	$108,694
	Disinfection O&M	Flow Rate (mgd)	31.55	$131,656	20	10.910	$1,436,357
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$29,792
			Total Annual O&M	**$334,000**		**Total PW O&M**	**$3,668,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	28.68	$176,960	20	10.910	$1,930,625
	Screening O&M	Flow Rate (mgd)	28.68	$9,963	20	10.910	$108,694
	Disinfection O&M	Flow Rate (mgd)	28.68	$124,229	20	10.910	$1,355,333
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$28,353
			Total Annual O&M	**$313,000**		**Total PW O&M**	**$3,440,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	21.91	$147,837	20	10.910	$1,612,889
	Tank O&M	No. Events / Yr	54	$50,008	50	14.484	$724,290
		Const Cost ($)	$6,732,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	22	$9,339	20	10.910	$101,893
	Odor Control O&M	Capacity (cfm)	7,170	$25,095	20	10.910	$273,785
	Reserve / Replace	10% Gravity / 15% Pump					$22,694
			Total Annual O&M	**$233,000**		**Total PW O&M**	**$2,736,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	6.07	$62,716	20	10.910	$684,224
	Tank O&M	No. Events / Yr	54	$82,203	50	14.484	$1,190,589
		Const Cost ($)	$19,610,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	22	$9,339	20	10.910	$101,893
	Odor Control O&M	Capacity (cfm)	71,650	$250,775	20	10.910	$2,735,940
	Reserve / Replace	10% Gravity / 15% Pump					$20,574
			Total Annual O&M	**$406,000**		**Total PW O&M**	**$4,733,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	21.91	$147,837	20	10.910	$1,612,889
	Sed. Basin O&M	Flow Rate (mgd)	21.91	$2,465	50	14.484	$35,702
	Screening O&M	Flow Rate (mgd)	21.91	$9,339	20	10.910	$101,893
	Disinfection O&M	Flow Rate (mgd)	21.91	$105,442	20	10.910	$1,150,369
	Odor Control O&M	Capacity (cfm)	3,450.00	$12,075	20	10.910	$131,738
	Reserve / Replace	10% Gravity / 15% Pump					$24,313
			Total Annual O&M	**$278,000**		**Total PW O&M**	**$3,057,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	24.10	$157,557	20	10.910	$1,718,933
	HREP O&M	Flow Rate (mgd)	21.91	$143,103	20	10.910	$1,561,241
	Screening O&M	Flow Rate (mgd)	21.91	$9,339	20	10.910	$101,893
	Disinfection O&M	Flow Rate (mgd)	24.10	$111,746	20	10.910	$1,219,140
	Odor Control O&M	Capacity (cfm)	350.00	$1,225	20	10.910	$13,365
	Reserve / Replace	10% Gravity / 15% Pump					$37,661
			Total Annual O&M	**$423,000**		**Total PW O&M**	**$4,652,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	24.10	$157,557	20	10.910	$1,718,933
	Swirl / Vortex O&M	Flow Rate (mgd)	21.91	$2,465	20	10.910	$26,893
	Screening O&M	Flow Rate (mgd)	21.91	$9,339	20	10.910	$101,893
	Disinfection O&M	Flow Rate (mgd)	24.10	$111,746	20	10.910	$1,219,140
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$24,858
			Total Annual O&M	**$282,000**		**Total PW O&M**	**$3,092,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	21.91	$147,837	20	10.910	$1,612,889
	Screening O&M	Flow Rate (mgd)	21.91	$9,339	20	10.910	$101,893
	Disinfection O&M	Flow Rate (mgd)	21.91	$105,442	20	10.910	$1,150,369
	Odor Control O&M	Capacity (cfm)	340.00	$1,190	20	10.910	$12,983
	Reserve / Replace	10% Gravity / 15% Pump					$23,761
			Total Annual O&M	**$264,000**		**Total PW O&M**	**$2,902,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	17.50	$127,228	20	10.910	$1,388,054
	Tank O&M	No. Events / Yr	54	$46,740	50	14.484	$676,965
		Const Cost ($)	$5,425,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	18	$8,942	20	10.910	$97,559
	Odor Control O&M	Capacity (cfm)	5,880	$20,580	20	10.910	$224,527
	Reserve / Replace	10% Gravity / 15% Pump					$19,776
			Total Annual O&M	**$204,000**		**Total PW O&M**	**$2,407,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	4.98	$54,940	20	10.910	$599,396
	Tank O&M	No. Events / Yr	54	$73,803	50	14.484	$1,068,927
		Const Cost ($)	$16,250,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	18	$8,942	20	10.910	$97,559
	Odor Control O&M	Capacity (cfm)	58,800	$205,800	20	10.910	$2,245,265
	Reserve / Replace	10% Gravity / 15% Pump					$18,368
			Total Annual O&M	**$344,000**		**Total PW O&M**	**$4,030,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	17.50	$127,228	20	10.910	$1,388,054
	Sed. Basin O&M	Flow Rate (mgd)	17.50	$1,969	50	14.484	$28,517
	Screening O&M	Flow Rate (mgd)	17.50	$8,942	20	10.910	$97,559
	Disinfection O&M	Flow Rate (mgd)	17.50	$91,953	20	10.910	$1,003,199
	Odor Control O&M	Capacity (cfm)	2,750.00	$9,625	20	10.910	$105,008
	Reserve / Replace	10% Gravity / 15% Pump					$21,223
			Total Annual O&M	**$240,000**		**Total PW O&M**	**$2,644,000**

Operation and Maintenance Costs

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	19.25	$135,593	20	10.910	$1,479,316
	HREP O&M	Flow Rate (mgd)	17.50	$125,388	20	10.910	$1,367,978
	Screening O&M	Flow Rate (mgd)	17.50	$8,942	20	10.910	$97,559
	Disinfection O&M	Flow Rate (mgd)	19.25	$97,450	20	10.910	$1,063,172
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$32,509
			Total Annual O&M	**$369,000**		**Total PW O&M**	**$4,052,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	19.25	$135,593	20	10.910	$1,479,316
	Swirl / Vortex O&M	Flow Rate (mgd)	17.50	$1,969	20	10.910	$21,481
	Screening O&M	Flow Rate (mgd)	17.50	$8,942	20	10.910	$97,559
	Disinfection O&M	Flow Rate (mgd)	19.25	$97,450	20	10.910	$1,063,172
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$21,635
			Total Annual O&M	**$244,000**		**Total PW O&M**	**$2,683,000**

ACSO 031GM34	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	17.50	$127,228	20	10.910	$1,388,054
	Screening O&M	Flow Rate (mgd)	17.50	$8,942	20	10.910	$97,559
	Disinfection O&M	Flow Rate (mgd)	17.50	$91,953	20	10.910	$1,003,199
	Odor Control O&M	Capacity (cfm)	270.00	$945	20	10.910	$10,310
	Reserve / Replace	10% Gravity / 15% Pump					$20,763
			Total Annual O&M	**$230,000**		**Total PW O&M**	**$2,520,000**

Cost Summary

CS4-Separation — SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$253.7	$253,653,000	$0
1	$253.7	$253,653,000	$0
2	$253.7	$253,653,000	$0
4	$253.7	$253,653,000	$0
6	$253.7	$253,653,000	$0

S2-Sub Surf Tnk — SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$91.6	$77,869,000	$13,732,000
1	$45.0	$38,241,000	$6,803,000
2	$37.6	$31,959,000	$5,682,000
4	$31.1	$26,364,000	$4,733,000
6	$26.3	$22,236,000	$4,030,000

S4-Surf Tnk — SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$40.2	$35,445,000	$4,717,000
1	$22.1	$18,728,000	$3,357,000
2	$19.6	$16,371,000	$3,196,000
4	$16.0	$13,296,000	$2,736,000
6	$13.6	$11,148,000	$2,407,000

T1-Vortex — SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$17.7	$13,263,000	$4,461,000
1	$12.4	$8,693,000	$3,668,000
2	$12.4	$8,693,000	$3,668,000
4	$10.4	$7,314,000	$3,092,000
6	$9.1	$6,411,000	$2,683,000

T2-HREOP — HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$24.2	$17,926,000	$6,322,000
1	$20.6	$15,094,000	$5,494,000
2	$20.6	$15,094,000	$5,494,000
4	$17.1	$12,479,000	$4,652,000
6	$14.8	$10,780,000	$4,052,000

T3-CSOTF — SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$30.4	$26,130,000	$4,220,000
1	$28.3	$24,663,000	$3,637,000
2	$28.3	$24,663,000	$3,636,000
4	$26.4	$23,338,000	$3,057,000
6	$25.1	$22,467,000	$2,644,000

T4-Scr & Dis — SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$14.4	$10,395,000	$3,972,000
1	$12.3	$8,860,000	$3,440,000
2	$12.3	$8,860,000	$3,440,000
4	$10.3	$7,446,000	$2,902,000
6	$9.0	$6,526,000	$2,520,000

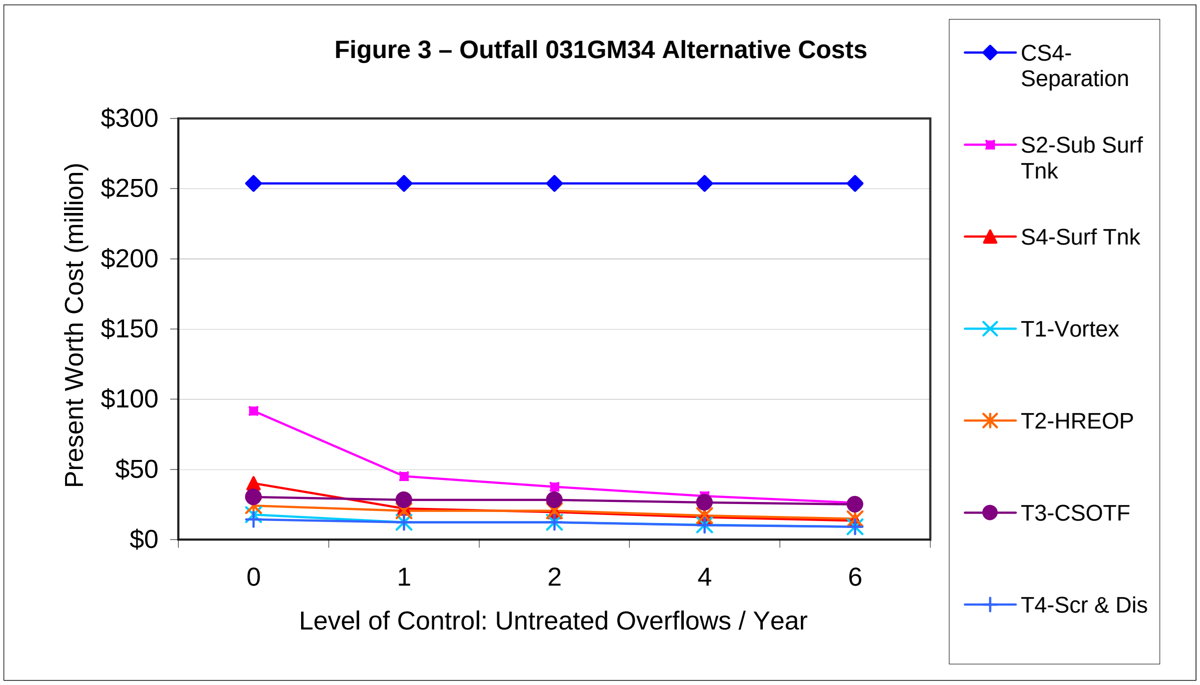


Figure 3 – Outfall 031GM34 Alternative Costs
Present Worth Cost (million)
$300
$250
$200
$150
$100
$50
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 031GM34
Location Name	Becks Run Road/E. Carson Street
Model ID	ADC 031GM34.1
Structure Type	Outfall
PWSA Sewershed	Becks Run
Stream of Discharge	Monongahela River
NPDES Permit Number	031GM34
Owner	ALCOSAN
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	54
Peak Volume:	2,740,077 ft^3
	20.50 MG
Total Volume:	13,470,710 ft^3
	100.77 MG
Peak Rate:	55.63 cfs

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/5/2005 1:00	5584	1/5/2005 14:40	2740076.95	20497.146	0	24.89	9
2/14/2005 6:15	2346	2/14/2005 20:05	1247325.34	9330.617	1	20.51	15
1/3/2005 9:10	1828	1/3/2005 17:35	1009609.66	7552.385	2	20.83	14
1/11/2005 8:55	1904	1/11/2005 11:35	992631.57	7425.380	3	25.30	7
4/1/2005 20:00	2798	4/2/2005 6:45	811607.08	6071.227	4	20.13	16
10/24/2005 12:35	2076	10/25/2005 3:55	760172.89	5686.473	5	12.93	30
11/29/2005 7:10	968	11/29/2005 11:05	665738.08	4980.054	6	27.08	6
3/28/2005 9:15	1505	3/28/2005 19:20	647728.21	4845.331	7	24.34	10
5/13/2005 22:45	1589	5/13/2005 23:50	516005.21	3859.977	8	30.87	5
2/20/2005 16:10	1633	2/20/2005 20:35	410641.34	3071.803	9	22.43	13
12/15/2005 11:50	817	12/15/2005 14:10	384159.05	2873.702	10	18.64	20
11/14/2005 22:25	625	11/15/2005 4:05	297914.76	2228.551	11	24.23	11
1/13/2005 23:10	1178	1/14/2005 2:35	297201.70	2223.217	12	13.88	26
3/23/2005 4:20	927	3/23/2005 12:45	233237.86	1744.736	13	14.93	25
8/20/2005 18:35	199	8/20/2005 18:55	210283.18	1573.023	14	55.63	0
5/28/2005 9:10	703	5/28/2005 9:35	159969.42	1196.651	15	19.99	17
11/16/2005 4:20	574	11/16/2005 4:25	153623.88	1149.183	16	12.67	31
2/16/2005 7:30	833	2/16/2005 8:15	147287.08	1101.781	17	13.65	28
7/5/2005 16:45	194	7/5/2005 17:00	143577.50	1074.031	18	44.38	1
2/9/2005 15:40	408	2/9/2005 16:55	141178.77	1056.088	19	17.80	22
10/7/2005 9:30	294	10/7/2005 10:55	127917.55	956.887	20	18.47	21
10/22/2005 6:35	764	10/22/2005 6:45	125526.36	939.000	21	35.79	3
5/11/2005 22:50	160	5/11/2005 23:00	107160.51	801.614	22	23.85	12
4/22/2005 16:30	335	4/22/2005 18:15	104127.83	778.928	23	13.83	27
9/29/2005 5:40	159	9/29/2005 5:50	97126.07	726.552	24	33.90	4
7/26/2005 20:00	118	7/26/2005 20:20	95245.82	712.486	25	44.37	2
10/21/2005 19:45	210	10/21/2005 22:05	84531.28	632.336	26	11.84	34
4/23/2005 4:10	574	4/23/2005 4:25	74112.11	554.396	27	19.12	18
11/1/2005 16:20	178	11/1/2005 16:35	70048.75	524.000	28	11.50	35
3/27/2005 17:15	231	3/27/2005 18:00	62505.83	467.575	29	12.29	33
8/29/2005 12:25	244	8/29/2005 13:50	62309.50	466.106	30	16.13	24
9/26/2005 7:25	269	9/26/2005 9:50	53647.13	401.307	31	9.65	37
5/23/2005 16:40	133	5/23/2005 16:55	48699.22	364.295	32	25.15	8

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
7/17/2005 16:35	115	7/17/2005 16:40	47579.75	355.920	33	17.73	23
12/25/2005 12:40	158	12/25/2005 13:10	44606.22	333.677	34	8.54	39
4/20/2005 20:05	264	4/20/2005 20:50	38059.17	284.702	35	4.93	42
8/8/2005 9:15	126	8/8/2005 9:30	35595.67	266.273	36	9.63	38
6/3/2005 9:00	119	6/3/2005 9:25	33897.35	253.569	37	10.45	36
5/20/2005 7:50	203	5/20/2005 9:05	33141.05	247.912	38	4.39	43
12/26/2005 7:20	338	12/26/2005 11:20	31090.34	232.571	39	3.08	46
9/16/2005 21:35	40	9/16/2005 21:45	24206.18	181.074	40	18.98	19
1/30/2005 13:20	118	1/30/2005 13:50	23829.16	178.254	41	6.69	40
6/11/2005 18:05	89	6/11/2005 18:15	19262.81	144.095	42	6.44	41
4/30/2005 6:50	74	4/30/2005 7:00	8619.25	64.476	43	4.10	44
7/21/2005 15:05	29	7/21/2005 15:10	8284.02	61.969	44	13.20	29
8/27/2005 15:35	25	8/27/2005 15:40	8155.06	61.004	45	12.58	32
11/24/2005 10:05	154	11/24/2005 12:05	6839.04	51.159	46	2.46	47
7/16/2005 12:05	64	7/16/2005 12:10	5851.45	43.772	47	2.23	48
6/14/2005 19:55	53	6/14/2005 20:00	5052.40	37.795	48	3.09	45
7/15/2005 18:30	64	7/15/2005 18:50	3900.52	29.178	49	1.75	51
3/8/2005 1:35	54	3/8/2005 2:00	3308.08	24.746	50	1.47	53
11/9/2005 20:15	48	11/9/2005 20:25	2953.97	22.097	51	1.83	50
5/7/2005 13:50	39	5/7/2005 14:00	2099.37	15.704	52	2.10	49
3/12/2005 12:35	28	3/12/2005 12:40	1452.03	10.862	53	1.57	52

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	ACSO 031GM34
Location Name	Becks Run Road/E. Carson Street
Model ID	ADC 031GM34.1
Structure Type	Outfall
PWSA Sewershed	Becks Run
Stream of Discharge	Monongahela River
NPDES Permit Number	031GM34
Owner	ALCOSAN

Results Summary

Number of Events:	54
Peak Volume:	2,740,077 ft^3
	20.50 MG
Total Volume:	13,470,710 ft^3
	100.77 MG
Peak Rate:	55.63 cfs

Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Figure 1 - Outfall 031GM34 CSO Volume

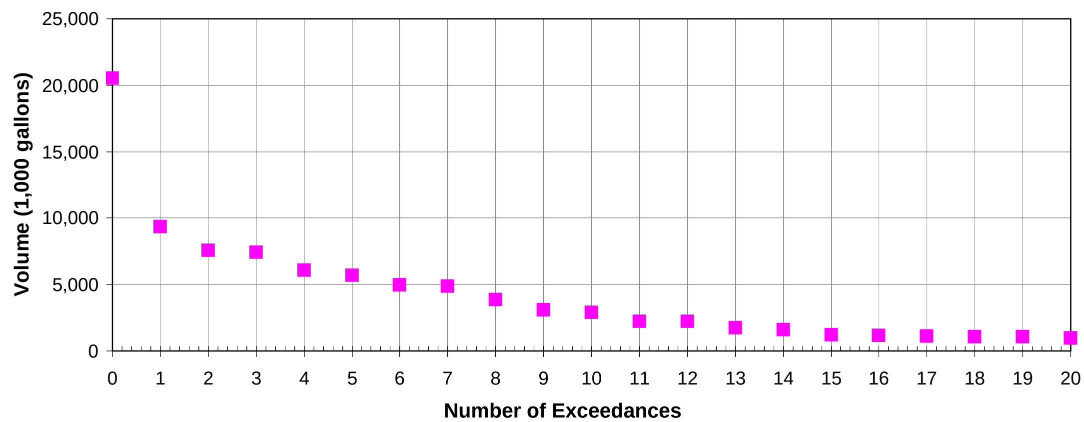
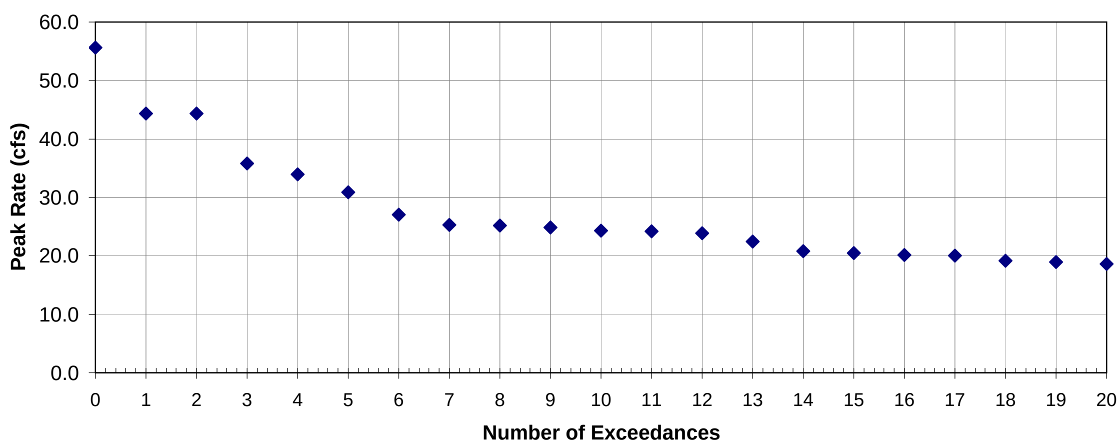


Figure 2 - Outfall 031GM34 CSO Peak Flow Rate



D.36.2 M-34 – BECKS RUN ROAD/EAST CARSON STREET – NPDES #031GM34

Description of Outfall

Outfall 031GM34 conveys overflows from the ALCOSAN diversion chamber M-34 to the Monongahela River. The outfall is located near the intersection of Becks Run Road and East Carson Street in the City of Pittsburgh. The Becks Run Sewershed consists of 1,635 acres of residential, business, and commercial users. The Becks Run Sewershed is comprised of approximately 1,350 manholes and 231,122 linear feet (43.8 miles) of sewer up to 48 inches in diameter. The sewershed is located in portions of Arlington, Arlington Heights, Carrick, Hays, Mount Oliver and St. Clair portions of the City and Baldwin Borough.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 031GM34 typically experiences 54 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 031GM34 is approximately 20.50 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 031GM34 is approximately 55.63 CFS. *Figure 1 – Outfall 031GM34 CSO Volume* and *Figure 2 – Outfall 031GM34 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

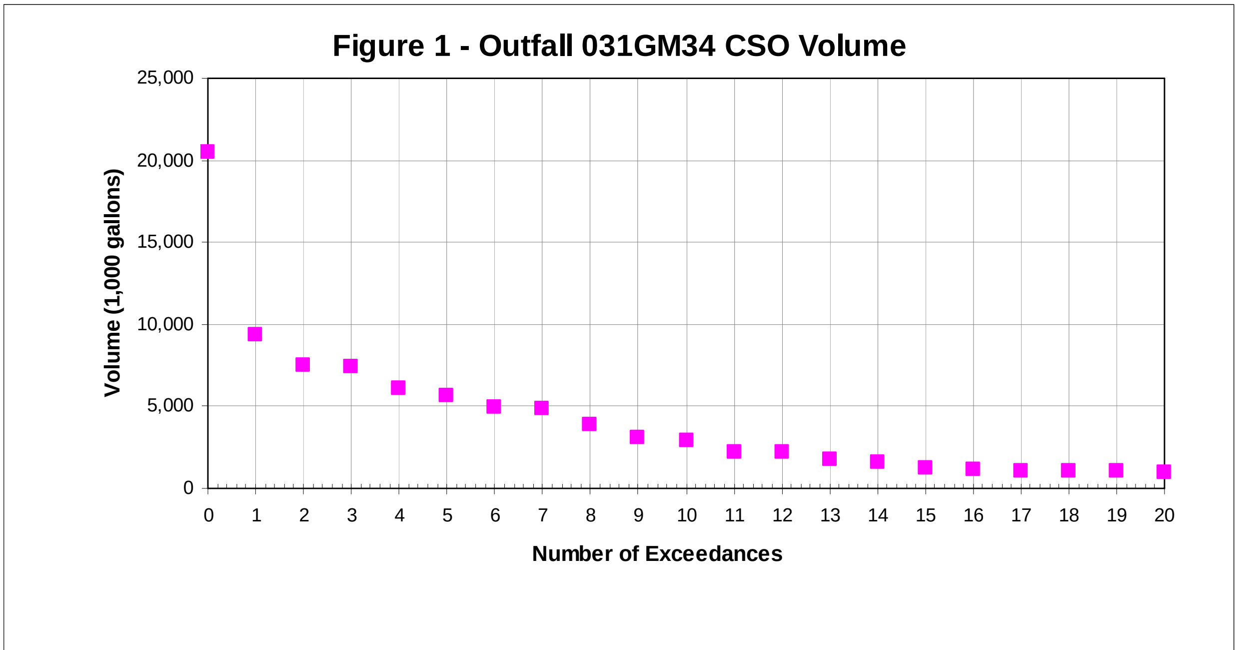


Figure 1 - Outfall 031GM34 CSO Volume
Volume (1,000 gallons)
25,000
20,000
15,000
10,000
5,000
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

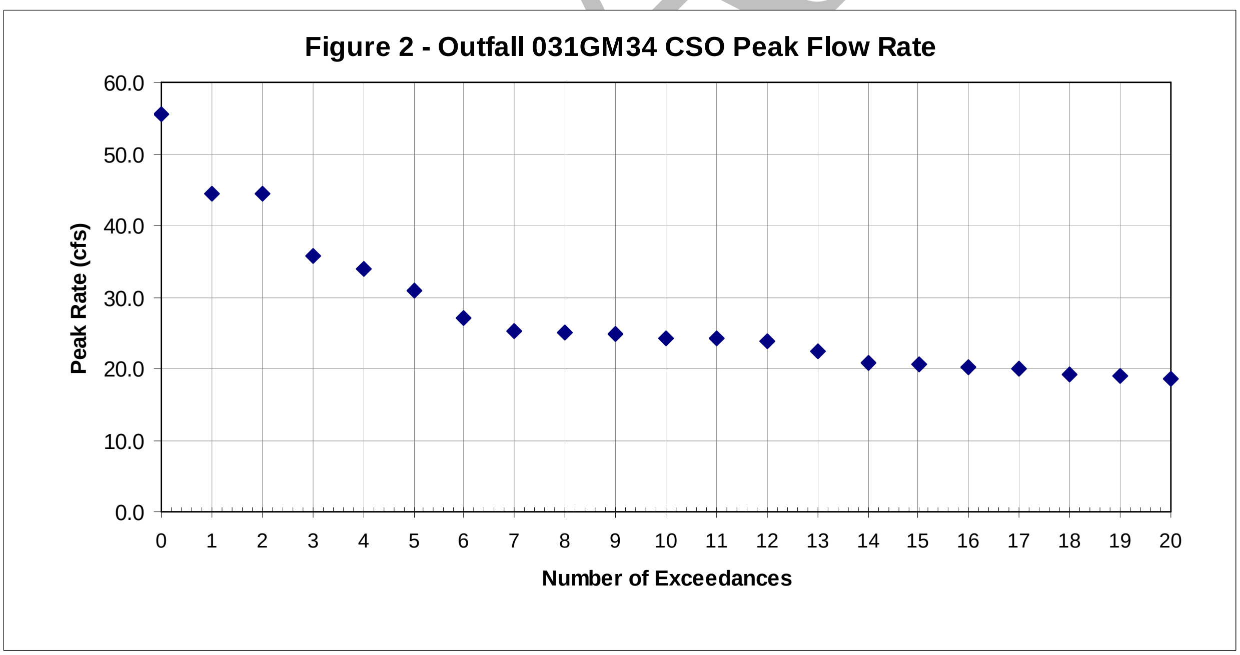


Figure 2 - Outfall 031GM34 CSO Peak Flow Rate
Peak Rate (cfs)
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

There appears to be limited available space for potential storage or treatment facilities between Carson Street and the Monongahela River. The site is generally bounded by the Monongahela River to the east, and existing vacant, steep lands to the north and south and Carson Street to the west.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 031GM34. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-031GM34: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-031GM34: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-031GM34: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-031GM34: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-031GM34: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-031GM34: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-031GM34: Screening and Disinfection

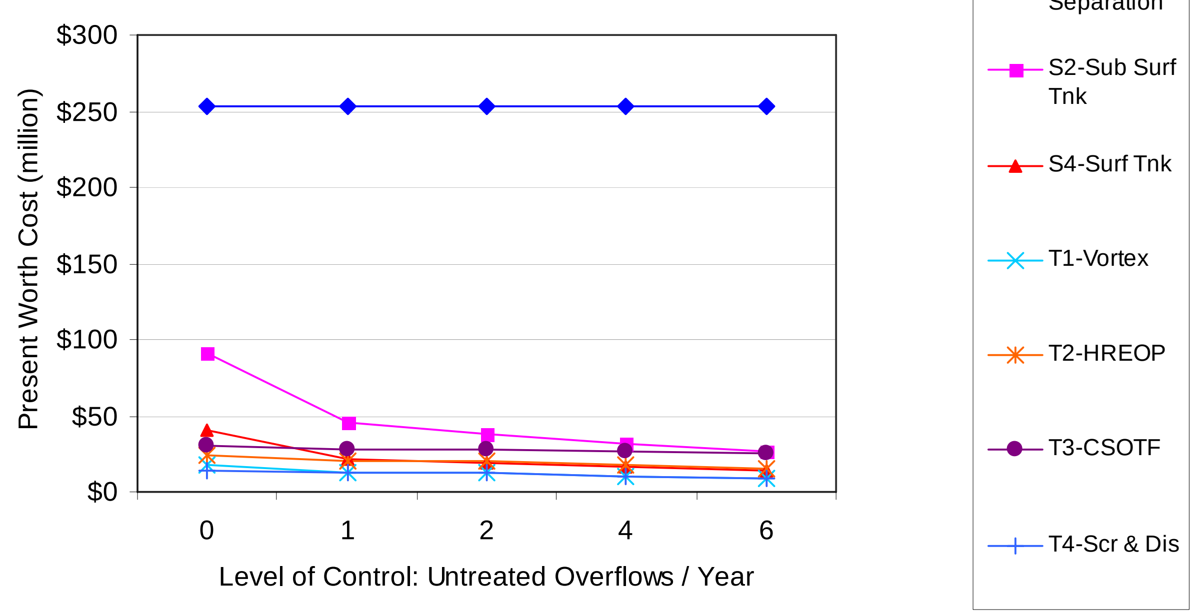
- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 031GM34 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 031GM34 Alternative Costs



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

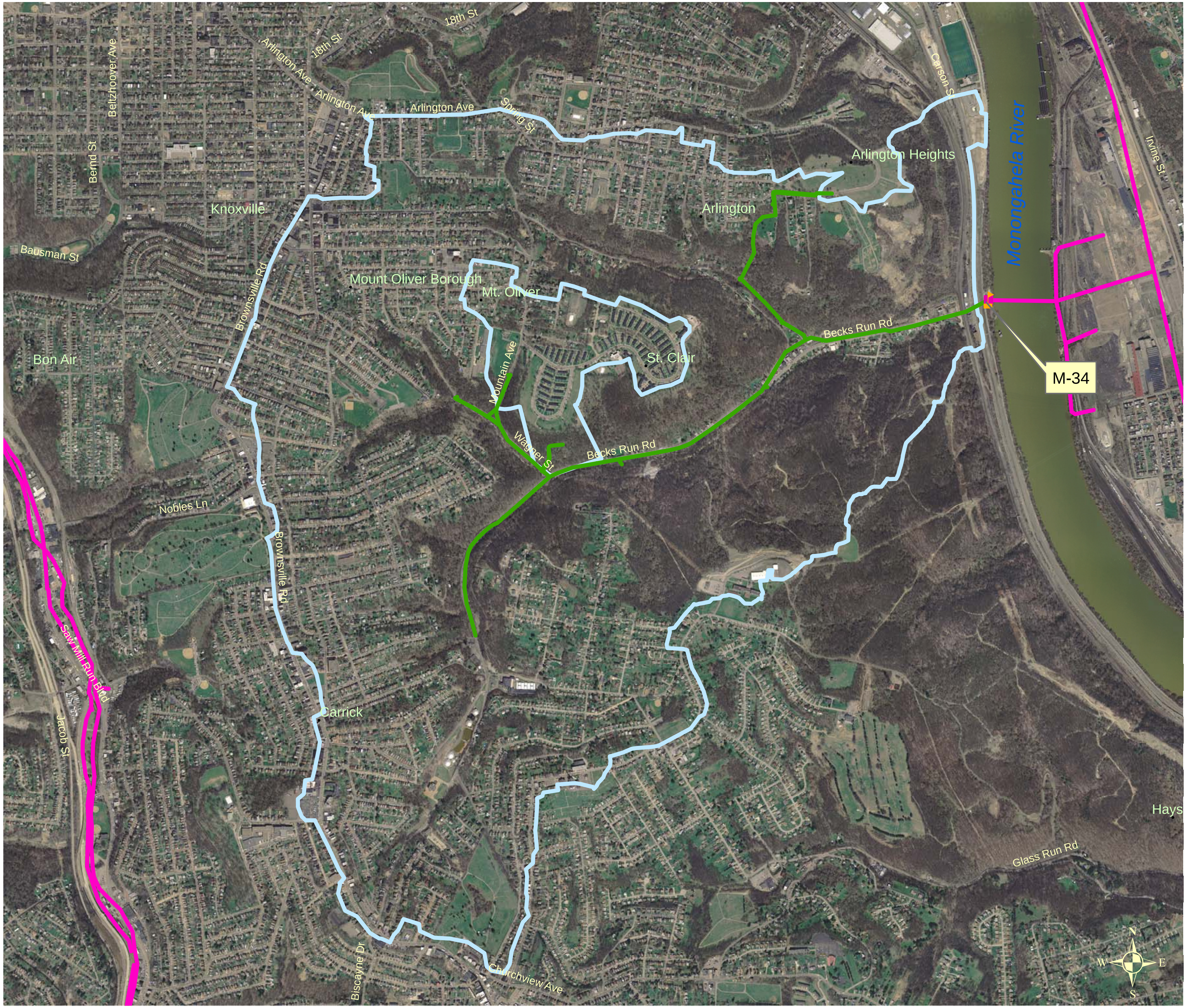
Recommendations

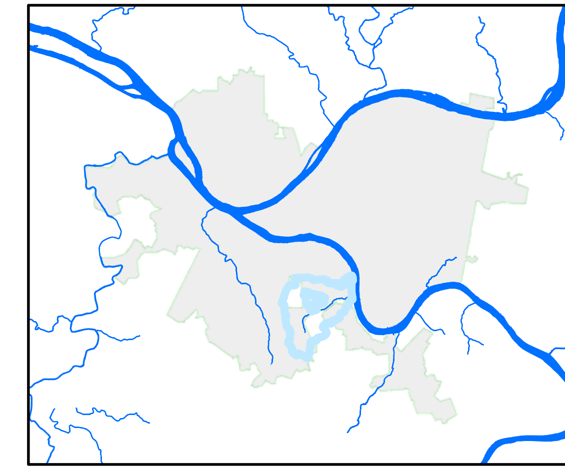
Based upon the above, for control level 0, it is recommended that Alternative T4-031GM34: Screening and Disinfection be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control levels 1 through 6, it is recommended that Alternative S4-031GM34: Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Property acquisition and use along the Monongahela River is limited. However, the outfall appears to be isolated with respect to the other PWSA outfalls in that outfall specific technology may be feasible.





Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

1,000 0 1,000
Feet

Attachment 1
M-34
Tributary Area Map
Becks Run
Sewershed

CSO Controls Alternatives

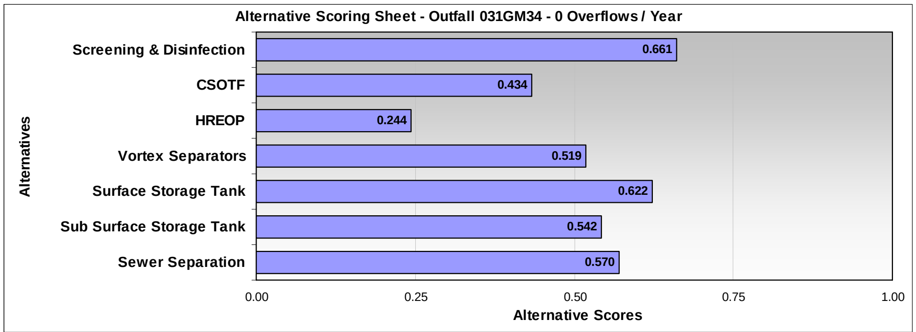
PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

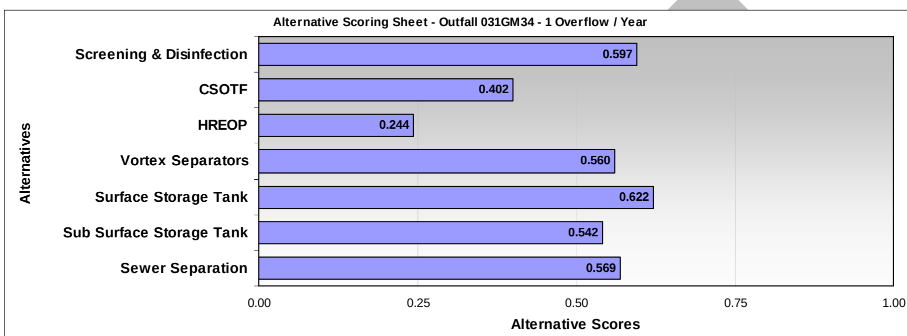
SW-D-0266.pdf

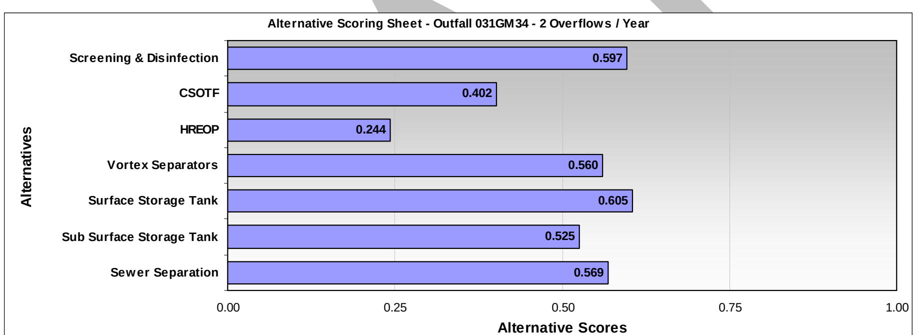
Attachment 2 - CSO Alternatives Development Worksheet

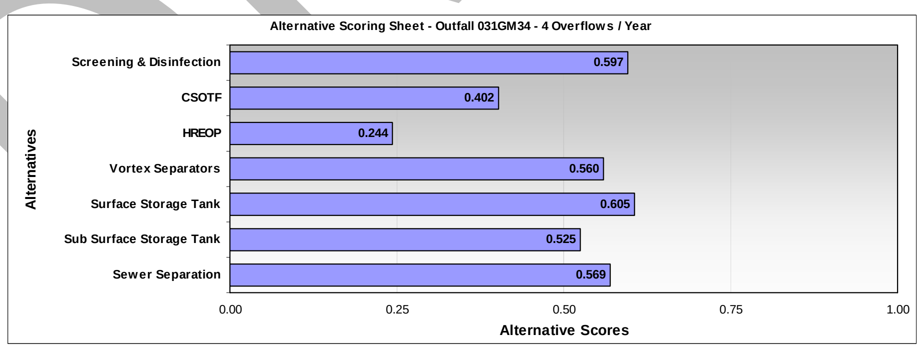
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only.
Sewer separation	Y	Sewer separation within the 1,681 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated for up to 55.38 CFS.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

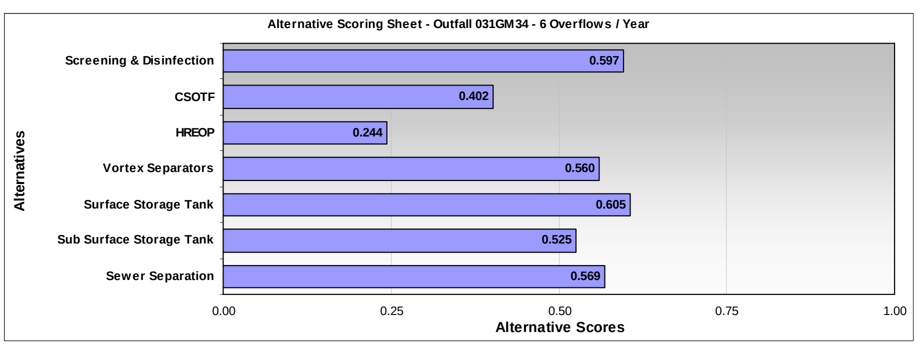
Attachment 3 – Alternative Scoring Sheet

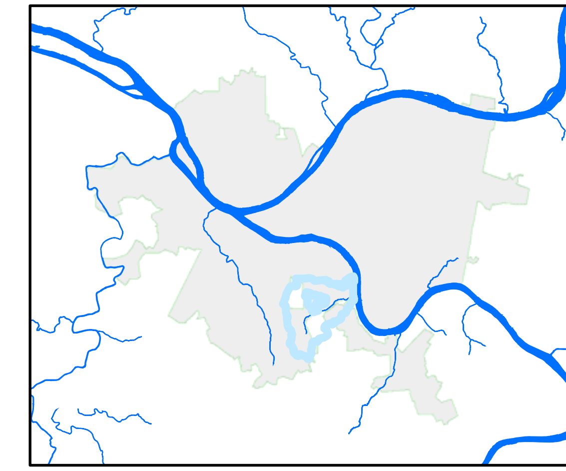












Area Overview

Legend

Sewershed Boundary
Facilities Boundary
ALCOSAN Interceptor
Trunk Sewer
ALCOSAN Diversion Structure
Combined Sewer Outfall

0 390 780
Feet

Attachment 4
M-34
Facilities Boundary Map
Becks Run
Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0266.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	4	4	4	4	4
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	2	2	2	2	2
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	3	3	3	3	3
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	2	2	2	2	2
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	2	2	2	2	2
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.					
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.	3	3	3	3	3
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	3	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T1-Vortex	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	3	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	3	3	3	3	3
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	2	2	2	2	2
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	2	2	2	2	2
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	1	1	1	1	1
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	2	2	2	2	2
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T3-CSOTF	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T3-CSOTF	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T3-CSOTF	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	2	2	2	2	2
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req’s	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req’s	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req’s	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	3	3	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	2	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	2	2	2	2	2
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	3	4	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.769**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.769**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.622**

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.622**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	4	0.75	0.040	0.030
Operating Complexity	5	1.01	0.078	0.079
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.622**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.632**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.632**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.615**

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.615**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.615**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.528**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.528**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.512**

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.512**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	2	0.15	0.062	0.009
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	4	0.82	0.078	0.064
Flexibility	2	0.25	0.053	0.013
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.512**

Total Score

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.431**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.505**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.642**

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.642**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.642**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	2	0.25	0.040	0.010
Operating Complexity	1	0.01	0.078	0.001
Flexibility	2	0.25	0.053	0.013
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.230**

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.348**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.348**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.412**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.412**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.476**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.361**

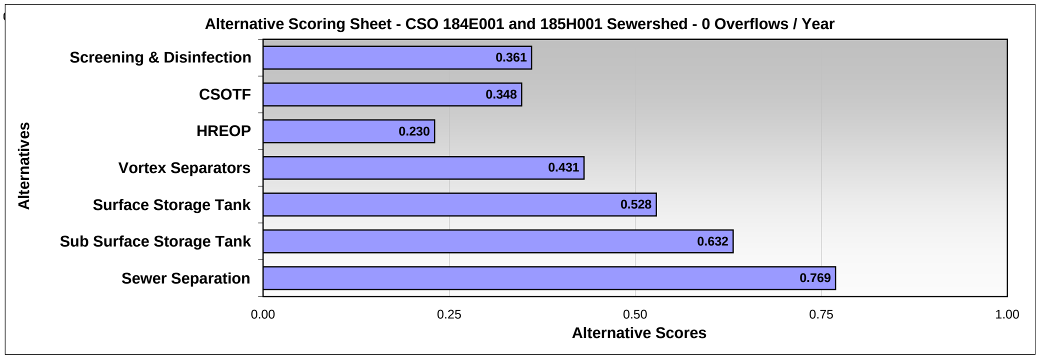
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.398**

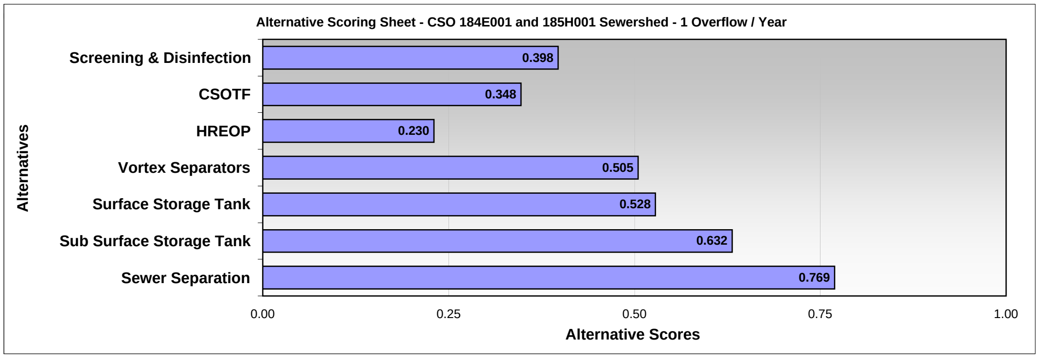
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.572**

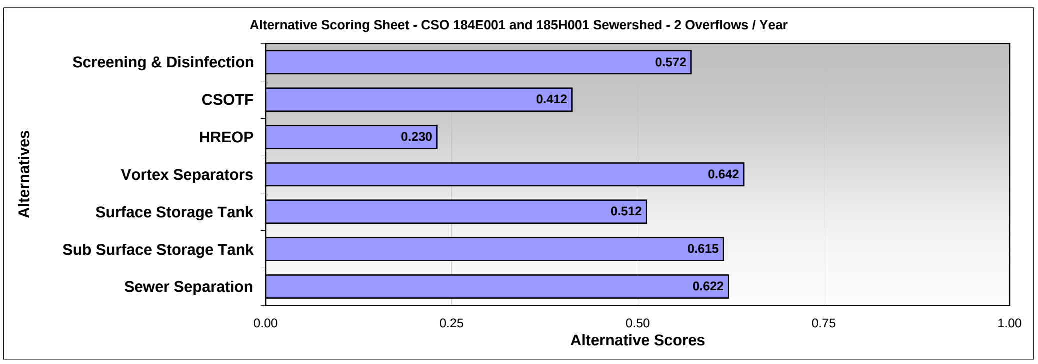
Total Score

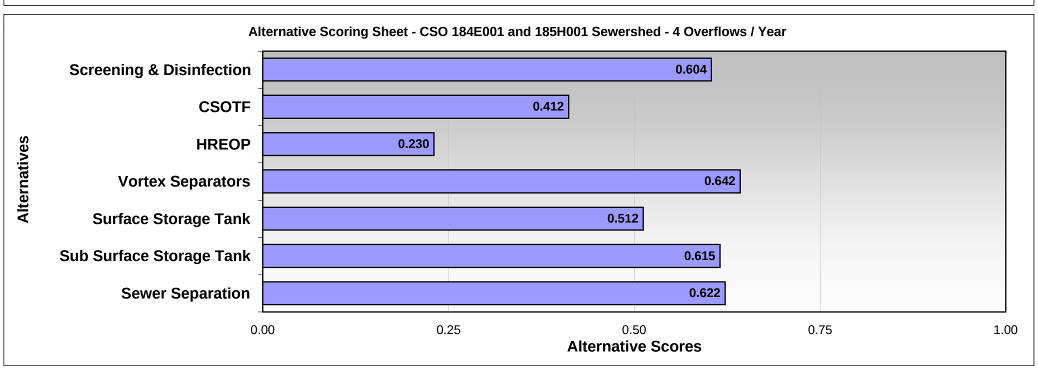
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.604**

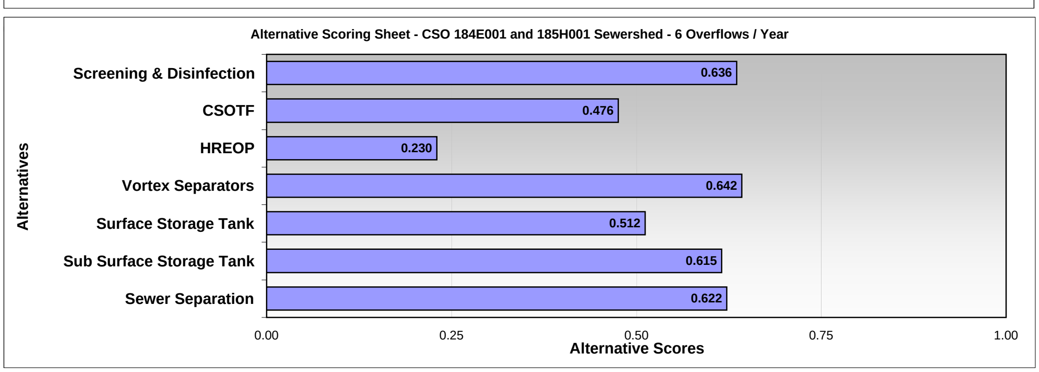
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	2	0.25	0.033	0.008
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.636**


Alternative Scoring Sheet - CSO 184E001 and 185H001 Sewershed - 0 Overflows / Year
Alternatives
Screening & Disinfection 0.361
CSOTF 0.348
HREOP 0.230
Vortex Separators 0.431
Surface Storage Tank 0.528
Sub Surface Storage Tank 0.632
Sewer Separation 0.769
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - CSO 184E001 and 185H001 Sewershed - 1 Overflow / Year
Alternatives
Screening & Disinfection 0.398
CSOTF 0.348
HREOP 0.230
Vortex Separators 0.505
Surface Storage Tank 0.528
Sub Surface Storage Tank 0.632
Sewer Separation 0.769
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - CSO 184E001 and 185H001 Sewershed - 2 Overflows / Year
Alternatives
Screening & Disinfection 0.572
CSOTF 0.412
HREOP 0.230
Vortex Separators 0.642
Surface Storage Tank 0.512
Sub Surface Storage Tank 0.615
Sewer Separation 0.622
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - CSO 184E001 and 185H001 Sewershed - 4 Overflows / Year
Alternatives
Screening & Disinfection 0.604
CSOTF 0.412
HREOP 0.230
Vortex Separators 0.642
Surface Storage Tank 0.512
Sub Surface Storage Tank 0.615
Sewer Separation 0.622
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - CSO 184E001 and 185H001 Sewershed - 6 Overflows / Year
Alternatives
Screening & Disinfection 0.636
CSOTF 0.476
HREOP 0.230
Vortex Separators 0.642
Surface Storage Tank 0.512
Sub Surface Storage Tank 0.615
Sewer Separation 0.622
0.00 0.25 0.50 0.75 1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	0	
Peak Volume	80,626	CF
	0.60	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	46.25	CFS
	29.89	MGD

Capital Costs - CSO 184E001 and 185H001 Region			
CONSOLIDATION SEWERS			
0 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		441	Input by Engineer
Peak Flow (CFS)		11.56	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		23.13	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		34.69	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Peak Flow (CFS)		46.25	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Construction Cost (Consolidation Sewers)	**$**	**322,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections			Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections			Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)			Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 437,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	0	
Peak Volume	80,626	CF
	0.60	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	46.25	CFS
	29.89	MGD

Capital Costs - CSO 184E001 and 185H001 Region				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		57		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**8,550,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		24,829		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST	**$ 8,639,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	0	
Peak Volume	80,626	CF
	0.60	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	46.25	CFS
	29.89	MGD

Capital Costs - CSO 184E001 and 185H001 Region			
SURFACE STORAGE TANK			
0 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.60	81,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.71	95,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	Sufficient Depth	Ref: Tech Par, Rev as Req'd
Length (Ft)	98		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	66		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.73	97,020	Sufficient Volume
Tank Area (SF)	6,000		= Length x Width
Construction Cost (Storage Tank)	**543,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	2		Typ 1, Rev as Req'd Ref: Tech Par
Influent Pumping Rate (MGD / CFS)	29.89	46.25	= Peak Rate
Force Main Diameter (In)	38		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 5,298,000**	**$ 46,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	46.25		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)			Input by Engineer
Depth (Ft)			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$ -**	**$ 437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	143,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	720		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$ 71,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	29.89		Ref: CSO Statistics
Construction Cost (Screening)	**$ 1,796,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	0.60		Ref: CSO Statistics
Dewatering Time (Days)	2		Typ 2, Rev as Req'd
Dewatering Pumping Rate (MGD)	0.30		= Peak Vol/DW Time
Construction Cost	**$ 8,146,373**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$ 299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	28,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 56,000**		
		TOTAL CAPITAL COST	**$ 16,692,373**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	0	
Peak Volume	80,626	CF
	0.60	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	46.25	CFS
	29.89	MGD

Capital Costs - CSO 184E001 and 185H001 Region			
SUB-SURFACE STORAGE TANK			
0 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.60	81,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.71	95,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)	98		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	66		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.73	97,020	**Sufficient Volume**
Tank Area (SF)	6,000		= Length x Width
Construction Cost (Storage Tank)	**2,771,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.30	0.47	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	4		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main)	**$ 541,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	46.25		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)			Input by Engineer
Depth (Ft)			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$ -**	**$ 437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	143,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	7,150		= ACH x Volume / 60
Construction Cost (Odor Control)	**$ 428,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	29.89		Ref: CSO Statistics
Construction Cost (Screening)	**$ 1,796,000**		
6. Stored Volume Treatment			
Volume Requiring Treatment (MG)	0.60		Ref: CSO Statistics
Dewatering Time (Days)	2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)	0.30		= Peak Vol/DW Time
Construction Cost	**$ 8,146,373**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$ 299,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	28,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost	**$ 56,000**		
		TOTAL CAPITAL COST	**$ 14,488,373**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	0	
Peak Volume	80,626	CF
	0.60	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	46.25	CFS
	29.89	MGD

Capital Costs - CSO 184E001 and 185H001 Region				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
0 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		29.89	46.25	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		4		
Construction Cost (Swirl / Vortex)	**$**	**2,407,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		16.44	25.44	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		28		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,657,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		46.25		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)				Input by Engineer
Depth (Ft)				Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		115,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		5,750		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**361,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		29.89		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,796,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		16.44		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		64	31	
Passes / Detention (Min)		3	**15.60**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**676,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		31,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**62,000**		
			TOTAL CAPITAL COST	**$ 9,731,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	0	
Peak Volume	80,626	CF
	0.60	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	46.25	CFS
	29.89	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SEDIMENTATION BASIN (CSOTF)					
0 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		29.89		46.25	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		5,000			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		101		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		51		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.46		61,812	
Construction Cost (CSOTF)	**$**	**16,371,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		29.89		46.25	= Peak Rate
Force Main Diameter (In)		38			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,298,000**	**$**	**46,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.25			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		93,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,650			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**305,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		29.89			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,796,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		29.89			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		86		41	
Passes / Detention (Min)		3		15.25	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**932,000**			
7. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.46			Sed Basin Volume
Dewatering Time (Days)		2			Typ 2, Rev as Req'd
Dewatering Pumping Rate (MGD)		0.23			= Peak Vol/DW Time
Construction Cost	**$**	**8,112,215**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
9. Land Acquisition Parameters					
Land Required - CSOTF (SF)		17,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**34,000**			
				TOTAL CAPITAL COST $	**33,630,215**

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RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	0	
Peak Volume	80,626	CF
	0.60	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	46.25	CFS
	29.89	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
0 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		29.89		46.25	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		360			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		28		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		14		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**5,954,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		32.88		50.88	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		39			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,663,000**	**$**	**47,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.25			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**49,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		29.89			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,796,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		32.88			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		90		43	
Passes / Detention (Min)		3		**15.21**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	987,000	$	861,000	
Construction Cost (Disinfection)	**$**	**1,848,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		36,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**72,000**			
			TOTAL CAPITAL COST	**$**	**16,165,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	0	
Peak Volume	80,626	CF
	0.60	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	46.25	CFS
	29.89	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		29.89		46.25	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,796,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		29.89		46.25	= Peak Flow x % Req Pump
Force Main Diameter (In)		38			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**5,298,000**	**$**	**46,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		46.25			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)					Input by Engineer
Depth (Ft)					Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		9,300			=CFS x 200
Odor Control Flow Rate (CFM)		470			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**51,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		29.89			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		86		41	
Passes / Detention (Min)		3		**15.25**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	932,000	$	808,000	
Construction Cost (Disinfection)	**$**	**1,740,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		26,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**			
				TOTAL CAPITAL COST $	**9,719,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	1	
Peak Volume	34,702	CF
	0.26	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	37.32	CFS
	24.12	MGD

Capital Costs - CSO 184E001 and 185H001 Region			
CONSOLIDATION SEWERS			
1 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		441	Width of Sewershed along Riverline
Peak Flow (CFS)		11.56	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		23.13	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		34.69	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Peak Flow (CFS)		46.25	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Construction Cost (Consolidation Sewers)	**$**	**322,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 437,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	1	
Peak Volume	34,702	CF
	0.26	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	37.32	CFS
	24.12	MGD

Capital Costs - CSO 184E001 and 185H001 Region				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		57		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**8,550,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		24,829		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**8,600,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	1	
Peak Volume	34,702	CF
	0.26	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	37.32	CFS
	24.12	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.26		35,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.31		41,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		65			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		44			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.32		42,900	**Sufficient Volume**
Tank Area (SF)		3,000			= Length x Width
Construction Cost (Storage Tank)		**217,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		24.12		37.32	= Peak Rate
Force Main Diameter (In)		34			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,594,000**	**$**	**42,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		37.32			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		62,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		310			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**37,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		24.12			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,529,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.26			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.13			= Peak Vol/DW Time
Construction Cost	**$**	**8,062,998**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		23,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**15,263,998**

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RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	1	
Peak Volume	34,702	CF
	0.26	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	37.32	CFS
	24.12	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SUB-SURFACE STORAGE TANK					
1 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.26		35,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.31		41,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		65			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		44			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.32		42,900	**Sufficient Volume**
Tank Area (SF)		3,000			= Length x Width
Construction Cost (Storage Tank)		**1,713,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.13		0.20	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		9.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**395,000**	**$**	**13,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		37.32			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		62,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**222,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		24.12			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,529,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.26			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.13			= Peak Vol/DW Time
Construction Cost	**$**	**8,062,998**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		23,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 12,716,998**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	1	
Peak Volume	34,702	CF
	0.26	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	37.32	CFS
	24.12	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
1 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		24.12		37.32	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		3			
Construction Cost (Swirl / Vortex)	**$**	**2,111,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		13.27		20.53	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		25			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,270,000**	**$**	**33,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		37.32			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		87,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		4,350			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**290,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		24.12			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,529,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		13.27			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		58		28	
Passes		3		15.82	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**612,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		25,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST	**$ 8,631,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	1	
Peak Volume	34,702	CF
	0.26	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	37.32	CFS
	24.12	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SEDIMENTATION BASIN (CSOTF)					
1 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		24.12		37.32	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		4,100			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		92		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		46		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.38		50,784	
Construction Cost (CSOTF)	**$**	**16,371,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		24.12		37.32	= Peak Rate
Force Main Diameter (In)		34			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,594,000**	**$**	**42,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		37.32			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		76,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,800			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**261,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		24.12			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,529,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		24.12			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		77		37	
Passes		3		**15.27**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**824,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.26			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.13			= Peak Vol/DW Time
Construction Cost	**$**	**8,062,998**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		15,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**30,000**			
			TOTAL CAPITAL COST	**$**	**32,449,998**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	1	
Peak Volume	34,702	CF
	0.26	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	37.32	CFS
	24.12	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		24.12		37.32	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		290			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		25		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		13		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**5,022,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		26.53		41.05	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		35			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,888,000**	**$**	**43,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		37.32			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		24.12			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,529,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		26.53			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		81		39	
Passes		3		**15.39**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	870,000	$	750,000	
Construction Cost (Disinfection)	**$**	**1,620,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		33,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**66,000**			
			TOTAL CAPITAL COST	**$**	**13,949,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	1	
Peak Volume	34,702	CF
	0.26	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	37.32	CFS
	24.12	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SCREENING AND DISINFECTION					
1 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		24.12		37.32	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,529,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		24.12		37.32	= Peak Flow x % Req Pump
Force Main Diameter (In)		34			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,594,000**	**$**	**42,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		37.32			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,500			=CFS x 200
Odor Control Flow Rate (CFM)		380			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**43,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		24.12			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		77		37	
Passes		3		**15.27**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	824,000	$	700,000	
Construction Cost (Disinfection)	**$**	**1,524,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		25,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST	**$ 8,518,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	2	
Peak Volume	33,216	CF
	0.25	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	5.68	CFS
	3.67	MGD

Capital Costs - CSO 184E001 and 185H001 Region

CONSOLIDATION SEWERS

2 Overflows / Year

1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		750	Width of Sewershed along Riverline
Peak Flow (CFS)		11.56	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		23.13	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		34.69	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Peak Flow (CFS)		46.25	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Construction Cost (Consolidation Sewers)	**$**	**322,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 437,000**

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RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	2	
Peak Volume	33,216	CF
	0.25	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	5.68	CFS
	3.67	MGD

Capital Costs - CSO 184E001 and 185H001 Region				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		57		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**8,550,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		24,829		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST	**$ 8,600,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	2	
Peak Volume	33,216	CF
	0.25	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	5.68	CFS
	3.67	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.25		33,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.29		39,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		63			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		43			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.30		40,635	**Sufficient Volume**
Tank Area (SF)		3,000			= Length x Width
Construction Cost (Storage Tank)		**207,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		3.67		5.68	= Peak Rate
Force Main Diameter (In)		13			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,997,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.68			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		59,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		300			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**36,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.67			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**582,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.25			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.12			= Peak Vol/DW Time
Construction Cost	**$**	**8,060,299**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		23,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 11,686,299**

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RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	2	
Peak Volume	33,216	CF
	0.25	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	5.68	CFS
	3.67	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SUB-SURFACE STORAGE TANK					
2 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.25		33,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.29		39,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		63			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		43			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.30		40,635	**Sufficient Volume**
Tank Area (SF)		3,000			= Length x Width
Construction Cost (Storage Tank)		**1,679,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.12		0.19	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		2			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		8.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**390,000**	**$**	**13,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.68			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		59,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,950			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**214,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.67			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**582,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.25			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.12			= Peak Vol/DW Time
Construction Cost	**$**	**8,060,299**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		23,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST **$**	**11,720,299**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	2	
Peak Volume	33,216	CF
	0.25	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	5.68	CFS
	3.67	MGD

Capital Costs - CSO 184E001 and 185H001 Region				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
2 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		3.67	5.68	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		1		
Construction Cost (Swirl / Vortex)	**$**	**668,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.02	3.12	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		10		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.7	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,713,000**	**$ 19,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		5.68		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		1,450		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**122,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.67		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**582,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		2.02		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		23	11	
Passes		3	**16.20**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**380,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		4,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**8,000**		
			TOTAL CAPITAL COST	**$ 4,228,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	2	
Peak Volume	33,216	CF
	0.25	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	5.68	CFS
	3.67	MGD

Capital Costs - CSO 184E001 and 185H001 Region				
SEDIMENTATION BASIN (CSOTF)				
2 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		3.67	5.68	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		38	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		19	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.06	8,664	
Construction Cost (CSOTF)	**$**	**16,392,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		2		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		3.67	5.68	= Peak Rate
Force Main Diameter (In)		13		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,997,000**	**$ 22,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		5.68		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-		Input by Engineer
Depth (Ft)		-		Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$ 437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		13,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		650		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**65,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.67		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**582,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		3.67		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		31	15	
Passes		3	**16.38**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**415,000**		
6. Stored Volume Treatment				
Volume Requiring Treatment (MG)		0.25		Sed Basin Volume
Dewatering Time (Days)		2		**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.12		= Peak Vol/DW Time
Construction Cost	**$**	**8,060,299**		
8. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		6,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**		
			TOTAL CAPITAL COST	**$ 28,281,299**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	2	
Peak Volume	33,216	CF
	0.25	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	5.68	CFS
	3.67	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		3.67		5.68	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		50			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		11		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		6		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**1,775,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		4.04		6.25	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		14			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,056,000**	**$**	**23,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.68			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		100			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		3.67			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**582,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		4.04			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		32		16	
Passes		3		**16.39**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	423,000	$	270,000	
Construction Cost (Disinfection)	**$**	**693,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		23,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 5,926,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	2	
Peak Volume	33,216	CF
	0.25	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	5.68	CFS
	3.67	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		3.67		5.68	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**582,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		3.67		5.68	= Peak Flow x % Req Pump
Force Main Diameter (In)		13			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,997,000**	**$**	**22,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		5.68			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,100			=CFS x 200
Odor Control Flow Rate (CFM)		60			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**10,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		3.67			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		31		15	
Passes		3		**16.38**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	415,000	$	260,000	
Construction Cost (Disinfection)	**$**	**675,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 4,068,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	4	
Peak Volume	5,845	CF
	0.04	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	3.06	CFS
	1.98	MGD

Capital Costs - CSO 184E001 and 185H001 Region			
CONSOLIDATION SEWERS			
4 Overflows / Year			
1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		441	Width of Sewershed along Riverline
Peak Flow (CFS)		11.56	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		23.13	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		34.69	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Peak Flow (CFS)		46.25	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Construction Cost (Consolidation Sewers)	**$**	**322,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST $	**437,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	4	
Peak Volume	5,845	CF
	0.04	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	3.06	CFS
	1.98	MGD

Capital Costs - CSO 184E001 and 185H001 Region				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		57		Typ 0, Rev as Req'd
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**8,550,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		24,829		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**8,600,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	4	
Peak Volume	5,845	CF
	0.04	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	3.06	CFS
	1.98	MGD

Capital Costs - CSO 184E001 and 185H001 Region

SURFACE STORAGE TANK

4 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.04		6,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.05		7,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		27			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		19			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.06		7,695	**Sufficient Volume**
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**31,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		1.98		3.06	= Peak Rate
Force Main Diameter (In)		10			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,705,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.06			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		11,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		60			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**10,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.98			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**504,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.04			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,010,610**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
			TOTAL CAPITAL COST	**$**	**11,055,610**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	4	
Peak Volume	5,845	CF
	0.04	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	3.06	CFS
	1.98	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SUB-SURFACE STORAGE TANK					
4 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.04		6,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.05		7,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		Sufficient Depth	Ref: Tech Par, Rev as Req'd
Length (Ft)		27			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		19			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.06		7,695	Sufficient Volume
Tank Area (SF)		1,000			= Length x Width
Construction Cost (Storage Tank)		**1,049,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.02		0.03	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		1			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**303,000**	**$**	**12,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.06			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		11,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		550			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**57,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		1.98			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**504,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.04			Ref: CSO Statistics
Dewatering Time (Days)		2			Typ 2, Rev as Req'd
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,010,610**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
			TOTAL CAPITAL COST	**$**	**10,711,610**

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RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	4	
Peak Volume	5,845	CF
	0.04	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	3.06	CFS
	1.98	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.98		3.06	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		1			
Construction Cost (Swirl / Vortex)	**$**	**458,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.09		1.68	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		7			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,210,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.06			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		1,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**122,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.98			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**504,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		1.09			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		17		8	
Passes		3		**16.15**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**361,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		2,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**4,000**			
			TOTAL CAPITAL COST	**$**	**3,412,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	4	
Peak Volume	5,845	CF
	0.04	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	3.06	CFS
	1.98	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SEDIMENTATION BASIN (CSOTF)					
4 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.98		3.06	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		400			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		29		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		15		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.04		5,220	
Construction Cost (CSOTF)	**$**	**16,395,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.98		3.06	= Peak Rate
Force Main Diameter (In)		10			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,705,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.06			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.98			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**504,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		1.98			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		23		11	
Passes		3		**16.53**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**379,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.04			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,010,610**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		6,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**12,000**			
			TOTAL CAPITAL COST	**$**	**27,805,610**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	4	
Peak Volume	5,845	CF
	0.04	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	3.06	CFS
	1.98	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
4 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.98		3.06	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		30			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		9		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		4		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**1,510,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		2.18		3.37	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		10			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,741,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.06			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.98			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**504,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		2.18			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		24		12	
Passes		3		**17.10**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	384,000	$	213,000	
Construction Cost (Disinfection)	**$**	**597,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		23,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 5,162,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	4	
Peak Volume	5,845	CF
	0.04	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	3.06	CFS
	1.98	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		1.98		3.06	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**504,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		1.98		3.06	= Peak Flow x % Req Pump
Force Main Diameter (In)		10			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,705,000**	**$**	**19,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		3.06			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		600			=CFS x 200
Odor Control Flow Rate (CFM)		30			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**6,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		1.98			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		23		11	
Passes		3		**16.53**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	379,000	$	205,000	
Construction Cost (Disinfection)	**$**	**584,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 3,600,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	6	
Peak Volume	4,063	CF
	0.03	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	1.59	CFS
	1.03	MGD

Capital Costs - CSO 184E001 and 185H001 Region

CONSOLIDATION SEWERS

6 Overflows / Year

1. Consolidation Sewer Parameters			
Total Consolidation Pipe (Ft)		441	Width of Sewershed along Riverline
Peak Flow (CFS)		11.56	25% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		23.13	50% of Peak Flow Rate
Diameter (In)		36	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	69,000	
Peak Flow (CFS)		34.69	75% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Peak Flow (CFS)		46.25	100% of Peak Flow Rate
Diameter (In)		48	<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		110	25% of Total Length
Depth (Ft)		20	Input by Engineer
Subtotal	$	92,000	
Construction Cost (Consolidation Sewers)	**$**	**322,000**	
2. Interceptor Connection Parameters			
Diameter (In)		24	
Number Connections		-	Input by Engineer, Total 8"-24" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		48	
Number Connections		1	Input by Engineer, Total 25"-48" Connx
Subtotal	$	115,000	Ref: Technical Parameters
Diameter (In)		72	
Number Connections		-	Input by Engineer, Total 49"-72" Connx
Subtotal	$	-	Ref: Technical Parameters
Diameter (In)		120	
Number Connections		-	Input by Engineer, Total >73" Connx
Subtotal	$	-	Ref: Technical Parameters
Construction Cost (Interceptor Connx)	**$**	**115,000**	
3. Land Acquisition Parameters			
Land Acquisition - Consolidation Sewers (SF)		0	Input by Engineer
Land Required Cost ($ / SF)	$	2	Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**	
		TOTAL CAPITAL COST	**$ 437,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	6	
Peak Volume	4,063	CF
	0.03	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	1.59	CFS
	1.03	MGD

Capital Costs - CSO 184E001 and 185H001 Region				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		57		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**8,550,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators				Input by Engr-Typ=# Regs in Region
Construction Cost (Regulators)	**$**	**-**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		24,829		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**8,600,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	6	
Peak Volume	4,063	CF
	0.03	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	1.59	CFS
	1.03	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SURFACE STORAGE TANK					
6 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.03		4,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.04		5,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		23			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		16			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.04		5,520	**Sufficient Volume**
Tank Area (SF)		0			= Length x Width
Construction Cost (Storage Tank)		**21,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		1.03		1.59	= Peak Rate
Force Main Diameter (In)		7			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,161,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.59			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		40			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**7,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.03			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**460,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.03			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,007,375**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
			TOTAL CAPITAL COST	**$**	**10,449,375**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	6	
Peak Volume	4,063	CF
	0.03	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	1.59	CFS
	1.03	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SUB-SURFACE STORAGE TANK					
6 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.03		4,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.04		5,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Par, Rev as Req'd**
Length (Ft)		23			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		16			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.04		5,520	**Sufficient Volume**
Tank Area (SF)		0			= Length x Width
Construction Cost (Storage Tank)		**1,008,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.02		0.02	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		1			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		4.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**297,000**	**$**	**12,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.59			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		8,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		400			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**45,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.03			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**460,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.03			Ref: CSO Statistics
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,007,375**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		20,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**40,000**			
				TOTAL CAPITAL COST	**$ 10,605,375**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	6	
Peak Volume	4,063	CF
	0.03	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	1.59	CFS
	1.03	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
6 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.03		1.59	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		1			
Construction Cost (Swirl / Vortex)	**$**	**308,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.57		0.88	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.4		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**766,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.59			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		29,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		1,450			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**122,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.03			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**460,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.57			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		13		6	
Passes		3		**17.79**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**349,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		1,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**2,000**			
			TOTAL CAPITAL COST	**$**	**2,758,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	6	
Peak Volume	4,063	CF
	0.03	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	1.59	CFS
	1.03	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SEDIMENTATION BASIN (CSOTF)					
6 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.03		1.59	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		200			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		11		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.02		2,772	
Construction Cost (CSOTF)	**$**	**16,398,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		2			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.03		1.59	= Peak Rate
Force Main Diameter (In)		7			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,161,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.59			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.03			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**460,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		1.03			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		17		8	
Passes		3		**17.06**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**359,000**			
6. Stored Volume Treatment					
Volume Requiring Treatment (MG)		0.03			Sed Basin Volume
Dewatering Time (Days)		2			**Typ 2, Rev as Req'd**
Dewatering Pumping Rate (MGD)		0.02			= Peak Vol/DW Time
Construction Cost	**$**	**8,007,375**			
8. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		5,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**			
			TOTAL CAPITAL COST	**$**	**27,174,375**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	6	
Peak Volume	4,063	CF
	0.03	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	1.59	CFS
	1.03	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.03		1.59	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		20			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		7		**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		4		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			**Typ 12, Rev as Req'd**
Construction Cost (HREOP)	**$**	**1,362,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.13		1.75	= Peak Flow / DW Time x % Req Pump
Force Main Diameter (In)		7			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,248,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.59			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		1.03			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**460,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		1.13			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		18		8	
Passes		3		**16.42**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	361,000	$	171,000	
Construction Cost (Disinfection)	**$**	**532,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		22,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
			TOTAL CAPITAL COST	**$**	**4,408,000**

RESULTS SUMMARY		
Number of Events / Year	51	
Number of Overflows / Year	6	
Peak Volume	4,063	CF
	0.03	MG
Total Volume	200,959	CF
	1.50	MG
Peak Rate	1.59	CFS
	1.03	MGD

Capital Costs - CSO 184E001 and 185H001 Region					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		1.03		1.59	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**460,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		1.03		1.59	= Peak Flow x % Req Pump
Force Main Diameter (In)		7			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,161,000**	**$**	**17,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.59			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		-			Input by Engineer
Depth (Ft)		-			Input by Engineer
Construction Cost (Local / Cnsldn Pipe)	**$**	**-**	**$**	**437,000**	Ancillary pipe / Pipe to connect outfalls
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		300			=CFS x 200
Odor Control Flow Rate (CFM)		20			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**4,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		1.03			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		17		8	
Passes		3		**17.06**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	359,000	$	167,000	
Construction Cost (Disinfection)	**$**	**526,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 2,950,000**

Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	29.89	$181,928	20	10.910	$1,984,821
	Tank O&M	No. Events / Yr	51	$32,692	50	14.484	$473,496
		Const Cost ($)	$543,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	30	$10,076	20	10.910	$109,933
	Odor Control O&M	Capacity (cfm)	720	$2,520	20	10.910	$27,493
	Reserve / Replace	10% Gravity / 15% Pump					$26,694
			Total Annual O&M	**$228,000**		**Total PW O&M**	**$2,622,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.30	$8,438	20	10.910	$92,058
	Tank O&M	No. Events / Yr	51	$38,262	50	14.484	$554,170
		Const Cost ($)	$2,771,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	30	$10,076	20	10.910	$109,933
	Odor Control O&M	Capacity (cfm)	7,150	$25,025	20	10.910	$273,021
	Reserve / Replace	10% Gravity / 15% Pump					$8,257
			Total Annual O&M	**$82,000**		**Total PW O&M**	**$1,037,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	29.89	$181,928	20	10.910	$1,984,821
	Sed. Basin O&M	Flow Rate (mgd)	29.89	$3,363	50	14.484	$48,705
	Screening O&M	Flow Rate (mgd)	29.89	$10,076	20	10.910	$109,933
	Disinfection O&M	Flow Rate (mgd)	29.89	$127,405	20	10.910	$1,389,983
	Odor Control O&M	Capacity (cfm)	4,650.00	$16,275	20	10.910	$177,559
	Reserve / Replace	10% Gravity / 15% Pump					$29,866
			Total Annual O&M	**$340,000**		**Total PW O&M**	**$3,741,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	32.88	$193,889	20	10.910	$2,115,319
	HREP O&M	Flow Rate (mgd)	29.89	$171,780	20	10.910	$1,874,114
	Screening O&M	Flow Rate (mgd)	29.89	$10,076	20	10.910	$109,933
	Disinfection O&M	Flow Rate (mgd)	32.88	$135,022	20	10.910	$1,473,078
	Odor Control O&M	Capacity (cfm)	450.00	$1,575	20	10.910	$17,183
	Reserve / Replace	10% Gravity / 15% Pump					$47,003
			Total Annual O&M	**$513,000**		**Total PW O&M**	**$5,637,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	16.44	$122,021	20	10.910	$1,331,244
	Swirl / Vortex O&M	Flow Rate (mgd)	29.89	$3,363	20	10.910	$36,688
	Screening O&M	Flow Rate (mgd)	29.89	$10,076	20	10.910	$109,933
	Disinfection O&M	Flow Rate (mgd)	16.44	$88,515	20	10.910	$965,691
	Odor Control O&M	Capacity (cfm)	5,750.00	$20,125	20	10.910	$219,563
	Reserve / Replace	10% Gravity / 15% Pump					$25,900
			Total Annual O&M	**$245,000**		**Total PW O&M**	**$2,689,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	29.89	$181,928	20	10.910	$1,984,821
	Screening O&M	Flow Rate (mgd)	29.89	$10,076	20	10.910	$109,933
	Disinfection O&M	Flow Rate (mgd)	29.89	$127,405	20	10.910	$1,389,983
	Odor Control O&M	Capacity (cfm)	470.00	$1,645	20	10.910	$17,947
	Reserve / Replace	10% Gravity / 15% Pump					$29,175
			Total Annual O&M	**$322,000**		**Total PW O&M**	**$3,532,000**

Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	24.12	$157,634	20	10.910	$1,719,776
	Tank O&M	No. Events / Yr	51	$31,877	50	14.484	$461,692
		Const Cost ($)	$217,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	24	$9,541	20	10.910	$104,093
	Odor Control O&M	Capacity (cfm)	310	$1,085	20	10.910	$11,837
	Reserve / Replace	10% Gravity / 15% Pump					$23,003
			Total Annual O&M	**$201,000**		**Total PW O&M**	**$2,320,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.13	$4,804	20	10.910	$52,415
	Tank O&M	No. Events / Yr	51	$35,617	50	14.484	$515,861
		Const Cost ($)	$1,713,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	24	$9,541	20	10.910	$104,093
	Odor Control O&M	Capacity (cfm)	3,100	$10,850	20	10.910	$118,373
	Reserve / Replace	10% Gravity / 15% Pump					$6,374
			Total Annual O&M	**$61,000**		**Total PW O&M**	**$797,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	24.12	$157,634	20	10.910	$1,719,776
	Sed. Basin O&M	Flow Rate (mgd)	24.12	$2,713	50	14.484	$39,300
	Screening O&M	Flow Rate (mgd)	24.12	$9,541	20	10.910	$104,093
	Disinfection O&M	Flow Rate (mgd)	24.12	$111,796	20	10.910	$1,219,685
	Odor Control O&M	Capacity (cfm)	3,800.00	$13,300	20	10.910	$145,102
	Reserve / Replace	10% Gravity / 15% Pump					$25,854
			Total Annual O&M	**$295,000**		**Total PW O&M**	**$3,254,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	26.53	$167,998	20	10.910	$1,832,847
	HREP O&M	Flow Rate (mgd)	24.12	$151,418	20	10.910	$1,651,964
	Screening O&M	Flow Rate (mgd)	24.12	$9,541	20	10.910	$104,093
	Disinfection O&M	Flow Rate (mgd)	26.53	$118,479	20	10.910	$1,292,600
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$40,251
			Total Annual O&M	**$449,000**		**Total PW O&M**	**$4,937,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	13.27	$105,727	20	10.910	$1,153,475
	Swirl / Vortex O&M	Flow Rate (mgd)	24.12	$2,713	20	10.910	$29,604
	Screening O&M	Flow Rate (mgd)	24.12	$9,541	20	10.910	$104,093
	Disinfection O&M	Flow Rate (mgd)	13.27	$77,670	20	10.910	$847,377
	Odor Control O&M	Capacity (cfm)	4,350.00	$15,225	20	10.910	$166,104
	Reserve / Replace	10% Gravity / 15% Pump					$22,825
			Total Annual O&M	**$211,000**		**Total PW O&M**	**$2,323,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	24.12	$157,634	20	10.910	$1,719,776
	Screening O&M	Flow Rate (mgd)	24.12	$9,541	20	10.910	$104,093
	Disinfection O&M	Flow Rate (mgd)	24.12	$111,796	20	10.910	$1,219,685
	Odor Control O&M	Capacity (cfm)	380.00	$1,330	20	10.910	$14,510
	Reserve / Replace	10% Gravity / 15% Pump					$25,261
			Total Annual O&M	**$281,000**		**Total PW O&M**	**$3,083,000**

Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	3.67	$44,808	20	10.910	$488,857
	Tank O&M	No. Events / Yr	51	$31,852	50	14.484	$461,330
		Const Cost ($)	$207,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	4	$7,742	20	10.910	$84,467
	Odor Control O&M	Capacity (cfm)	300	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$9,829
			Total Annual O&M	**$86,000**		**Total PW O&M**	**$1,056,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.12	$4,666	20	10.910	$50,904
	Tank O&M	No. Events / Yr	51	$35,532	50	14.484	$514,630
		Const Cost ($)	$1,679,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	4	$7,742	20	10.910	$84,467
	Odor Control O&M	Capacity (cfm)	2,950	$10,325	20	10.910	$112,645
	Reserve / Replace	10% Gravity / 15% Pump					$3,756
			Total Annual O&M	**$59,000**		**Total PW O&M**	**$766,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	3.67	$44,808	20	10.910	$488,857
	Sed. Basin O&M	Flow Rate (mgd)	3.67	$413	50	14.484	$5,980
	Screening O&M	Flow Rate (mgd)	3.67	$7,742	20	10.910	$84,467
	Disinfection O&M	Flow Rate (mgd)	3.67	$35,506	20	10.910	$387,364
	Odor Control O&M	Capacity (cfm)	650.00	$2,275	20	10.910	$24,820
	Reserve / Replace	10% Gravity / 15% Pump					$11,036
			Total Annual O&M	**$91,000**		**Total PW O&M**	**$1,003,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	4.04	$47,754	20	10.910	$520,998
	HREP O&M	Flow Rate (mgd)	3.67	$50,038	20	10.910	$545,914
	Screening O&M	Flow Rate (mgd)	3.67	$7,742	20	10.910	$84,467
	Disinfection O&M	Flow Rate (mgd)	4.04	$37,628	20	10.910	$410,521
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$15,991
			Total Annual O&M	**$144,000**		**Total PW O&M**	**$1,582,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	2.02	$30,054	20	10.910	$327,882
	Swirl / Vortex O&M	Flow Rate (mgd)	3.67	$413	20	10.910	$4,505
	Screening O&M	Flow Rate (mgd)	3.67	$7,742	20	10.910	$84,467
	Disinfection O&M	Flow Rate (mgd)	2.02	$24,668	20	10.910	$269,121
	Odor Control O&M	Capacity (cfm)	1,450.00	$5,075	20	10.910	$55,368
	Reserve / Replace	10% Gravity / 15% Pump					$10,846
			Total Annual O&M	**$68,000**		**Total PW O&M**	**$752,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	3.67	$44,808	20	10.910	$488,857
	Screening O&M	Flow Rate (mgd)	3.67	$7,742	20	10.910	$84,467
	Disinfection O&M	Flow Rate (mgd)	3.67	$35,506	20	10.910	$387,364
	Odor Control O&M	Capacity (cfm)	60.00	$210	20	10.910	$2,291
	Reserve / Replace	10% Gravity / 15% Pump					$10,887
			Total Annual O&M	**$89,000**		**Total PW O&M**	**$974,000**

Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.98	$29,657	20	10.910	$323,558
	Tank O&M	No. Events / Yr	51	$31,412	50	14.484	$454,957
		Const Cost ($)	$31,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,600	20	10.910	$82,918
	Odor Control O&M	Capacity (cfm)	60	$210	20	10.910	$2,291
	Reserve / Replace	10% Gravity / 15% Pump					$8,354
			Total Annual O&M	**$69,000**		**Total PW O&M**	**$872,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.02	$1,461	20	10.910	$15,945
	Tank O&M	No. Events / Yr	51	$33,957	50	14.484	$491,818
		Const Cost ($)	$1,049,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	2	$7,600	20	10.910	$82,918
	Odor Control O&M	Capacity (cfm)	550	$1,925	20	10.910	$21,002
	Reserve / Replace	10% Gravity / 15% Pump					$2,762
			Total Annual O&M	**$45,000**		**Total PW O&M**	**$614,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	1.98	$29,657	20	10.910	$323,558
	Sed. Basin O&M	Flow Rate (mgd)	1.98	$223	50	14.484	$3,224
	Screening O&M	Flow Rate (mgd)	1.98	$7,600	20	10.910	$82,918
	Disinfection O&M	Flow Rate (mgd)	1.98	$24,371	20	10.910	$265,883
	Odor Control O&M	Capacity (cfm)	400.00	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$9,481
			Total Annual O&M	**$64,000**		**Total PW O&M**	**$700,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	2.18	$31,607	20	10.910	$344,831
	HREP O&M	Flow Rate (mgd)	1.98	$34,796	20	10.910	$379,626
	Screening O&M	Flow Rate (mgd)	1.98	$7,600	20	10.910	$82,918
	Disinfection O&M	Flow Rate (mgd)	2.18	$25,828	20	10.910	$281,778
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$13,650
			Total Annual O&M	**$101,000**		**Total PW O&M**	**$1,105,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	1.09	$19,891	20	10.910	$217,014
	Swirl / Vortex O&M	Flow Rate (mgd)	1.98	$223	20	10.910	$2,429
	Screening O&M	Flow Rate (mgd)	1.98	$7,600	20	10.910	$82,918
	Disinfection O&M	Flow Rate (mgd)	1.09	$16,932	20	10.910	$184,722
	Odor Control O&M	Capacity (cfm)	1,450.00	$5,075	20	10.910	$55,368
	Reserve / Replace	10% Gravity / 15% Pump					$8,244
			Total Annual O&M	**$50,000**		**Total PW O&M**	**$551,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	1.98	$29,657	20	10.910	$323,558
	Screening O&M	Flow Rate (mgd)	1.98	$7,600	20	10.910	$82,918
	Disinfection O&M	Flow Rate (mgd)	1.98	$24,371	20	10.910	$265,883
	Odor Control O&M	Capacity (cfm)	30.00	$105	20	10.910	$1,146
	Reserve / Replace	10% Gravity / 15% Pump					$9,374
			Total Annual O&M	**$62,000**		**Total PW O&M**	**$683,000**

Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.03	$19,180	20	10.910	$209,256
	Tank O&M	No. Events / Yr	51	$31,387	50	14.484	$454,595
		Const Cost ($)	$21,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,521	20	10.910	$82,055
	Odor Control O&M	Capacity (cfm)	40	$140	20	10.910	$1,527
	Reserve / Replace	10% Gravity / 15% Pump					$6,007
			Total Annual O&M	**$59,000**		**Total PW O&M**	**$753,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.02	$1,146	20	10.910	$12,505
	Tank O&M	No. Events / Yr	51	$33,854	50	14.484	$490,333
		Const Cost ($)	$1,008,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,521	20	10.910	$82,055
	Odor Control O&M	Capacity (cfm)	400	$1,400	20	10.910	$15,274
	Reserve / Replace	10% Gravity / 15% Pump					$2,585
			Total Annual O&M	**$44,000**		**Total PW O&M**	**$603,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	1.03	$19,180	20	10.910	$209,256
	Sed. Basin O&M	Flow Rate (mgd)	1.03	$116	50	14.484	$1,679
	Screening O&M	Flow Rate (mgd)	1.03	$7,521	20	10.910	$82,055
	Disinfection O&M	Flow Rate (mgd)	1.03	$16,379	20	10.910	$178,691
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$7,035
			Total Annual O&M	**$44,000**		**Total PW O&M**	**$486,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	1.13	$20,441	20	10.910	$223,014
	HREP O&M	Flow Rate (mgd)	1.03	$23,710	20	10.910	$258,670
	Screening O&M	Flow Rate (mgd)	1.03	$7,521	20	10.910	$82,055
	Disinfection O&M	Flow Rate (mgd)	1.13	$17,358	20	10.910	$189,373
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$11,054
			Total Annual O&M	**$70,000**		**Total PW O&M**	**$766,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	0.57	$12,864	20	10.910	$140,350
	Swirl / Vortex O&M	Flow Rate (mgd)	1.03	$116	20	10.910	$1,265
	Screening O&M	Flow Rate (mgd)	1.03	$7,521	20	10.910	$82,055
	Disinfection O&M	Flow Rate (mgd)	0.57	$11,379	20	10.910	$124,145
	Odor Control O&M	Capacity (cfm)	1,450.00	$5,075	20	10.910	$55,368
	Reserve / Replace	10% Gravity / 15% Pump					$6,076
			Total Annual O&M	**$37,000**		**Total PW O&M**	**$409,000**

CSO 184E001 and 185H001 Region	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	1.03	$19,180	20	10.910	$209,256
	Screening O&M	Flow Rate (mgd)	1.03	$7,521	20	10.910	$82,055
	Disinfection O&M	Flow Rate (mgd)	1.03	$16,379	20	10.910	$178,691
	Odor Control O&M	Capacity (cfm)	20.00	$70	20	10.910	$764
	Reserve / Replace	10% Gravity / 15% Pump					$6,975
			Total Annual O&M	**$44,000**		**Total PW O&M**	**$478,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$8.6	$8,639,000	$0
1	$8.6	$8,639,000	$0
2	$8.6	$8,639,000	$0
4	$8.6	$8,639,000	$0
6	$8.6	$8,639,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$15.5	$14,488,373	$1,037,000
1	$13.5	$12,716,998	$797,000
2	$12.5	$11,720,299	$766,000
4	$11.3	$10,711,610	$614,000
6	$11.2	$10,605,375	$603,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$19.3	$16,692,373	$2,622,000
1	$17.6	$15,263,998	$2,320,000
2	$12.7	$11,686,299	$1,056,000
4	$11.9	$11,055,610	$872,000
6	$11.2	$10,449,375	$753,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$12.4	$9,731,000	$2,689,000
1	$11.0	$8,631,000	$2,323,000
2	$5.0	$4,228,000	$752,000
4	$4.0	$3,412,000	$551,000
6	$3.2	$2,758,000	$409,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$21.8	$16,165,000	$5,637,000
1	$18.9	$13,949,000	$4,937,000
2	$7.5	$5,926,000	$1,582,000
4	$6.3	$5,162,000	$1,105,000
6	$5.2	$4,408,000	$766,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$37.4	$33,630,215	$3,741,000
1	$35.7	$32,449,998	$3,254,000
2	$29.3	$28,281,299	$1,003,000
4	$28.5	$27,805,610	$700,000
6	$27.7	$27,174,375	$486,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$13.3	$9,719,000	$3,532,000
1	$11.6	$8,518,000	$3,083,000
2	$5.0	$4,068,000	$974,000
4	$4.3	$3,600,000	$683,000
6	$3.4	$2,950,000	$478,000

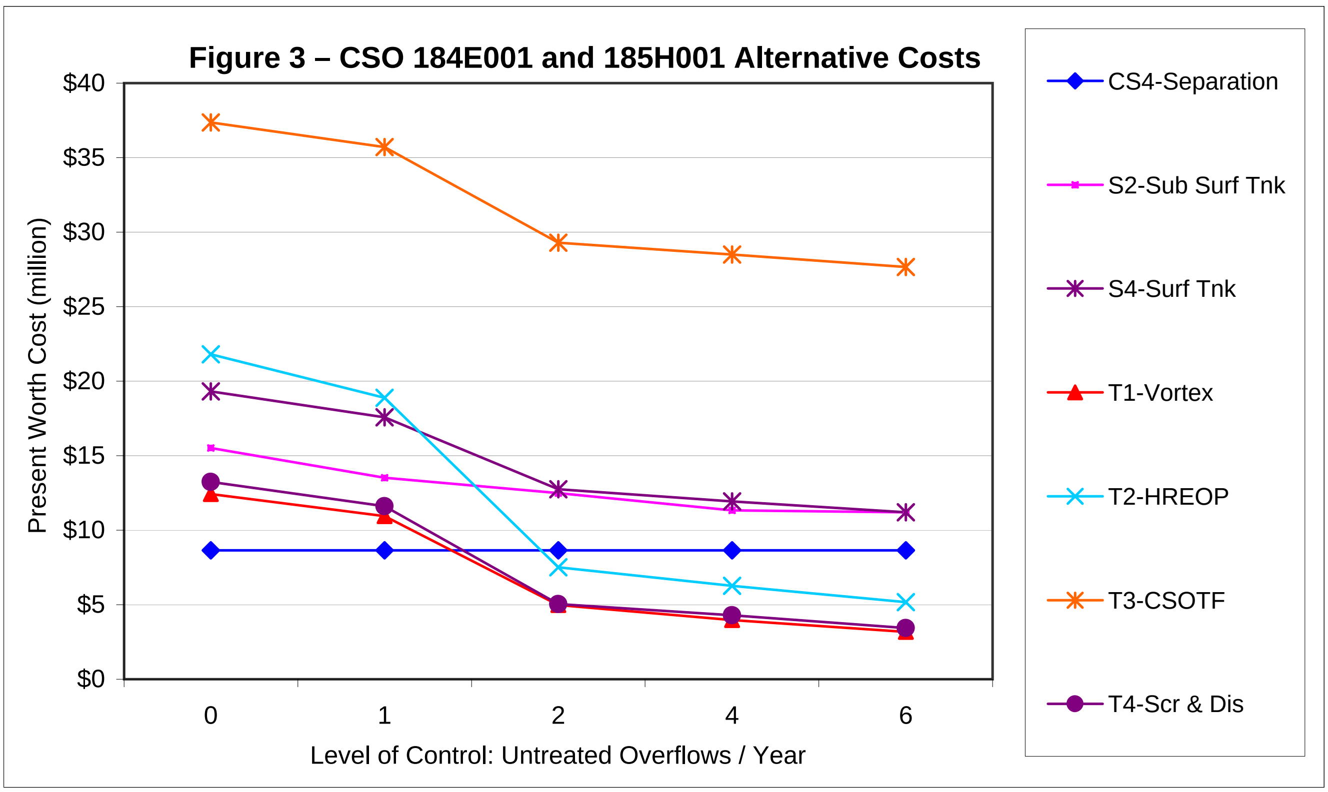


Figure 3 – CSO 184E001 and 185H001 Alternative Costs
$40
$35
$30
$25
$20
$15
$10
$5
$0
Present Worth Cost (million)
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name CSO 184E001 and 185H001
Structures within Region CSO 184E001, CSO 185H001
Model ID CSO 184E001 and 185H001.1
Structure Type Consolidation
PWSA Sewershed N/A
Stream of Discharge Saw Mill Run
NPDES Permit Number N/A
Owner N/A

Results Summary

Number of Events:	51
Peak Volume:	80,626 ft^3
	0.60 MG
Total Volume:	200,959 ft^3
	1.50 MG
Peak Rate:	46.25 cfs

Model Network (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
8/20/2005 18:30	236	8/20/2005 18:45	80626.29	603.125	0	46.25	0
1/5/2005 0:53	3335	1/5/2005 14:30	34702.26	259.590	1	0.90	14
9/16/2005 21:15	45	9/16/2005 21:30	33215.56	248.469	2	37.32	1
7/17/2005 16:15	39	7/17/2005 16:45	8410.46	62.914	3	5.68	2
7/5/2005 16:45	64	7/5/2005 17:00	5844.52	43.720	4	3.55	3
3/28/2005 8:58	770	3/28/2005 19:15	4844.32	36.238	5	1.41	8
1/11/2005 8:49	1038	1/12/2005 1:30	4062.51	30.390	6	0.80	18
11/29/2005 6:58	533	11/29/2005 7:30	3039.92	22.740	7	0.55	21
9/29/2005 5:30	40	9/29/2005 5:45	2403.43	17.979	8	1.54	7
5/11/2005 22:45	78	5/11/2005 23:00	2304.31	17.237	9	3.06	4
2/14/2005 6:51	847	2/14/2005 20:15	2093.48	15.660	10	0.11	34
1/13/2005 23:06	244	1/14/2005 2:30	1959.72	14.660	11	1.08	10
1/8/2005 4:45	214	1/8/2005 5:45	1671.16	12.501	12	0.70	19
7/26/2005 19:55	29	7/26/2005 20:15	1530.33	11.448	13	1.59	6
4/2/2005 5:55	254	4/2/2005 9:45	1490.95	11.153	14	0.41	23
1/3/2005 13:08	467	1/3/2005 18:00	1486.97	11.123	15	0.20	32
7/21/2005 14:50	19	7/21/2005 15:00	1425.22	10.661	16	2.38	5
6/6/2005 9:40	29	6/6/2005 10:00	1308.36	9.787	17	1.23	9
2/20/2005 19:44	69	2/20/2005 20:30	1227.57	9.183	18	0.86	15
6/6/2005 16:45	23	6/6/2005 17:00	897.93	6.717	19	1.04	12
6/11/2005 17:20	18	6/11/2005 17:30	636.74	4.763	20	1.06	11
8/13/2005 19:35	19	8/13/2005 19:45	449.09	3.359	21	1.00	13
10/22/2005 16:02	37	10/22/2005 16:30	426.88	3.193	22	0.35	26
12/15/2005 11:05	420	12/15/2005 14:00	372.61	2.787	23	0.05	46
10/22/2005 6:31	25	10/22/2005 6:45	366.03	2.738	24	0.51	22
11/16/2005 4:20	202	11/16/2005 4:30	344.00	2.573	25	0.25	28
11/14/2005 22:02	73	11/14/2005 23:00	339.57	2.540	26	0.23	30
7/25/2005 13:35	16	7/25/2005 13:45	313.75	2.347	27	0.68	20
6/8/2005 21:10	21	6/8/2005 21:15	298.50	2.233	28	0.83	16
6/14/2005 19:06	20	6/14/2005 19:15	293.75	2.197	29	0.81	17
5/23/2005 16:40	25	5/23/2005 16:45	271.88	2.034	30	0.29	27
10/21/2005 19:35	18	10/21/2005 19:45	217.15	1.624	31	0.37	25
5/28/2005 8:50	390	5/28/2005 15:15	201.59	1.508	32	0.17	33

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
11/9/2005 12:50	14	11/9/2005 13:00	199.86	1.495	33	0.40	24
2/16/2005 7:14	66	2/16/2005 8:00	197.57	1.478	34	0.07	36
5/14/2005 9:19	25	5/14/2005 9:30	173.27	1.296	35	0.23	29
4/1/2005 19:17	65	4/1/2005 19:30	172.26	1.289	36	0.06	42
8/8/2005 9:02	19	8/8/2005 9:15	143.92	1.077	37	0.21	31
3/27/2005 16:54	60	3/27/2005 17:45	141.17	1.056	38	0.06	43
5/13/2005 22:48	74	5/13/2005 23:00	139.80	1.046	39	0.08	35
10/7/2005 10:11	47	10/7/2005 10:30	133.51	0.999	40	0.07	37
6/3/2005 6:40	147	6/3/2005 9:00	130.07	0.973	41	0.07	38
5/20/2005 6:18	33	5/20/2005 6:30	99.81	0.747	42	0.06	44
3/23/2005 12:16	34	3/23/2005 12:45	75.44	0.564	43	0.04	49
10/28/2005 12:15	18	10/28/2005 12:30	62.36	0.466	44	0.07	39
5/7/2005 13:30	18	5/7/2005 13:45	58.34	0.436	45	0.07	40
4/22/2005 16:06	16	4/22/2005 16:15	44.67	0.334	46	0.06	41
3/23/2005 2:31	17	3/23/2005 2:45	42.06	0.315	47	0.05	45
10/21/2005 7:46	14	10/21/2005 8:00	28.79	0.215	48	0.03	50
5/14/2005 17:06	10	5/14/2005 17:15	20.83	0.156	49	0.04	48
4/20/2005 20:39	8	4/20/2005 20:45	18.41	0.138	50	0.04	47

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Region Name	CSO 184E001 and 185H001
Structures within Region	CSO 184E001, CSO 185H001
Model ID	CSO 184E001 and 185H001.1
Structure Type	Consolidation
PWSA Sewershed	N/A
Stream of Discharge	Saw Mill Run
NPDES Permit Number	N/A
Owner	N/A
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

Results Summary

Number of Events:	51
Peak Volume:	80,626 ft^3
	0.60 MG
Total Volume:	200,959 ft^3
	1.50 MG
Peak Rate:	46.25 cfs

Figure 1 - 184E001 and 185H001 CSO Volume

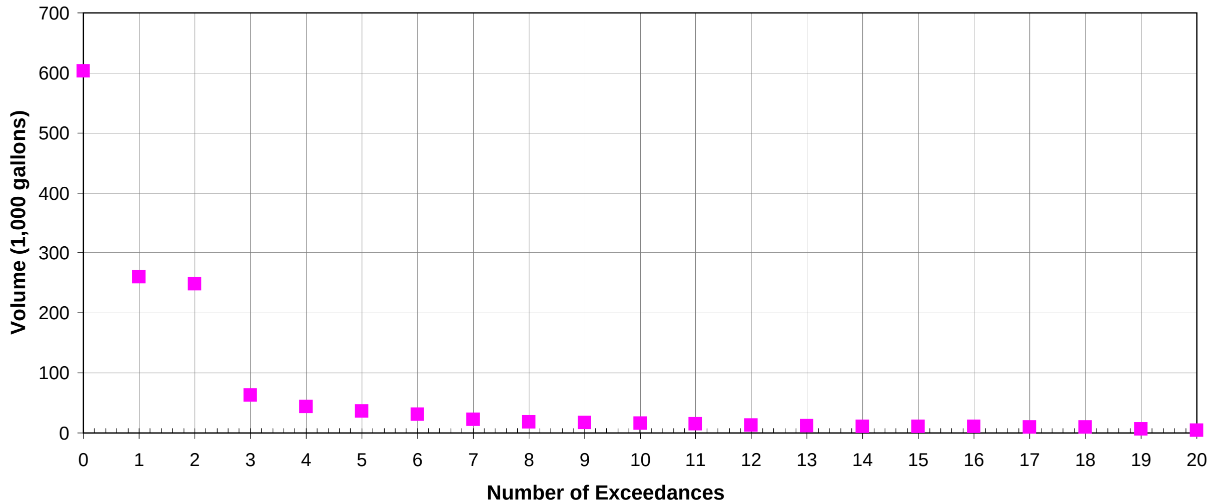
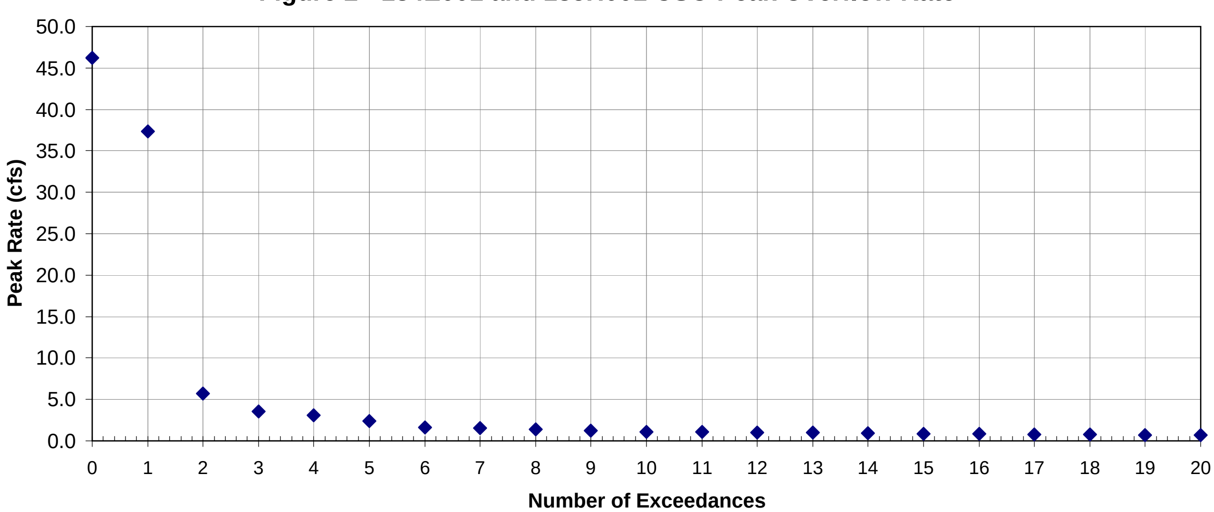


Figure 2 - 184E001 and 185H001 CSO Peak Overflow Rate



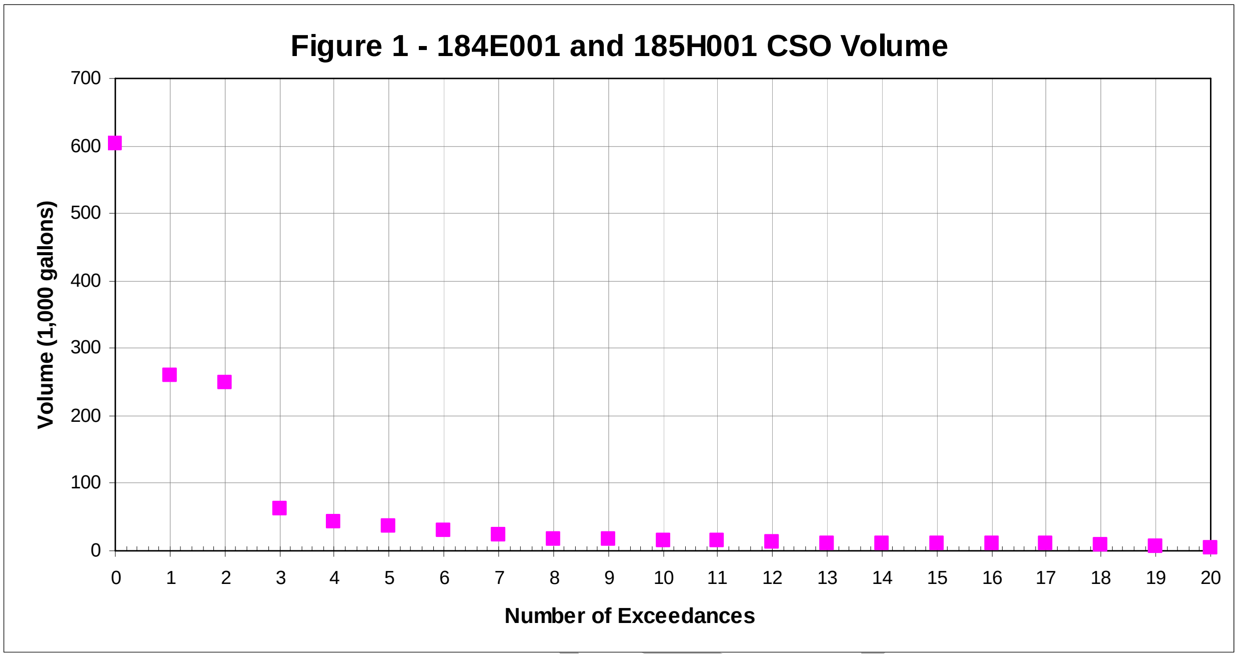
D.37.1 STREETS RUN SEWERSHED – NPDES # 184E001 AND 185H001

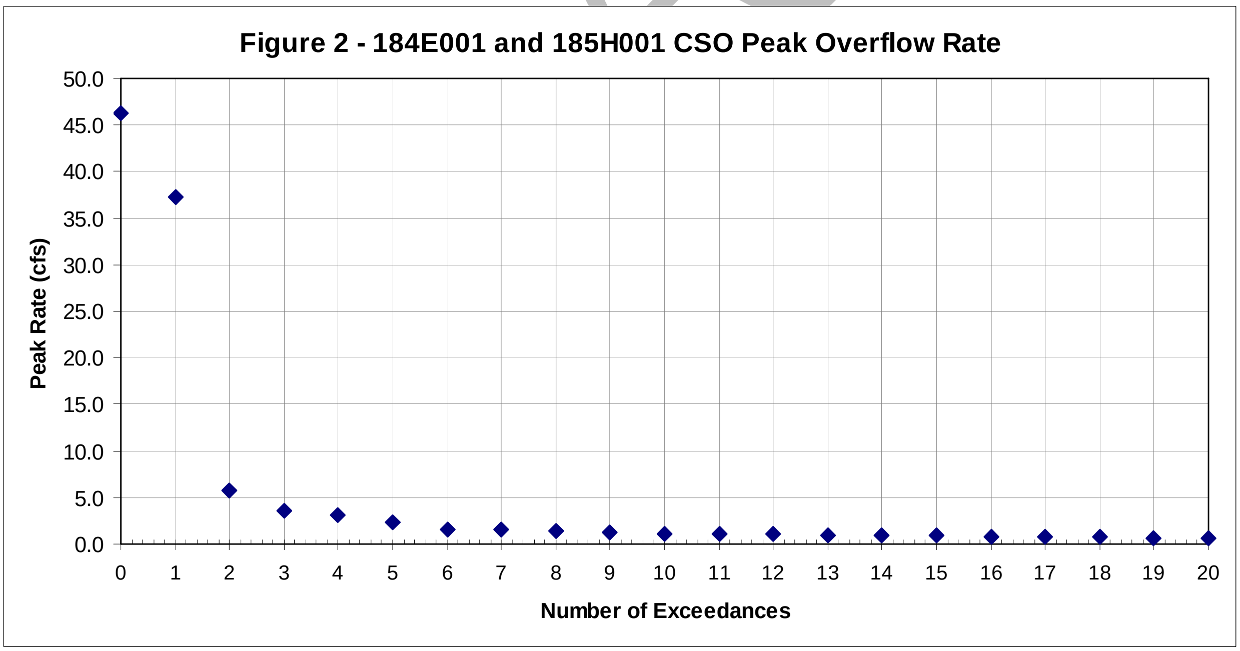
Description of Outfall

The outfalls 184E001 and 185H001 have been consolidated to be evaluated as a group. Outfall 184E001 conveys overflows from the PWSA diversion chamber 184E001 to a tributary to Streets Run, and ultimately into the Monongahela River. The outfall is located along a tributary to Streets Run, near Oakleaf Drive and Mifflin Road. Outfall 185H001 conveys flows from the PWSA diversion chamber 185H001 to a tributary to Streets Run. This outfall is located near Glenhurst Road and Mifflin Road. The Streets Run Sewershed consists of 6,521 acres of residential, business and commercial users. The Streets Run Sewershed is comprised of approximately 663 manholes and 125,501 linear feet (23.8 miles) of storm, sanitary, and combined sewers up to 60 inches in diameter. The 184E001 and 185H001 sewersheds consists of 22 acres and 35 acres, respectively.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

This consolidation of outfalls typically experiences 51 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from these outfalls is approximately 0.60 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 184E001 is approximately 46.25 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.





A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers. The sewers are required to convey CSOs from outfalls 184E001 and 185H001 to the vicinity of outfall 184E001. There appears to be available space for potential storage or treatment facilities adjacent to the outfall 184E001 to the north of Mifflin Road. The site is generally bounded by Mifflin Road to the south, a steep valley to the north and private development to the west and east.

Description of Consolidated Outfall Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 184E001. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-184E001 and 185H001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-184E001 and 185H001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-184E001 and 185H001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-184E001 and 185H001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-184E001 and 185H001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-184E001 and 185H001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-184E001 and 185H001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 184E001 and 185H001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.

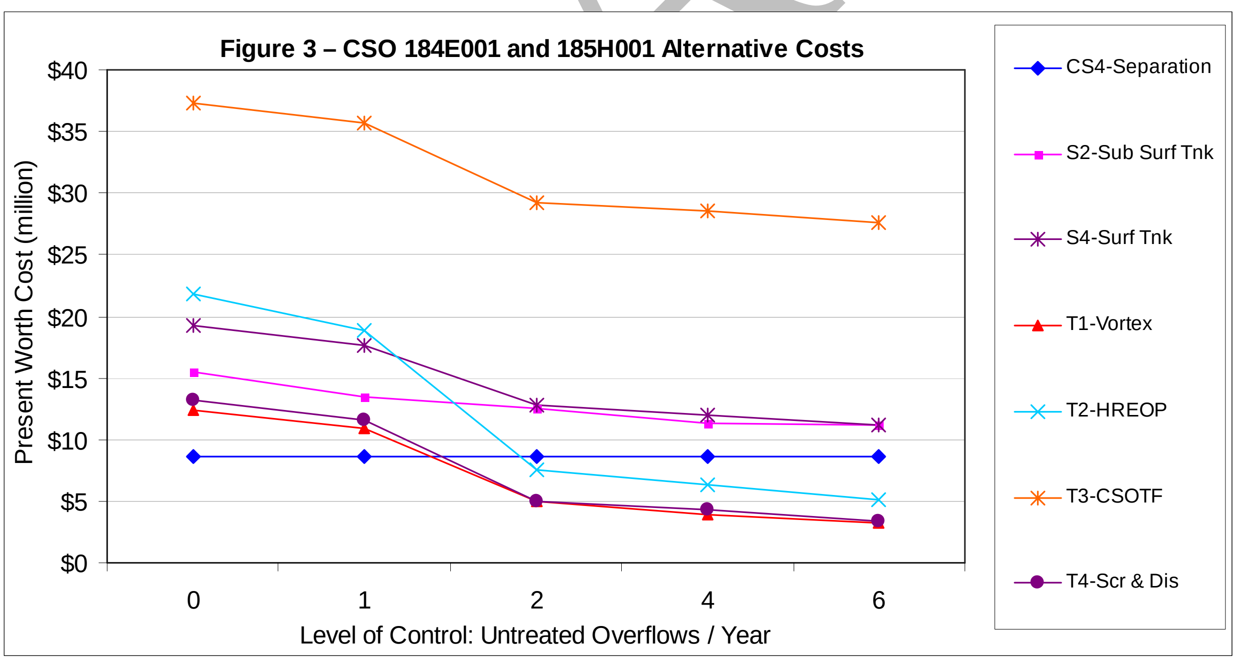


Figure 3 – CSO 184E001 and 185H001 Alternative Costs

The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall “ranking” of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

Recommendations

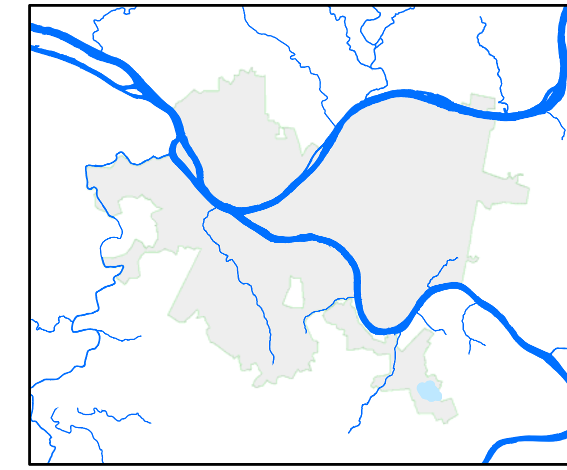
Based upon the above, for control levels 0 and 1, it is recommended that Alternative CS4-184E001 and 185H001: Sewer Separation be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control levels 2 through 6, it is recommended that Alternative T4-184E001 and 185H001: Suspended Solids Control be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Although separation reduces hydraulic loading, additional pollutants may be introduced to the receiving stream. Stormwater flows that would have originally ended up in the trunk sewer will now discharge directly to local waterways. Discharge constituents include surface pollutants such as oil, grease and road grit, as well as general trash and road debris. Another issue to consider with separation is the available regulator capacity at the ALCOSAN diversion chamber. Sufficient capacity must exist in order to convey the sanitary flow to the interceptor. Failure to provide sufficient capacity may result in a sanitary sewer overflow (SSO) condition.

For control levels 2 through 6, a treatment facility was the highest rank alternative. It appears that space is available adjacent to Mifflin Road to construct a storage or treatment facility near the diversion chamber for 184E001. However the flow would have to be pumped to the facility.



Area Overview

Legend

- Sewershed Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

200 0 200
Feet

Attachment 1 CSO 184E001 to CSO 185H001 Tributary Area Map Streets Run Sewershed

CSO Controls Alternatives

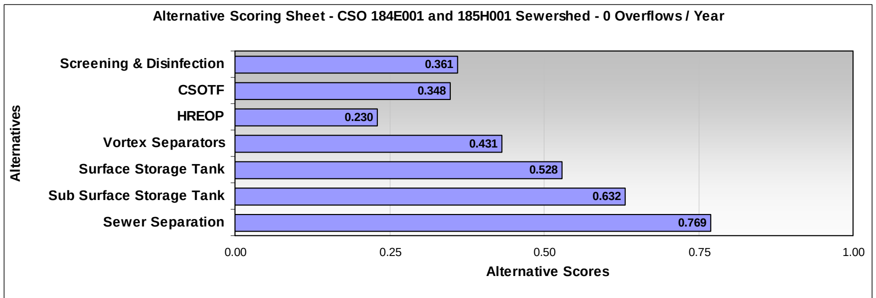
PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

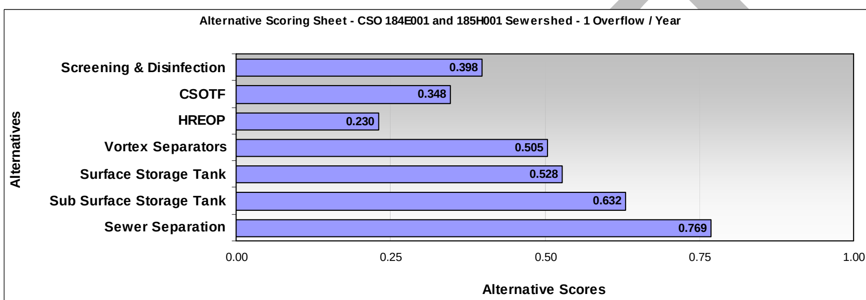
SW-D-0268.pdf

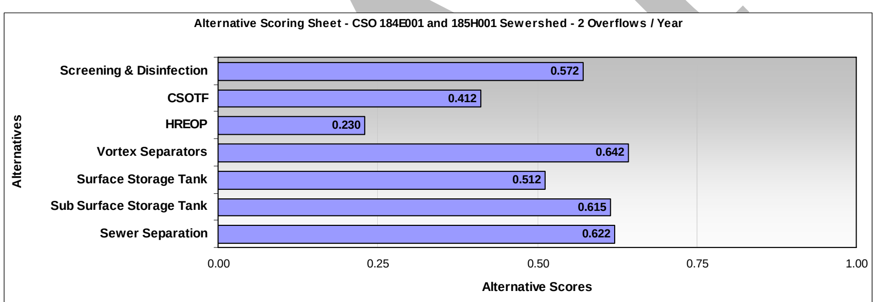
Attachment 2 - CSO Alternatives Development Worksheet

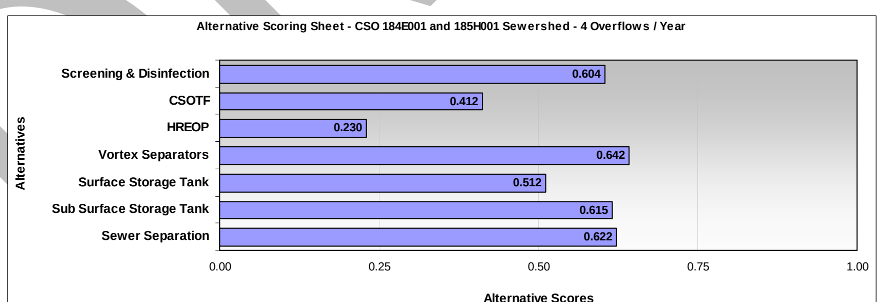
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	Y	A relief sewer will be evaluated.
Sewer separation	Y	Sewer separation within the 22 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

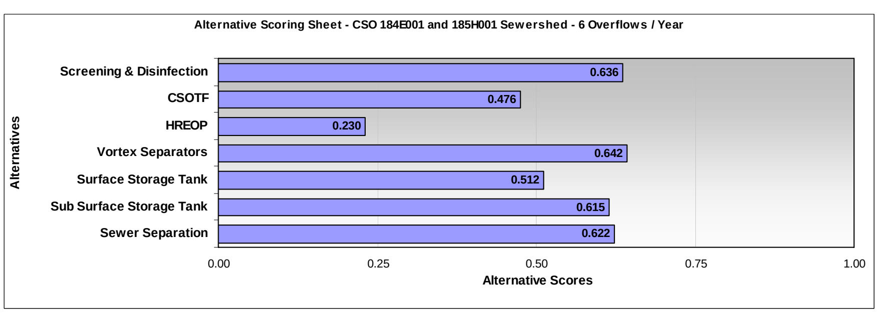
Attachment 3 – Alternative Scoring Sheet

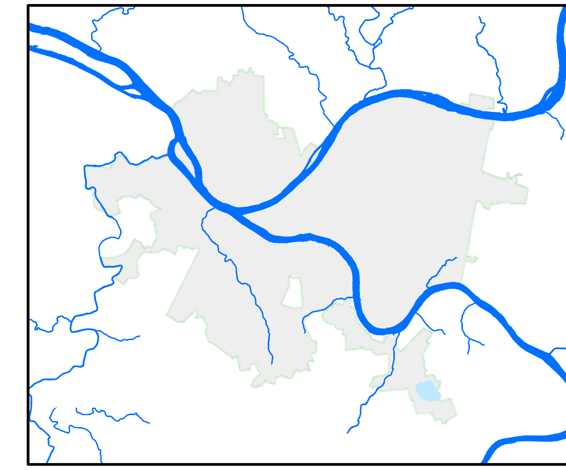












Area Overview

Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

0 250 500 Feet

Attachment 4
CSO 184E001 to CSO 185H001 Facilities Boundary Map
Streets Run Sewershed

CSO Controls Alternatives

THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0268.pdf

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	5	5	5	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	CS4-Separation	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific	1	1	1	1	1
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	CS4-Separation	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	4	4	4	4	4
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: S2-Sub Surf Tnk		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	4	3	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S4-Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	3	5	5
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	S4-Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S4-Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.	5	5	5	5	5
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.					
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.	4	4	4	4	4
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.					
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	3	2	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative: T1-Vortex		Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	2
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative: T1-Vortex		Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	3	3	3	3	3
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative: T1-Vortex		Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T1-Vortex		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T1-Vortex		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.	2	2	2	2	2
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T2-HREOP		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T2-HREOP		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T2-HREOP		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	1	1	1	1	1
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T3-CSOTF		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	3	3	3	3	3
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	2	3
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	3	3	3	3	3
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	2
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.717**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.716**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.716**

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.716**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.716**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.670**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.670**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.621**

Total Score

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.589**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.525**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.590**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.558**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.583**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.656**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.656**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Total Score

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.349**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.338**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.370**

Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

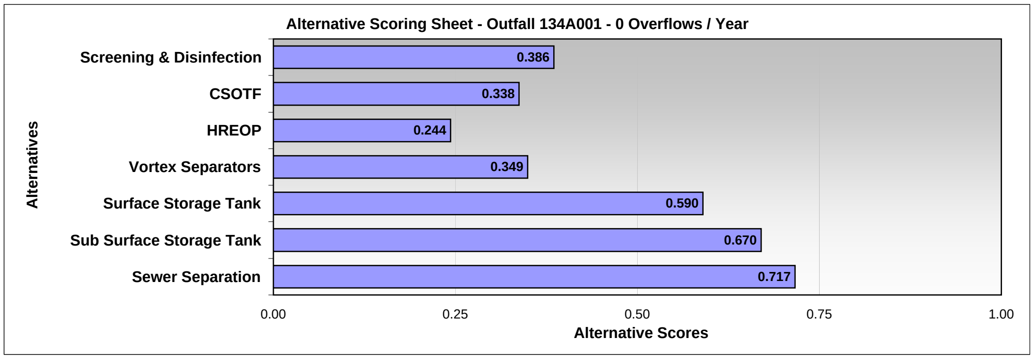
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.386**

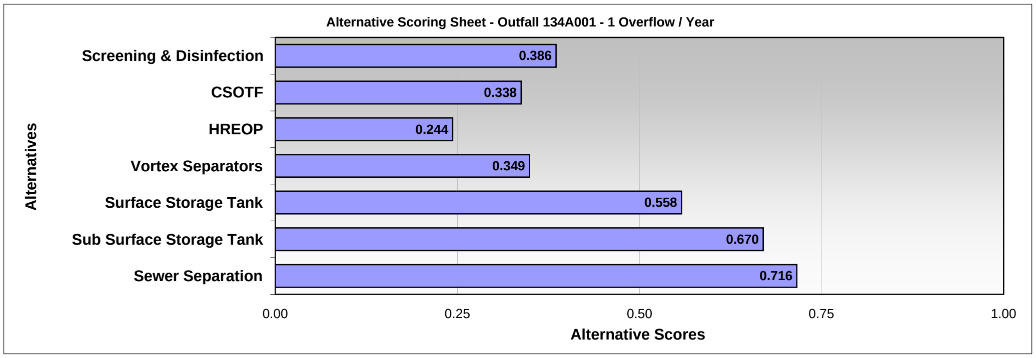
Total Score

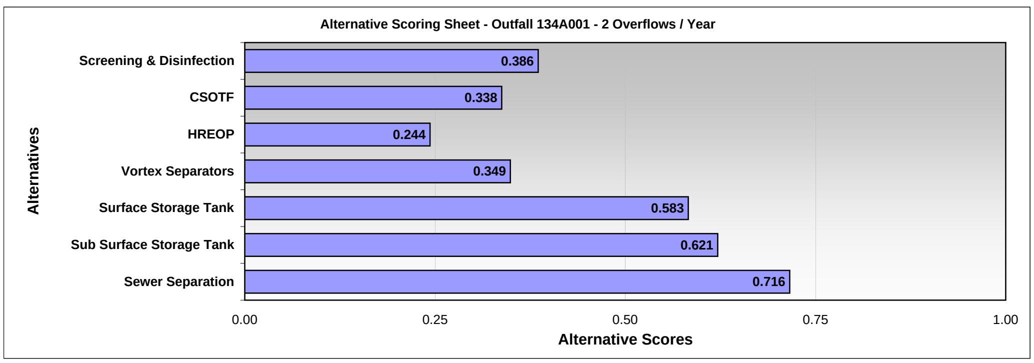
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.422**

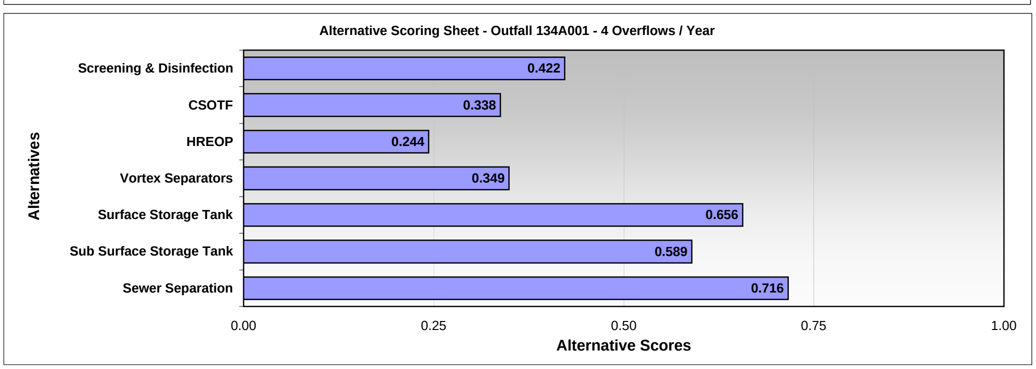
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.491**

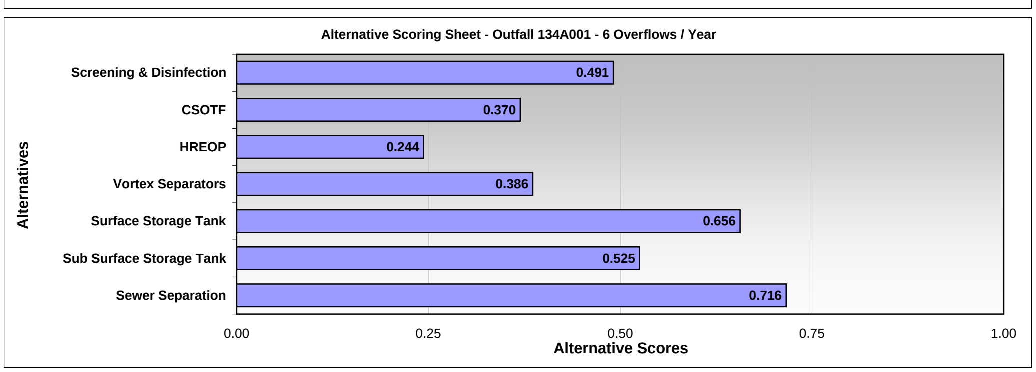
Alternative Scoring Sheet











RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	0	
Peak Volume	21,463	CF
	0.16	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	15.25	CFS
	9.86	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SEWER SEPARATION				
0 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		9		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)				Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**1,350,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		3,920		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**8,000**		
			TOTAL CAPITAL COST $	**1,397,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	0	
Peak Volume	21,463	CF
	0.16	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	15.25	CFS
	9.86	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.16	21,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.19	25,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		51		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		34		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.19	26,010	**Sufficient Volume**
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**128,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		9.86	15.25	= Peak Rate
Force Main Diameter (In)		22		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,793,000**	**$ 30,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		15.25		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		38,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		190		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**25,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		9.86		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**869,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		22,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**3,991,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	0	
Peak Volume	21,463	CF
	0.16	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	15.25	CFS
	9.86	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SUB-SURFACE STORAGE TANK				
0 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.16	21,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.19	25,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		51		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		34		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.19	26,010	**Sufficient Volume**
Tank Area (SF)		2,000		= Length x Width
Construction Cost (Storage Tank)		**1,409,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.16	0.25	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		3		Input by Engineer
Force Main Velocity (FPS)		5.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**421,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		15.25		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		38,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,900		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**151,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		9.86		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**869,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		22,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**3,010,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	0	
Peak Volume	21,463	CF
	0.16	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	15.25	CFS
	9.86	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
0 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		9.86		15.25	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35		Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		2			
Construction Cost (Swirl / Vortex)	**$**	**1,222,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		10.84		16.78	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		23			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,881,000**	**$**	**31,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		15.25			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		58,000			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		2,900			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**211,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		9.86			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**869,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		10.84			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		52		25	
Passes / Detention (Min)		3		15.50	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**563,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			Typ=# Regs, Rev Qty as Req'd
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		10,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**20,000**			
				TOTAL CAPITAL COST	**$ 6,159,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	0	
Peak Volume	21,463	CF
	0.16	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	15.25	CFS
	9.86	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SEDIMENTATION BASIN (CSOTF)				
0 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		9.86	15.25	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		1,700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		59	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		30	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.16	21,240	
Construction Cost (CSOTF)	**$**	**16,382,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		9.86	15.25	= Peak Flow x % Req Pump
Force Main Diameter (In)		22		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.8	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,793,000**	**$ 30,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		15.25		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		32,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		1,600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**132,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		9.86		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**869,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		9.86		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		50	24	
Passes / Detention (Min)		3	15.74	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**543,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		9,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**18,000**		
			TOTAL CAPITAL COST $	**20,869,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	0	
Peak Volume	21,463	CF
	0.16	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	15.25	CFS
	9.86	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
0 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		9.86	15.25	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		120		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		16	OK	Input by Engineer
Width (Ft)		9	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**2,749,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		10.84	16.78	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		23		Input by Engineer
Force Main Velocity (FPS)		5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,881,000**	**$ 31,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		15.25		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		150		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**21,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		9.86		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**869,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		10.84		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		52	25	Input by Engineer
Passes / Detention (Min)		3	15.50	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	563,000	$ 434,000	
Construction Cost (Disinfection)	**$**	**997,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		26,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**52,000**		
		TOTAL CAPITAL COST	**$**	**7,702,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	0	
Peak Volume	21,463	CF
	0.16	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	15.25	CFS
	9.86	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
SCREENING AND DISINFECTION					
0 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		9.86		15.25	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**869,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		9.86		15.25	= Peak Flow x % Req Pump
Force Main Diameter (In)		22			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,793,000**	**$**	**30,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		15.25			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		3,100			=CFS x 200
Odor Control Flow Rate (CFM)		160			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**22,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		9.86			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		50		24	
Passes / Detention (Min)		3		**15.74**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	543,000	$	416,000	
Construction Cost (Disinfection)	**$**	**959,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		23,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
			TOTAL CAPITAL COST	**$**	**4,821,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	1	
Peak Volume	1,907	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		9		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**1,350,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		3,920		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**8,000**		
			TOTAL CAPITAL COST $	**1,397,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	1	
Peak Volume	1,907	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SURFACE STORAGE TANK				
1 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value	
Sizing Basis: Peak Volume (MG / CF)	0.01	2,000	Ref: CSO Statistics	
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters	
Required Storage Volume (MG / CF)	0.02	2,000	= Peak Vol / Available Capacity	
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**	
Length (Ft)	15		= (Vol / SWD * 1.5)$^{1/2}$	
Width (Ft)	10		= (Vol / SWD / 1.5)$^{1/2}$	
Total Volume (MG / CF)	0.02	2,250	**Sufficient Volume**	
Tank Area (SF)	0		= Length x Width	
Construction Cost (Storage Tank)	**9,000**			
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters	
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**	
Influent Pumping Rate (MGD / CFS)	1.21	1.87	= Peak Rate	
Force Main Diameter (In)	8		DW Pump Rate / 2 FPS	
Force Main Velocity (FPS)	5.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**	
Force Main Length (Ft)	100		Input by Engineer	
Construction Cost (PS / Force Main) $	**1,314,000**	**$ 18,000**		
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)	1.87		Ref: Technical Parameters	
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"	
Length (Ft)	100		Input by Engineer	
Depth (Ft)	20		Input by Engineer	
Construction Cost (Pipe) $	**63,000**			
4. Odor Control Parameters				
Air Changes / Hour (ACH)	3		Ref: Technical Parameters	
Volume of Ventilated Space (CF)	3,000		=Required Storage Vol x 1.5	
Odor Control Flow Rate (CFM)	20		= ACH x Volume / 60 * 10%	
Construction Cost (Odor Control) $	**4,000**			
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd	
Peak Flow, into facility (MGD)	1.21		Ref: CSO Statistics	
Construction Cost (Screening) $	**468,000**			
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**	
Peak Flow (MGD)	0.00		Ref: Peak flow of PS	
Cl_2 Contact Tank Length / Width (Ft)				
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum	
Construction Cost (Disinfection / CC Tank) $	-	$ -		
Construction Cost (Disinfection) $	**-**		**No Disinfection**	
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer	
Number Regulators	1		Input by Engineer	
Construction Cost (Regulators) $	**39,000**			
8. Land Acquisition Parameters				
Land Required - Tank (SF)	19,000		=(0.291 x Vol (MG) + 0.439) x 43560	
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters	
Land Acquisition Cost $	**38,000**			
		TOTAL CAPITAL COST $		**1,953,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	1	
Peak Volume	1,907	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001

SUB-SURFACE STORAGE TANK

1 Overflows / Year

1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.01	2,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.02	2,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)	15		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	10		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.02	2,250	**Sufficient Volume**
Tank Area (SF)	0		= Length x Width
Construction Cost (Storage Tank)	**958,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	0.01	0.02	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)	1		Input by Engineer
Force Main Velocity (FPS)	4.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**297,000**	**$ 12,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	1.87		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	3,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	150		= ACH x Volume / 60
Construction Cost (Odor Control) $	**21,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	1.21		Ref: CSO Statistics
Construction Cost (Screening) $	**468,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**38,000**		
		TOTAL CAPITAL COST $	**1,896,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	1	
Peak Volume	1,907	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001			
SWIRL CONCENTRATOR / VORTEX SEPARATOR			
1 Overflows / Year			
1. Swirl Concentrator / Vortex Separator Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	1.21	1.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)	10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate	0		
Construction Cost (Swirl / Vortex) $	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Underflow Rate (%)	10%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)	1.33	2.06	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)	8		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**1,417,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	1.87		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)	1.21		Ref: CSO Statistics
Construction Cost (Screening) $	**468,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)	1.33		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	19	9	
Passes	3	**16.59**	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**366,000**		
7. Regulator / Vortex Drop Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
New Vortex Drop Shaft	1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex) $	**299,000**		
8. Land Acquisition Parameters			
Land Required - Swirl / Vortex (SF)	1,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**2,000**		
		TOTAL CAPITAL COST $	**2,633,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	1	
Peak Volume	1,907	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SEDIMENTATION BASIN (CSOTF)				
1 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		1.21	1.87	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		300		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		25	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		13	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.03	3,900	
Construction Cost (CSOTF)	**$**	**16,397,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		1.21	1.87	= Peak Flow x % Req Pump
Force Main Diameter (In)		8		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.4	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,314,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		1.87		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		300		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		1.21		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**468,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		1.21		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		18	9	
Passes		3	17.29	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**363,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		5,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**		
			TOTAL CAPITAL COST $	**18,708,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	1	
Peak Volume	1,907	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		1.21		1.87	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		20			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		7		**OK**	Input by Engineer
Width (Ft)		4		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,390,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		1.33		2.06	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		8			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,417,000**	**$**	**18,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		1.87			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		50			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**9,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		1.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**468,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		1.33			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		19		9	Input by Engineer
Passes		3		**16.59**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	366,000	$	179,000	
Construction Cost (Disinfection)	**$**	**545,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		22,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST $	**3,993,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	1	
Peak Volume	1,907	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	1.87	CFS
	1.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SCREENING AND DISINFECTION				
1 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		1.21	1.87	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**468,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		1.21	1.87	= Peak Flow x % Req Pump
Force Main Diameter (In)		8		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.4	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**1,314,000**	**$ 18,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		1.87		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		400		=CFS x 200
Odor Control Flow Rate (CFM)		20		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**4,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		1.21		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		18	9	
Passes		3	**17.29**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	363,000	$ 175,000	
Construction Cost (Disinfection)	**$**	**538,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		23,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**		
			TOTAL CAPITAL COST $	**2,490,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	2	
Peak Volume	1,078	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.95	CFS
	0.62	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		9		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**1,350,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		3,920		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**8,000**		
			TOTAL CAPITAL COST $	**1,397,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	2	
Peak Volume	1,078	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.95	CFS
	0.62	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001

SURFACE STORAGE TANK

2 Overflows / Year

Parameter		Value		Calculated / Check	Reference
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.01		1,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.01		1,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		11			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		8			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.01		1,320	**Sufficient Volume**
Tank Area (SF)		0			= Length x Width
Construction Cost (Storage Tank)		**5,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		0.62		0.95	= Peak Rate
Force Main Diameter (In)		5			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		7.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**809,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.95			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		10			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**2,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		0.62			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**441,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		19,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**			
				TOTAL CAPITAL COST $	**1,412,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	2	
Peak Volume	1,078	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.95	CFS
	0.62	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SUB-SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)	2	Subsurface Tank	Default Value	
Sizing Basis: Peak Volume (MG / CF)	0.01	1,000	Ref: CSO Statistics	
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters	
Required Storage Volume (MG / CF)	0.01	1,000	= Peak Vol / Available Capacity	
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**	
Length (Ft)	11		= (Vol / SWD * 1.5)$^{1/2}$	
Width (Ft)	8		= (Vol / SWD / 1.5)$^{1/2}$	
Total Volume (MG / CF)	0.01	1,320	**Sufficient Volume**	
Tank Area (SF)	0		= Length x Width	
Construction Cost (Storage Tank)	**939,000**			
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters	
Dewatering Time (Days)	1		**Typ 1, Adjust as Req'd Ref: Tech Par**	
Dewatering Pumping Rate (MGD / CFS)	0.01	0.01	= Peak Vol / DW Time x %Req Pump	
Force Main Diameter (In)	1		Input by Engineer	
Force Main Velocity (FPS)	2.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**	
Force Main Length (Ft)	100		Input by Engineer	
Construction Cost (PS / Force Main) $	**291,000**	**$ 12,000**		
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)	0.95		Ref: Technical Parameters	
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"	
Length (Ft)	100		Input by Engineer	
Depth (Ft)	20		Input by Engineer	
Construction Cost (Pipe) $	**63,000**			
4. Odor Control Parameters				
Air Changes / Hour (ACH)	3		Ref: Technical Parameters	
Volume of Ventilated Space (CF)	2,000		=Required Storage Vol x 1.5	
Odor Control Flow Rate (CFM)	100		= ACH x Volume / 60	
Construction Cost (Odor Control) $	**15,000**			
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)	1		**Typ 1, Rev as Req'd**	
Peak Flow, into facility (MGD)	0.62		Ref: CSO Statistics	
Construction Cost (Screening) $	**441,000**			
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**	
Peak Flow (MGD)	0.00		Ref: Peak flow of PS	
Cl_2 Contact Tank Length / Width (Ft)				
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum	
Construction Cost (Disinfection / CC Tank) $	-	$ -		
Construction Cost (Disinfection) $	**-**		**No Disinfection**	
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer	
Number Regulators	1		Input by Engineer	
Construction Cost (Regulators) $	**39,000**			
8. Land Acquisition Parameters				
Land Required - Tank (SF)	19,000		=(0.291 x Vol (MG) + 0.439) x 43560	
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters	
Land Acquisition Cost $	**38,000**			
		TOTAL CAPITAL COST $		**1,838,000**

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RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	2	
Peak Volume	1,078	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.95	CFS
	0.62	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001

SWIRL CONCENTRATOR / VORTEX SEPARATOR

2 Overflows / Year

1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		0.62	0.95	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.68	1.05	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		6		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.3	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**861,000**	**$ 16,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		0.95		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.62		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**441,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.68		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		14	7	
Passes		3	**18.67**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**352,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		1,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**2,000**		
			TOTAL CAPITAL COST $	**2,034,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	2	
Peak Volume	1,078	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.95	CFS
	0.62	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SEDIMENTATION BASIN (CSOTF)				
2 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		0.62	0.95	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		200		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		11	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.02	2,772	
Construction Cost (CSOTF)	**$**	**16,398,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.62	0.95	= Peak Flow x % Req Pump
Force Main Diameter (In)		5		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		7.0	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**809,000**	**$ 15,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		0.95		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		200		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**26,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		0.62		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**441,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		0.62		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		13	7	
Passes		3	19.07	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**350,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		5,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**		
			TOTAL CAPITAL COST $	**18,151,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	2	
Peak Volume	1,078	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.95	CFS
	0.62	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.62		0.95	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		5		OK	Input by Engineer
Width (Ft)		3		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,298,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.68		1.05	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		6			Input by Engineer
Force Main Velocity (FPS)		5.3		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**861,000**	**$**	**16,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.95			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		0.62			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**441,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		0.68			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		14		7	Input by Engineer
Passes		3		18.67	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	352,000	$	152,000	
Construction Cost (Disinfection)	**$**	**504,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		22,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST $	**3,266,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	2	
Peak Volume	1,078	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.95	CFS
	0.62	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		0.62		0.95	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**441,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		0.62		0.95	= Peak Flow x % Req Pump
Force Main Diameter (In)		5			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		7.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**809,000**	**$**	**15,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.95			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		200			=CFS x 200
Odor Control Flow Rate (CFM)		10			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		0.62			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		13		7	
Passes		3		**19.07**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	350,000	$	148,000	
Construction Cost (Disinfection)	**$**	**498,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		22,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST $	**1,911,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	4	
Peak Volume	883	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.54	CFS
	0.35	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SEWER SEPARATION				
4 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		9		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**1,350,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		3,920		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**8,000**		
			TOTAL CAPITAL COST $	**1,397,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	4	
Peak Volume	883	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.54	CFS
	0.35	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.01	1,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.01	1,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		11		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		8		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.01	1,320	**Sufficient Volume**
Tank Area (SF)		0		= Length x Width
Construction Cost (Storage Tank)		**4,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		0.35	0.54	= Peak Rate
Force Main Diameter (In)		4		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**582,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		0.54		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		10		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**2,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		0.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**428,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**1,170,000**

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RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	4	
Peak Volume	883	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.54	CFS
	0.35	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001

SUB-SURFACE STORAGE TANK

4 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.01	1,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.01	1,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	Sufficient Depth	Ref: Tech Parameters, Rev as Req'd
Length (Ft)		11		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		8		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.01	1,320	Sufficient Volume
Tank Area (SF)		0		= Length x Width
Construction Cost (Storage Tank)		**934,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.01	0.01	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		1		Input by Engineer
Force Main Velocity (FPS)		1.9	Check:	Not OK
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**290,000**	**$ 12,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		0.54		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		100		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		0.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**428,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		Typ 2, Rev as Req'd
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		No Disinfection
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**1,819,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	4	
Peak Volume	883	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.54	CFS
	0.35	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
4 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.35		0.54	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.38		0.59	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		4			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.8		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**611,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.54			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.35			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**428,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.38			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		11		5	
Passes		3		**18.49**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**346,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		0			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**			
				TOTAL CAPITAL COST	**$ 1,761,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	4	
Peak Volume	883	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.54	CFS
	0.35	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SEDIMENTATION BASIN (CSOTF)				
4 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		0.35	0.54	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		100		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		15	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		8	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.01	1,440	
Construction Cost (CSOTF)	**$**	**16,399,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.35	0.54	= Peak Flow x % Req Pump
Force Main Diameter (In)		4		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**582,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		0.54		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		100		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**428,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.35		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		10	5	
Passes		3	**18.49**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**345,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		5,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**		
			TOTAL CAPITAL COST $	**17,895,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	4	
Peak Volume	883	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.54	CFS
	0.35	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
4 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		0.35	0.54	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		5	OK	Input by Engineer
Width (Ft)		3	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**1,256,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.38	0.59	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		4		Input by Engineer
Force Main Velocity (FPS)		6.8	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**611,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		0.54		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		0.35		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**428,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		0.38		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		11	5	Input by Engineer
Passes		3	18.49	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	346,000	$ 134,000	
Construction Cost (Disinfection)	**$**	**480,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		22,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**		
			TOTAL CAPITAL COST $	**2,935,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	4	
Peak Volume	883	CF
	0.01	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.54	CFS
	0.35	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
SCREENING AND DISINFECTION					
4 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		0.35		0.54	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**428,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		0.35		0.54	= Peak Flow x % Req Pump
Force Main Diameter (In)		4			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**582,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.54			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		100			=CFS x 200
Odor Control Flow Rate (CFM)		10			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		0.35			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		10		5	
Passes		3		**18.49**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	345,000	$	130,000	
Construction Cost (Disinfection)	**$**	**475,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		22,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
			TOTAL CAPITAL COST	**$**	**1,647,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	6	
Peak Volume	349	CF
	0.00	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.32	CFS
	0.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SEWER SEPARATION				
6 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		9		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**1,350,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		3,920		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**8,000**		
			TOTAL CAPITAL COST $	**1,397,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	6	
Peak Volume	349	CF
	0.00	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.32	CFS
	0.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001			
SURFACE STORAGE TANK			
6 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	0.00	-	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	0.00	0	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	1		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	1		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	0.00	15	**Insufficient Volume**
Tank Area (SF)	0		= Length x Width
Construction Cost (Storage Tank)	**1,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	0.21	0.32	= Peak Rate
Force Main Diameter (In)	3		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.6	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**463,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	0.32		Ref: Technical Parameters
Diameter (In)	36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	100		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**63,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	0		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	0		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**-**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	0.21		Ref: CSO Statistics
Construction Cost (Screening) $	**422,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**38,000**		
		TOTAL CAPITAL COST $	**1,040,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	6	
Peak Volume	349	CF
	0.00	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.32	CFS
	0.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001				
SUB-SURFACE STORAGE TANK				
6 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		0.00	-	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		0.00	0	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		1		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		1		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		0.00	15	**Insufficient Volume**
Tank Area (SF)		0		= Length x Width
Construction Cost (Storage Tank)		**922,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.00	0.00	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		0		Input by Engineer
Force Main Velocity (FPS)		0.0	**Check:**	**No Main Req'd**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**287,000**	**$ 11,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		0.32		Ref: Technical Parameters
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.21		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**422,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		19,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**38,000**		
			TOTAL CAPITAL COST $	**1,782,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	6	
Peak Volume	349	CF
	0.00	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.32	CFS
	0.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
6 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.21		0.32	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				Diameter OK	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		0.23		0.36	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		3			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		7.3		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**481,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.32			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		0.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**422,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		0.23			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		8		4	
Passes		3		**17.91**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**342,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		0			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**-**			
				TOTAL CAPITAL COST	**$ 1,621,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	6	
Peak Volume	349	CF
	0.00	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.32	CFS
	0.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001

SEDIMENTATION BASIN (CSOTF)

6 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		0.21	0.32	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		100		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		15	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		8	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.01	1,440	
Construction Cost (CSOTF)	**$**	**16,399,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.21	0.32	= Peak Flow x % Req Pump
Force Main Diameter (In)		3		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.6	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**463,000**	**$ 14,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		0.32		Ref: CSO Statistics
Diameter (In)		36		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		100		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**15,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		0.21		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**422,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		0.21		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		8	4	
Passes		3	19.71	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**342,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		5,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**10,000**		
			TOTAL CAPITAL COST $	**17,767,000**

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RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	6	
Peak Volume	349	CF
	0.00	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.32	CFS
	0.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		0.21		0.32	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		10			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		5		OK	Input by Engineer
Width (Ft)		3		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**1,234,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		0.23		0.36	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		3			Input by Engineer
Force Main Velocity (FPS)		7.3		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**481,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.32			Ref: Technical Parameters
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		0.21			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**422,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		0.23			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		8		4	Input by Engineer
Passes		3		17.91	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	342,000	$	120,000	
Construction Cost (Disinfection)	**$**	**462,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		22,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST $	**2,759,000**

RESULTS SUMMARY		
Number of Events / Year	19	
Number of Overflows / Year	6	
Peak Volume	349	CF
	0.00	MG
Total Volume	28,414	CF
	0.21	MG
Peak Rate	0.32	CFS
	0.21	MGD

Capital Costs - 134A001 / Sewershed CSO 134A001					
SCREENING AND DISINFECTION					
6 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		0.21		0.32	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**422,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		0.21		0.32	= Peak Flow x % Req Pump
Force Main Diameter (In)		3			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.6		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**463,000**	**$**	**14,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		0.32			Ref: CSO Statistics
Diameter (In)		36			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		100			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**63,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		100			=CFS x 200
Odor Control Flow Rate (CFM)		10			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**2,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		0.21			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		8		4	
Passes		3		**19.71**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	342,000	$	120,000	
Construction Cost (Disinfection)	**$**	**462,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		22,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**44,000**			
				TOTAL CAPITAL COST $	**1,509,000**

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	9.86	$86,694	20	10.910	$945,824
	Tank O&M	No. Events / Yr	19	$11,994	50	14.484	$173,710
		Const Cost ($)	$128,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,270	20	10.910	$90,228
	Odor Control O&M	Capacity (cfm)	190	$665	20	10.910	$7,255
	Reserve / Replace	10% Gravity / 15% Pump					$13,827
			Total Annual O&M	$108,000		Total PW O&M	$1,231,000

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.16	$5,538	20	10.910	$60,418
	Tank O&M	No. Events / Yr	19	$15,196	50	14.484	$220,094
		Const Cost ($)	$1,409,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	10	$8,270	20	10.910	$90,228
	Odor Control O&M	Capacity (cfm)	1,900	$6,650	20	10.910	$72,551
	Reserve / Replace	10% Gravity / 15% Pump					$4,492
			Total Annual O&M	$36,000		Total PW O&M	$448,000

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	9.86	$86,694	20	10.910	$945,824
	Sed. Basin O&M	Flow Rate (mgd)	9.86	$1,109	50	14.484	$16,060
	Screening O&M	Flow Rate (mgd)	9.86	$8,270	20	10.910	$90,228
	Disinfection O&M	Flow Rate (mgd)	9.86	$64,812	20	10.910	$707,096
	Odor Control O&M	Capacity (cfm)	1,600.00	$5,600	20	10.910	$61,096
	Reserve / Replace	10% Gravity / 15% Pump					$15,595
			Total Annual O&M	$167,000		Total PW O&M	$1,836,000

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	10.84	$92,394	20	10.910	$1,008,010
	HREP O&M	Flow Rate (mgd)	9.86	$89,456	20	10.910	$975,959
	Screening O&M	Flow Rate (mgd)	9.86	$8,270	20	10.910	$90,228
	Disinfection O&M	Flow Rate (mgd)	10.84	$68,687	20	10.910	$749,367
	Odor Control O&M	Capacity (cfm)	150.00	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$23,184
			Total Annual O&M	**$260,000**		**Total PW O&M**	**$2,852,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	10.84	$92,394	20	10.910	$1,008,010
	Swirl / Vortex O&M	Flow Rate (mgd)	9.86	$1,109	20	10.910	$12,097
	Screening O&M	Flow Rate (mgd)	9.86	$8,270	20	10.910	$90,228
	Disinfection O&M	Flow Rate (mgd)	10.84	$68,687	20	10.910	$749,367
	Odor Control O&M	Capacity (cfm)	2,900.00	$10,150	20	10.910	$110,736
	Reserve / Replace	10% Gravity / 15% Pump					$17,885
			Total Annual O&M	**$181,000**		**Total PW O&M**	**$1,988,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	9.86	$86,694	20	10.910	$945,824
	Screening O&M	Flow Rate (mgd)	9.86	$8,270	20	10.910	$90,228
	Disinfection O&M	Flow Rate (mgd)	9.86	$64,812	20	10.910	$707,096
	Odor Control O&M	Capacity (cfm)	160.00	$560	20	10.910	$6,110
	Reserve / Replace	10% Gravity / 15% Pump					$15,296
			Total Annual O&M	**$161,000**		**Total PW O&M**	**$1,765,000**

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	1.21	$21,361	20	10.910	$233,048
	Tank O&M	No. Events / Yr	19	$11,696	50	14.484	$169,402
		Const Cost ($)	$9,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,536	20	10.910	$82,219
	Odor Control O&M	Capacity (cfm)	20	$70	20	10.910	$764
	Reserve / Replace	10% Gravity / 15% Pump					$6,645
			Total Annual O&M	**$41,000**		**Total PW O&M**	**$492,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.01	$1,099	20	10.910	$11,990
	Tank O&M	No. Events / Yr	19	$14,069	50	14.484	$203,764
		Const Cost ($)	$958,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,536	20	10.910	$82,219
	Odor Control O&M	Capacity (cfm)	150	$525	20	10.910	$5,728
	Reserve / Replace	10% Gravity / 15% Pump					$2,542
			Total Annual O&M	**$24,000**		**Total PW O&M**	**$306,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	1.21	$21,361	20	10.910	$233,048
	Sed. Basin O&M	Flow Rate (mgd)	1.21	$136	50	14.484	$1,973
	Screening O&M	Flow Rate (mgd)	1.21	$7,536	20	10.910	$82,219
	Disinfection O&M	Flow Rate (mgd)	1.21	$18,069	20	10.910	$197,128
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$7,719
			Total Annual O&M	**$49,000**		**Total PW O&M**	**$534,000**

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	1.33	$22,766	20	10.910	$248,371
	HREP O&M	Flow Rate (mgd)	1.21	$26,067	20	10.910	$284,390
	Screening O&M	Flow Rate (mgd)	1.21	$7,536	20	10.910	$82,219
	Disinfection O&M	Flow Rate (mgd)	1.33	$19,149	20	10.910	$208,912
	Odor Control O&M	Capacity (cfm)	50.00	$175	20	10.910	$1,909
	Reserve / Replace	10% Gravity / 15% Pump					$11,855
			Total Annual O&M	**$76,000**		**Total PW O&M**	**$838,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	1.33	$22,766	20	10.910	$248,371
	Swirl / Vortex O&M	Flow Rate (mgd)	1.21	$136	20	10.910	$1,486
	Screening O&M	Flow Rate (mgd)	1.21	$7,536	20	10.910	$82,219
	Disinfection O&M	Flow Rate (mgd)	1.33	$19,149	20	10.910	$208,912
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$8,050
			Total Annual O&M	**$50,000**		**Total PW O&M**	**$549,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	1.21	$21,361	20	10.910	$233,048
	Screening O&M	Flow Rate (mgd)	1.21	$7,536	20	10.910	$82,219
	Disinfection O&M	Flow Rate (mgd)	1.21	$18,069	20	10.910	$197,128
	Odor Control O&M	Capacity (cfm)	20.00	$70	20	10.910	$764
	Reserve / Replace	10% Gravity / 15% Pump					$7,632
			Total Annual O&M	**$48,000**		**Total PW O&M**	**$521,000**

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.62	$13,611	20	10.910	$148,500
	Tank O&M	No. Events / Yr	19	$11,686	50	14.484	$169,257
		Const Cost ($)	$5,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,487	20	10.910	$81,679
	Odor Control O&M	Capacity (cfm)	10	$35	20	10.910	$382
	Reserve / Replace	10% Gravity / 15% Pump					$4,506
			Total Annual O&M	**$33,000**		**Total PW O&M**	**$404,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.01	$750	20	10.910	$8,187
	Tank O&M	No. Events / Yr	19	$14,021	50	14.484	$203,076
		Const Cost ($)	$939,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	1	$7,487	20	10.910	$81,679
	Odor Control O&M	Capacity (cfm)	100	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$2,428
			Total Annual O&M	**$23,000**		**Total PW O&M**	**$299,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	0.62	$13,611	20	10.910	$148,500
	Sed. Basin O&M	Flow Rate (mgd)	0.62	$69	50	14.484	$1,005
	Screening O&M	Flow Rate (mgd)	0.62	$7,487	20	10.910	$81,679
	Disinfection O&M	Flow Rate (mgd)	0.62	$11,980	20	10.910	$130,702
	Odor Control O&M	Capacity (cfm)	200.00	$700	20	10.910	$7,637
	Reserve / Replace	10% Gravity / 15% Pump					$5,523
			Total Annual O&M	**$34,000**		**Total PW O&M**	**$375,000**

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	0.68	$14,506	20	10.910	$158,263
	HREP O&M	Flow Rate (mgd)	0.62	$17,531	20	10.910	$191,263
	Screening O&M	Flow Rate (mgd)	0.62	$7,487	20	10.910	$81,679
	Disinfection O&M	Flow Rate (mgd)	0.68	$12,696	20	10.910	$138,516
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$9,200
			Total Annual O&M	**$53,000**		**Total PW O&M**	**$579,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	0.68	$14,506	20	10.910	$158,263
	Swirl / Vortex O&M	Flow Rate (mgd)	0.62	$69	20	10.910	$757
	Screening O&M	Flow Rate (mgd)	0.62	$7,487	20	10.910	$81,679
	Disinfection O&M	Flow Rate (mgd)	0.68	$12,696	20	10.910	$138,516
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$5,670
			Total Annual O&M	**$35,000**		**Total PW O&M**	**$385,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	0.62	$13,611	20	10.910	$148,500
	Screening O&M	Flow Rate (mgd)	0.62	$7,487	20	10.910	$81,679
	Disinfection O&M	Flow Rate (mgd)	0.62	$11,980	20	10.910	$130,702
	Odor Control O&M	Capacity (cfm)	10.00	$35	20	10.910	$382
	Reserve / Replace	10% Gravity / 15% Pump					$5,458
			Total Annual O&M	**$34,000**		**Total PW O&M**	**$367,000**

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.35	$9,312	20	10.910	$101,590
	Tank O&M	No. Events / Yr	19	$11,684	50	14.484	$169,220
		Const Cost ($)	$4,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	0	$7,464	20	10.910	$81,437
	Odor Control O&M	Capacity (cfm)	10	$35	20	10.910	$382
	Reserve / Replace	10% Gravity / 15% Pump					$3,544
			Total Annual O&M	**$29,000**		**Total PW O&M**	**$356,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.01	$657	20	10.910	$7,166
	Tank O&M	No. Events / Yr	19	$14,009	50	14.484	$202,895
		Const Cost ($)	$934,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	0	$7,464	20	10.910	$81,437
	Odor Control O&M	Capacity (cfm)	100	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$2,388
			Total Annual O&M	**$23,000**		**Total PW O&M**	**$298,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	0.35	$9,312	20	10.910	$101,590
	Sed. Basin O&M	Flow Rate (mgd)	0.35	$39	50	14.484	$569
	Screening O&M	Flow Rate (mgd)	0.35	$7,464	20	10.910	$81,437
	Disinfection O&M	Flow Rate (mgd)	0.35	$8,475	20	10.910	$92,458
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$4,518
			Total Annual O&M	**$26,000**		**Total PW O&M**	**$284,000**

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	0.38	$9,924	20	10.910	$108,269
	HREP O&M	Flow Rate (mgd)	0.35	$12,551	20	10.910	$136,930
	Screening O&M	Flow Rate (mgd)	0.35	$7,464	20	10.910	$81,437
	Disinfection O&M	Flow Rate (mgd)	0.38	$8,981	20	10.910	$97,985
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$8,014
			Total Annual O&M	**$39,000**		**Total PW O&M**	**$433,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	0.38	$9,924	20	10.910	$108,269
	Swirl / Vortex O&M	Flow Rate (mgd)	0.35	$39	20	10.910	$429
	Screening O&M	Flow Rate (mgd)	0.35	$7,464	20	10.910	$81,437
	Disinfection O&M	Flow Rate (mgd)	0.38	$8,981	20	10.910	$97,985
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$4,598
			Total Annual O&M	**$27,000**		**Total PW O&M**	**$293,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	0.35	$9,312	20	10.910	$101,590
	Screening O&M	Flow Rate (mgd)	0.35	$7,464	20	10.910	$81,437
	Disinfection O&M	Flow Rate (mgd)	0.35	$8,475	20	10.910	$92,458
	Odor Control O&M	Capacity (cfm)	10.00	$35	20	10.910	$382
	Reserve / Replace	10% Gravity / 15% Pump					$4,483
			Total Annual O&M	**$26,000**		**Total PW O&M**	**$280,000**

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.21	$6,624	20	10.910	$72,267
	Tank O&M	No. Events / Yr	19	$11,676	50	14.484	$169,112
		Const Cost ($)	$1,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	0	$7,453	20	10.910	$81,311
	Odor Control O&M	Capacity (cfm)	0	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$3,037
			Total Annual O&M	**$26,000**		**Total PW O&M**	**$326,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	0.00	$353	20	10.910	$3,856
	Tank O&M	No. Events / Yr	19	$13,979	50	14.484	$202,460
		Const Cost ($)	$922,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	0	$7,453	20	10.910	$81,311
	Odor Control O&M	Capacity (cfm)	0	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$2,319
			Total Annual O&M	**$22,000**		**Total PW O&M**	**$290,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	0.21	$6,624	20	10.910	$72,267
	Sed. Basin O&M	Flow Rate (mgd)	0.21	$24	50	14.484	$342
	Screening O&M	Flow Rate (mgd)	0.21	$7,453	20	10.910	$81,311
	Disinfection O&M	Flow Rate (mgd)	0.21	$6,212	20	10.910	$67,775
	Odor Control O&M	Capacity (cfm)	100.00	$350	20	10.910	$3,818
	Reserve / Replace	10% Gravity / 15% Pump					$4,008
			Total Annual O&M	**$21,000**		**Total PW O&M**	**$230,000**

Operation and Maintenance Cost Summary

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	0.23	$7,059	20	10.910	$77,018
	HREP O&M	Flow Rate (mgd)	0.21	$9,300	20	10.910	$101,460
	Screening O&M	Flow Rate (mgd)	0.21	$7,453	20	10.910	$81,311
	Disinfection O&M	Flow Rate (mgd)	0.23	$6,584	20	10.910	$71,827
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$7,397
			Total Annual O&M	**$31,000**		**Total PW O&M**	**$339,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	0.23	$7,059	20	10.910	$77,018
	Swirl / Vortex O&M	Flow Rate (mgd)	0.21	$24	20	10.910	$258
	Screening O&M	Flow Rate (mgd)	0.21	$7,453	20	10.910	$81,311
	Disinfection O&M	Flow Rate (mgd)	0.23	$6,584	20	10.910	$71,827
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$4,041
			Total Annual O&M	**$22,000**		**Total PW O&M**	**$234,000**

CSO 134A001	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	0.21	$6,624	20	10.910	$72,267
	Screening O&M	Flow Rate (mgd)	0.21	$7,453	20	10.910	$81,311
	Disinfection O&M	Flow Rate (mgd)	0.21	$6,212	20	10.910	$67,775
	Odor Control O&M	Capacity (cfm)	10.00	$35	20	10.910	$382
	Reserve / Replace	10% Gravity / 15% Pump					$3,973
			Total Annual O&M	**$21,000**		**Total PW O&M**	**$226,000**

Cost Summary

CS4-Separation SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$1.4	$1,397,000	$0
1	$1.4	$1,397,000	$0
2	$1.4	$1,397,000	$0
4	$1.4	$1,397,000	$0
6	$1.4	$1,397,000	$0

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$3.5	$3,010,000	$448,000
1	$2.2	$1,896,000	$306,000
2	$2.1	$1,838,000	$299,000
4	$2.1	$1,819,000	$298,000
6	$2.1	$1,782,000	$290,000

S4-Surf Tnk SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$5.2	$3,991,000	$1,231,000
1	$2.4	$1,953,000	$492,000
2	$1.8	$1,412,000	$404,000
4	$1.5	$1,170,000	$356,000
6	$1.4	$1,040,000	$326,000

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$8.1	$6,159,000	$1,988,000
1	$3.2	$2,633,000	$549,000
2	$2.4	$2,034,000	$385,000
4	$2.1	$1,761,000	$293,000
6	$1.9	$1,621,000	$234,000

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$10.6	$7,702,000	$2,852,000
1	$4.8	$3,993,000	$838,000
2	$3.8	$3,266,000	$579,000
4	$3.4	$2,935,000	$433,000
6	$3.1	$2,759,000	$339,000

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$22.7	$20,869,000	$1,836,000
1	$19.2	$18,708,000	$534,000
2	$18.5	$18,151,000	$375,000
4	$18.2	$17,895,000	$284,000
6	$18.0	$17,767,000	$230,000

T4-Scr & Dis SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$6.6	$4,821,000	$1,765,000
1	$3.0	$2,490,000	$521,000
2	$2.3	$1,911,000	$367,000
4	$1.9	$1,647,000	$280,000
6	$1.7	$1,509,000	$226,000

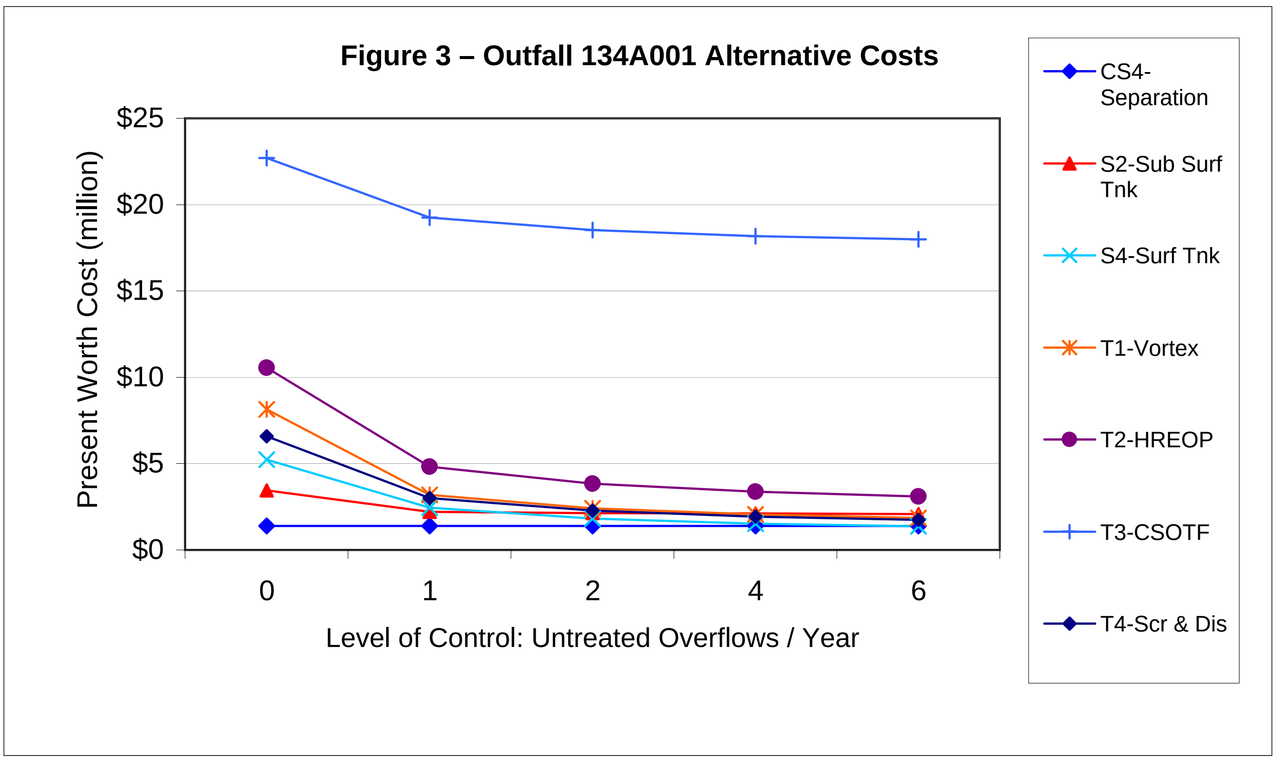


Figure 3 – Outfall 134A001 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	CSO 134A001
Location Name	Hillburn Street
Model ID	DC 134A001-W.Y
Structure Type	Outfall
PWSA Sewershed	Streets Run
Stream of Discharge	Monongahela River
NPDES Permit Number	134A001
Owner	PWSA

Results Summary

Number of Events:	19
Peak Volume:	21,463 ft^3
	0.16 MG
Total Volume:	28,414 ft^3
	0.21 MG
Peak Rate:	15.25 cfs

Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
8/20/2005 18:30	109	8/20/2005 18:45	21463.12	160.555	0	15.25	0
7/17/2005 16:15	34	7/17/2005 16:25	1907.25	14.267	1	1.87	1
7/5/2005 16:45	34	7/5/2005 17:00	1077.51	8.060	2	0.95	2
9/16/2005 21:15	34	9/16/2005 21:25	1073.39	8.030	3	0.76	3
6/6/2005 9:30	34	6/6/2005 9:45	882.73	6.603	4	0.54	4
7/26/2005 19:50	29	7/26/2005 20:05	440.88	3.298	5	0.32	6
7/21/2005 14:45	19	7/21/2005 14:55	349.08	2.611	6	0.45	5
9/29/2005 5:30	19	9/29/2005 5:45	188.59	1.411	7	0.21	10
4/23/2005 4:00	18	4/23/2005 4:15	148.76	1.113	8	0.17	11
6/8/2005 21:05	14	6/8/2005 21:10	141.34	1.057	9	0.24	7
5/13/2005 22:35	14	5/13/2005 22:40	136.76	1.023	10	0.23	8
5/11/2005 22:50	14	5/11/2005 22:55	128.60	0.962	11	0.22	9
7/5/2005 3:31	18	7/5/2005 3:45	123.73	0.926	12	0.14	14
7/25/2005 13:35	13	7/25/2005 13:45	96.55	0.722	13	0.16	12
11/9/2005 12:51	13	11/9/2005 12:55	84.01	0.628	14	0.14	13
10/21/2005 19:31	16	10/21/2005 19:45	69.34	0.519	15	0.08	15
10/22/2005 6:32	16	10/22/2005 6:45	62.63	0.468	16	0.07	16
11/29/2005 7:19	12	11/29/2005 7:25	25.81	0.193	17	0.04	18
5/28/2005 15:09	7	5/28/2005 15:15	13.92	0.104	18	0.04	17

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

Structure ID	CSO 134A001
Location Name	Hillburn Street
Model ID	DC 134A001-W.Y
Structure Type	Outfall
PWSA Sewershed	Streets Run
Stream of Discharge	Monongahela River
NPDES Permit Number	134A001
Owner	PWSA
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	19
Peak Volume:	21,463 ft^3
	0.16 MG
Total Volume:	28,414 ft^3
	0.21 MG
Peak Rate:	15.25 cfs

Figure 1 - Outfall CSO134A001 CSO Volume

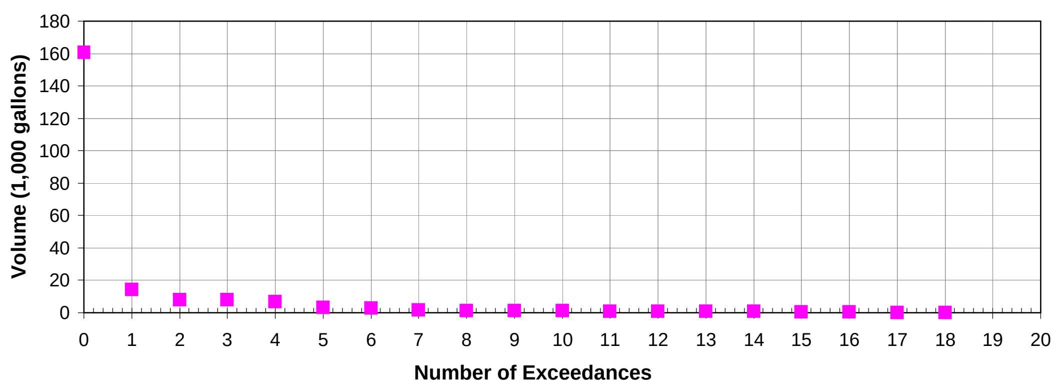
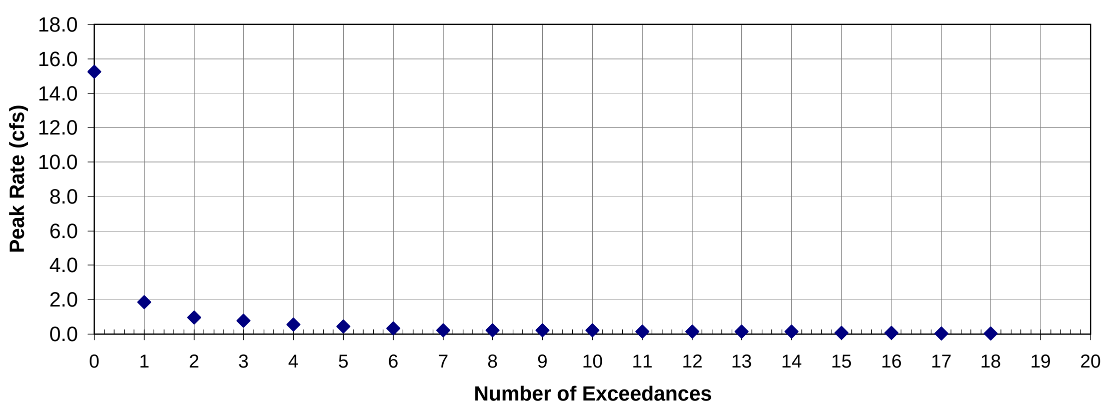


Figure 2 - Outfall CSO134A001 CSO Peak Flow Rate



D.37.2 STREETS RUN SEWERSHED – HILLBURN STREET - NPDES #134A001

Description of Outfall

Outfall 134A001 conveys overflows from the PWSA diversion chamber 134A001 to Streets Run, and ultimately into the Monongahela River. The outfall is located along Streets Run, north of Hillburn Street, adjacent to a neighborhood playground area. The Streets Run Sewershed consists of 6,521 acres of residential, business and commercial users. The Streets Run Sewershed is comprised of approximately 663 manholes and 125,501 linear feet (23.8 miles) of storm, sanitary, and combined sewers up to 60 inches in diameter. The 134A001 Sewershed (Hillburn Street) consists of 9 acres, or approximately 0.1% of the total service area.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 134A001 typically experiences 19 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 134A001 is approximately 0.16 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 134A001 is approximately 15.25 CFS. *Figure 1 – Outfall 134A001 CSO Volume* and *Figure 2 – Outfall 134A001 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 19 largest CSO events during the typical year baseline conditions simulation.

Figure 1 - Outfall CSO134A001 CSO Volume

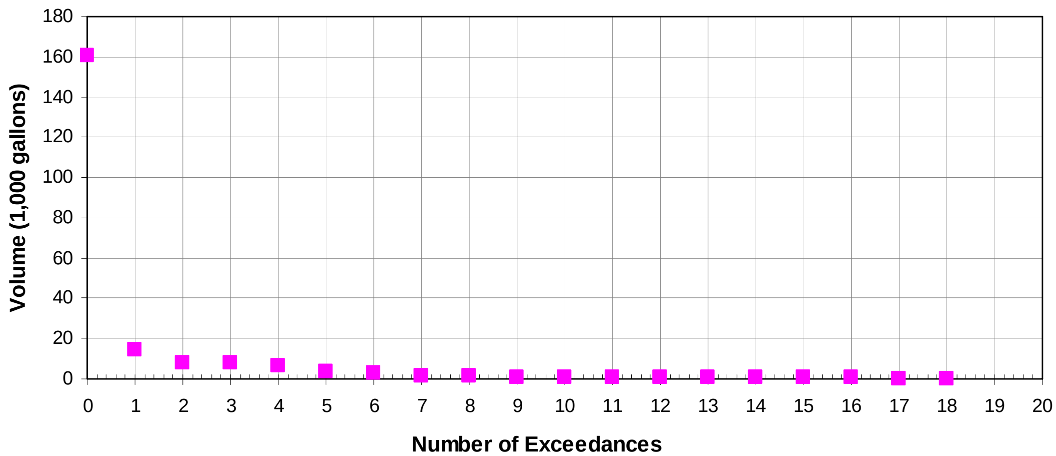
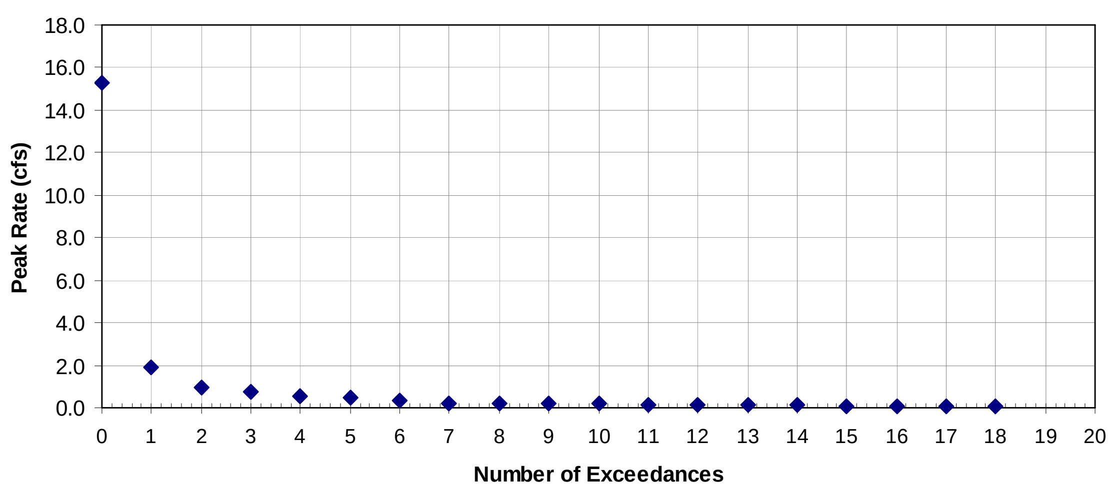


Figure 2 - Outfall CSO134A001 CSO Peak Flow Rate



There appears to be available space for potential storage or treatment facilities to the north of Mifflin Road, adjacent to the outfall. The site is generally bounded by Mifflin Road to the south, Calera Street to the west and private development to the north and east.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 134A001. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS3-134A001: Relief Sewer

- Construct a relief sewer to capture the overflows from the outfall and convey them to ALCOSAN regulator M-42.

CS4-134A001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-134A001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-134A001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the the

collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-134A001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-134A001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-134A001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-134A001: Screening and Disinfection

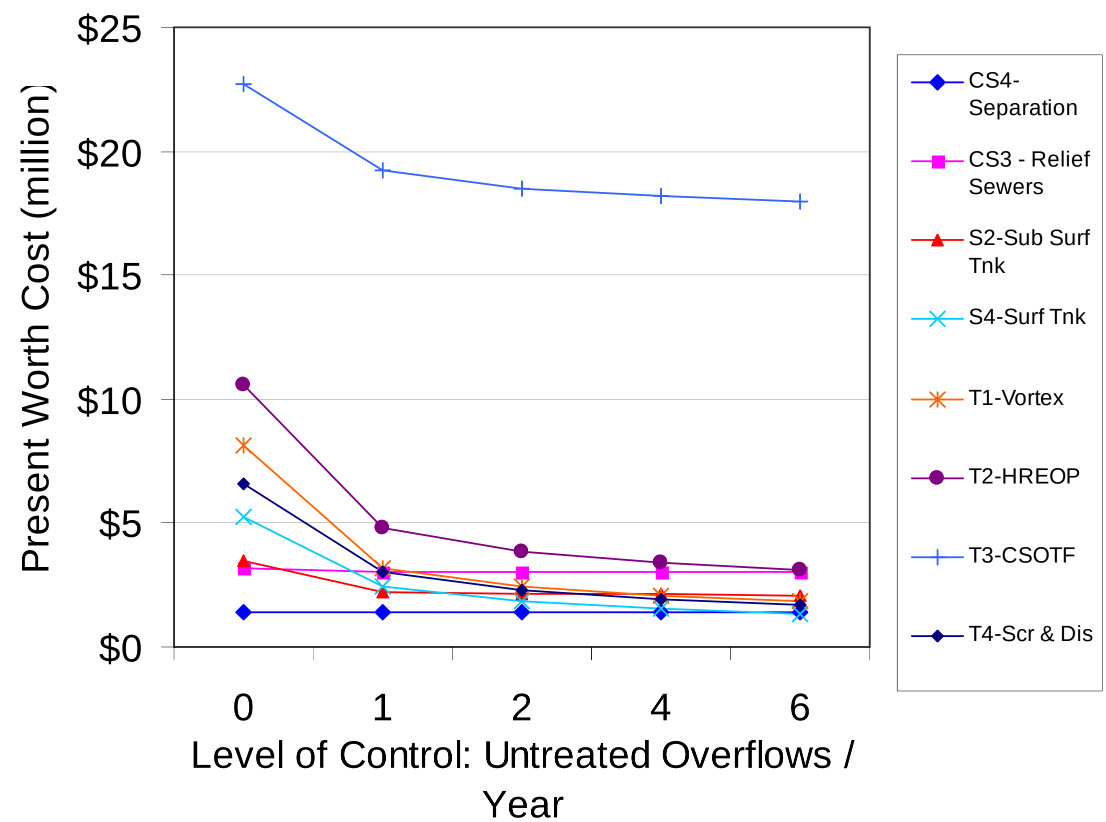
- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 134A001 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 134A001 Alternative Costs



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

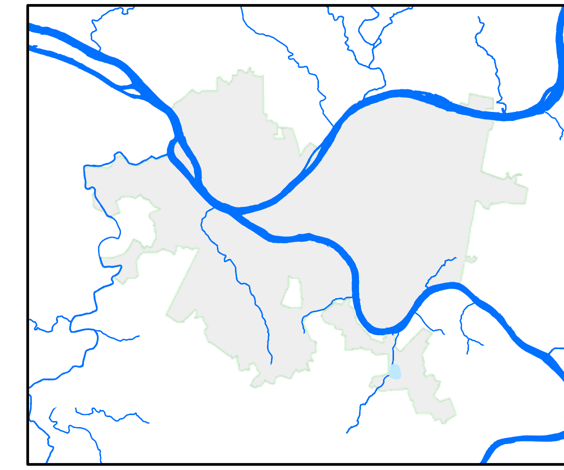
Recommendations

Based upon the above, for control levels 0 through 6, it is recommended that Alternative CS4-134A001: Sewer Separation be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Although separation reduces hydraulic loading, additional pollutants may be introduced to the receiving stream. Stormwater flows that would have originally ended up in the trunk sewer will now discharge directly to local waterways. Discharge constituents include surface pollutants such as oil, grease and road grit, as well as general trash and road debris. Another issue to consider with separation is the available regulator capacity at the ALCOSAN diversion chamber. Sufficient capacity must exist in order to convey the sanitary flow to the interceptor. Failure to provide sufficient capacity may result in a sanitary sewer overflow (SSO) condition.



Area Overview

Legend

- Sewershed Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

0 290 580
Feet

Attachment 1
CSO 134A001
Tributary Area Map
Streets Run
Sewershed

CSO Controls Alternatives

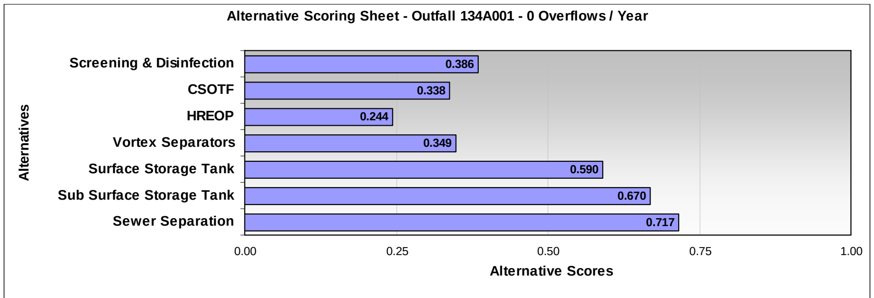
PWSA

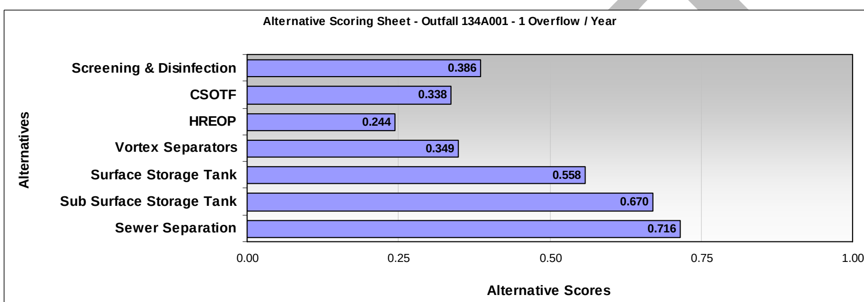
SW-D-0270.pdf

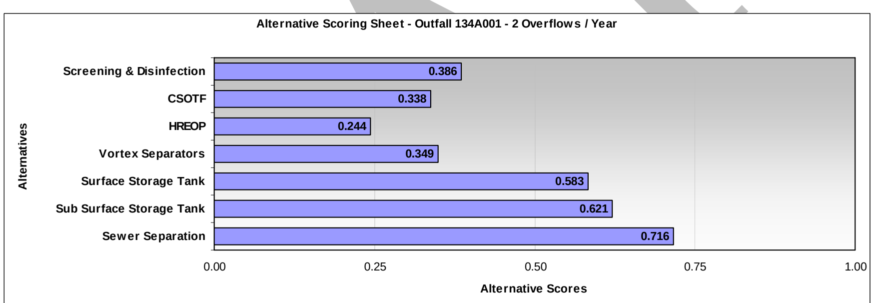
Attachment 2 - CSO Alternatives Development Worksheet

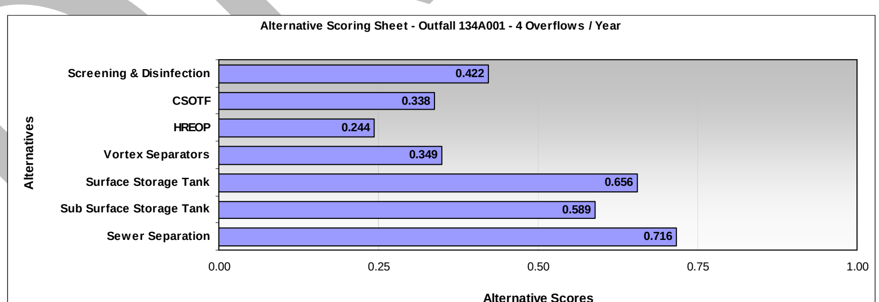
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	Y	A relief sewer will be evaluated.
Sewer separation	Y	Sewer separation within the 9 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

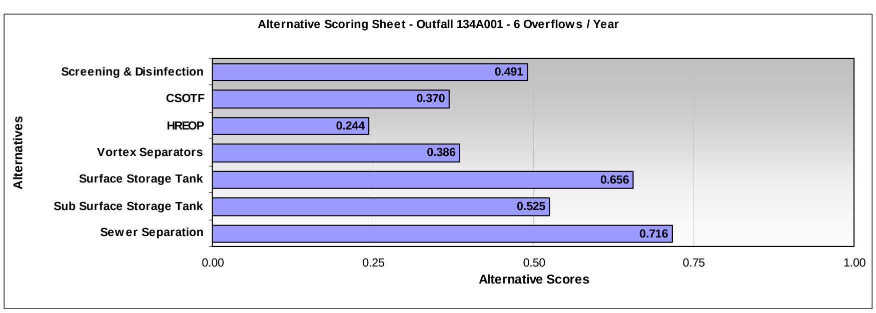
Attachment 3 – Alternative Scoring Sheet

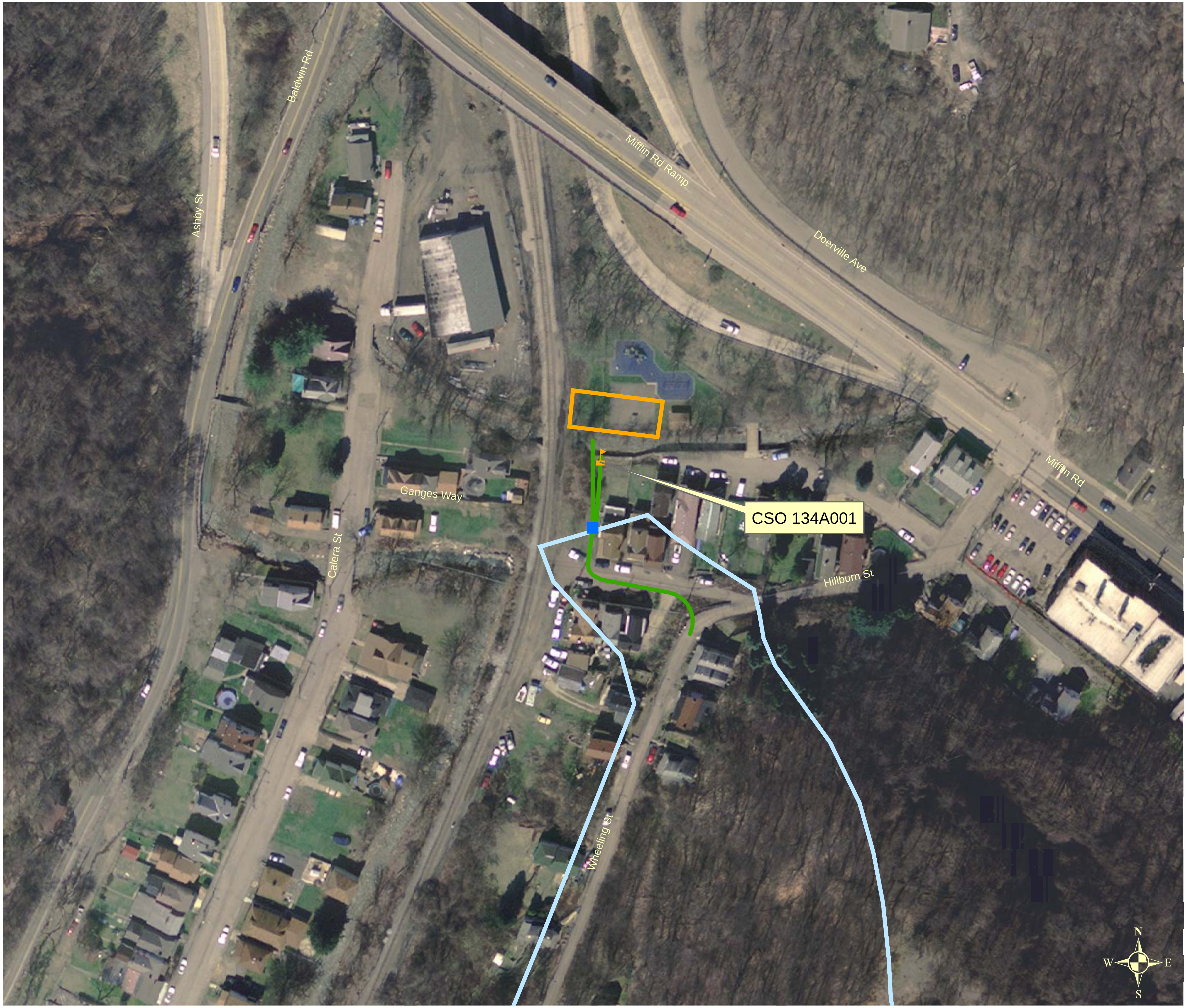


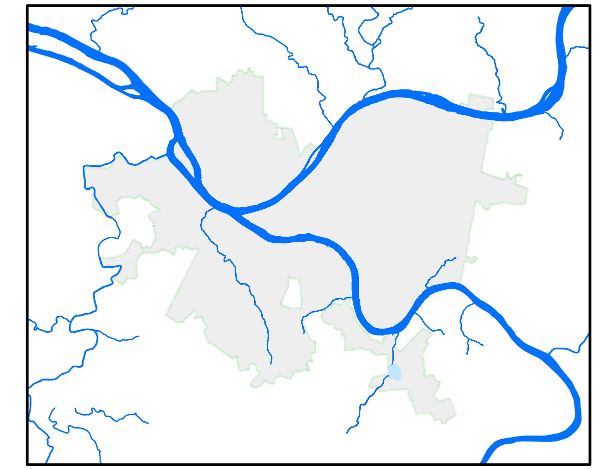












Area Overview

Legend

- Sewershed Boundary
- Facilities Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

100 0 100
Feet

Attachment 4
CSO 134A001
Facilities Boundary Map
Streets Run
Sewershed

CSO Controls Alternatives

SW-D-0270.pdf

Objective Scoring

Alternative:	CS4-Separation	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	CS4-Separation	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	2	2	2	2	2
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP					
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	CS4-Separation	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	2	2	2	2	2
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: CS4-Separation		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	1	1	1	1	1
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: CS4-Separation		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	4	4	4	4	4
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	CS4-Separation	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	5	5	5	5	5
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	CS4-Separation	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	3	3	3	3	3
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	CS4-Separation	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	CS4-Separation	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	5	5	5	5	5
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	1	1	1	1	1
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	CS4-Separation	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	5	5	5	5	5
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	CS4-Separation	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	5	5	5
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.	1	1	1	1	1
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.					
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Alternative:	S2-Sub Surf Tnk	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)	4	4	4	4	4
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
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5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.	5	5	4	4	4
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.					
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Alternative:	S2-Sub Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
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5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	4	4	4	4	4
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	3	3	3	3	3
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S2-Sub Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	1	1	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	**S4-Surf Tnk**	**Objective Scoring: Present Worth**	**Actual Scores**				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	2
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	**S4-Surf Tnk**	**Objective Scoring: Pollution Reduction**	**Actual Scores**				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	**S4-Surf Tnk**	**Objective Scoring: Impact on Habitat, Stream, River etc.**	**Actual Scores**				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	5	5	4	4	4
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	S4-Surf Tnk	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.	3	3	3	3	3
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.					
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	S4-Surf Tnk	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.	2	2	2	2	2
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.					
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	S4-Surf Tnk	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.	1	1	1	1	1
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.					
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	S4-Surf Tnk	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	S4-Surf Tnk	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	S4-Surf Tnk	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	4	4	4	4	4
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	S4-Surf Tnk	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	5	5	5	5	5
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	4	4	4	4	4
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	S4-Surf Tnk	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	4	4	4	4	4
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T1-Vortex	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	3	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T1-Vortex	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T1-Vortex	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T1-Vortex		Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T1-Vortex	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T1-Vortex	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

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Alternative:	T1-Vortex	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.	5	5	5	5	5
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.					
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T1-Vortex	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T1-Vortex	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.	2	2	2	2	2
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.					
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T1-Vortex	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T1-Vortex	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	4	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T2-HREOP	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T2-HREOP	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	4	4	4	4	4
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T2-HREOP	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T2-HREOP	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T2-HREOP	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T2-HREOP	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T2-HREOP	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T2-HREOP	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.					
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.	1	1	1	1	1
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T2-HREOP	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	1	1	1	1	1
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T2-HREOP	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	1	1	1	1	1
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	1	1	1	1	1
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T2-HREOP	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	2	1	1	1
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team
Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

Alternative:	T3-CSOTF	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	1	1	1	1	1
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T3-CSOTF	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	3	3	3	3	3
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T3-CSOTF	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	2	2	2	2	2
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative: T3-CSOTF		Objective Scoring: Constructability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific.					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative: T3-CSOTF		Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	2	2	2	2	2
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative: T3-CSOTF		Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Alternative:	T3-CSOTF	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T3-CSOTF	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	1	1	1	1	1
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T3-CSOTF	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T3-CSOTF	Objective Scoring: Reliability	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T3-CSOTF	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	4	3	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	T4-Scr & Dis	Objective Scoring: Present Worth	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	PW Cost is more than 40% higher than the cost of the least expensive control alternative.					
2	High Cost	PW Cost is between 30% and 40% more than the cost of the least expensive control alternative.					
3	Moderate Cost	PW Cost is between 20% and 30% more than the cost of the least expensive control alternative.	5	5	5	5	5
4	Low Cost	PW Cost is between 10% and 20% more than the cost of the least expensive control alternative.					
5	Very Low Cost	PW Cost is within 10% of the cost of the least expensive control alternative.					

Alternative:	T4-Scr & Dis	Objective Scoring: Pollution Reduction	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Minimal Treatment	Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.)					
2	Less than Primary Treatment	Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO.					
3	Primary Treatment	Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP	2	2	2	2	2
4	Primary to Secondary Treatment	Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels.					
5	Secondary Treatment	Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP.					

Alternative:	T4-Scr & Dis	Objective Scoring: Impact on Habitat, Stream, River etc.	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Negative Impact	Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc.					
2	Mod Negative Impact	Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs					
3	No Impact	Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats.	3	3	3	3	3
4	Mod Positive Impact	Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat.					
5	Positive Impact	Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment.					

Alternative:	T4-Scr & Dis	Objective Scoring: Constructability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Community Disruption	Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific					
2	Significant Community Disruption	Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific.					
3	Moderate Community Disruption	Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific.	3	3	3	3	3
4	Minimal Community Disruption	Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific.					
5	No Community Disruption	Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation.					

Alternative:	T4-Scr & Dis	Objective Scoring: Permanent Land Requirement	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Extreme Land Requirement	Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land.					
2	Large Land Requirement	Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity.					
3	Moderate Land Requirement	Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods.	3	3	3	3	3
4	Small Land Requirement	Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements.					
5	No Land Requirement	Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities.					

Alternative:	T4-Scr & Dis	Objective Scoring: Public Acceptance	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Strong Public Opposition	Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed.					
3	No Public Reaction	Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed.	3	3	3	3	3
5	Strong Public Support	Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed.					

Objective Scoring

Alternative:	T4-Scr & Dis	Objective Scoring: Institutional Constraints	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Not in PWSA Jurisdiction	Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities.					
3	Shared Jurisdiction	PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion.	5	5	5	5	5
5	PWSA Jurisdiction	Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications.					

Alternative:	T4-Scr & Dis	Objective Scoring: Siting Restrictions	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Difficult Req's	Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland.	3	3	3	3	3
3	Moderate Req's	Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities.					
5	No Req's	No permits required. Example: expanding existing PWSA facilities, such as raising weirs.					

Alternative:	T4-Scr & Dis	Objective Scoring: Operating Complexity	Actual Scores				
Baseline Score	**Metric**	**Example / Explanation**	**0 OF**	**1 OF**	**2 OF**	**4 OF**	**6 OF**
1	Extremely Complex; Req's Significant Trng and/or Staff	Example: High rate end-of-pipe treatment alternatives.					
2	Difficult to Operate; Req's Specific Trng	Example: elaborate real-time control alternatives. Vortex separators.					
3	Moderately Complex; Req's General Trng	Example: CSO treatment facility or screening and disinfection facilities.	3	3	3	3	3
4	Simple to Operate; Req's Limited Trng	Example: Storage / conveyance tunnels with pump station.					
5	Little or No O&M Required	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Flexibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Cannot be Exp. for Add'l CSO Control	Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.					
3	May be Exp. on Ltd Basis, w/ Some Difficulty	Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered.	3	3	3	3	3
5	Could be Easily Expanded	Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered.					

Alternative:	T4-Scr & Dis	Objective Scoring: Reliability	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	History of Significant Problems / Ltd Track Record	Example: High rate end-of-pipe alternatives.					
3	Mod Reliable, Req's Routine Maint. & Repair	Example: CSO treatment facilities. Most other treatment units.	3	3	3	3	3
5	Minimum Maint with Proven Track Record	Example: Storage tanks tunnels. Also includes separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Compatibility	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	No PWSA Experience	Example: High rate end-of-pipe alternatives.					
2	Very little PWSA Exp	Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units.					
3	Limited PWSA Experience	Example: Sub-surface storage tanks and tunnels.	2	2	2	2	2
4	Moderate PWSA Exp	Example: Above greade storage faccilities.					
5	Extensive PWSA Exp	Example: Sewer separation and regulator optimization.					

Alternative:	T4-Scr & Dis	Objective Scoring: Annual O&M	Actual Scores				
Baseline Score	Metric	Example / Explanation	0 OF	1 OF	2 OF	4 OF	6 OF
1	Very High Cost	Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives.	5	5	4	4	3
2	High Cost	Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives.					
3	Moderate Cost	Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives.					
4	Low Cost	Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives.					
5	Very Low Cost	Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives.					

3ox = Objective scores determined by PWSA / Consultant Team

ıf Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Alternative:	CS4-Separation		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.112	0.017
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.570**

Alternative:	CS4-Separation		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Total Score

Alternative:	CS4-Separation		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	CS4-Separation		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	1	0.00	0.062	0.000
Permanent Land Requirement	4	0.85	0.042	0.036
Public Acceptance	5	1.00	0.053	0.053
Institutional Constraints	3	0.50	0.033	0.017
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	5	1.01	0.078	0.079
Flexibility	1	0.00	0.053	0.000
Reliability	5	1.00	0.102	0.102
Compatibility	5	1.00	0.042	0.042
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.569**

Alternative:	S2-Sub Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.542**

Alternative:	S2-Sub Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.542**

Alternative:	S2-Sub Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.525**

Alternative:	S2-Sub Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.525**

Alternative:	S2-Sub Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	3	0.50	0.042	0.021
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.525**

Alternative:	S4-Surf Tnk		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.622**

Alternative:	S4-Surf Tnk		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	5	1.00	0.108	0.108
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.622**

Alternative:	S4-Surf Tnk		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.605**

Total Score

Alternative:	S4-Surf Tnk		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.605**

Alternative:	S4-Surf Tnk		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	2	0.25	0.147	0.037
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	4	0.85	0.108	0.092
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	1	0.00	0.053	0.000
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	4	0.82	0.078	0.064
Flexibility	3	0.50	0.053	0.027
Reliability	5	1.00	0.102	0.102
Compatibility	4	0.75	0.042	0.032
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.642**

Alternative:	T1-Vortex		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	3	0.50	0.147	0.074
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.551**

Alternative:	T1-Vortex		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.624**

Alternative:	T1-Vortex		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.592**

Alternative:	T1-Vortex		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.560**

Alternative:	T1-Vortex		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	2	0.12	0.078	0.009
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.560**

Total Score

Alternative:	T2-HREOP		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.372**

Alternative:	T2-HREOP		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	2	0.25	0.128	0.032
			Sum Total:	**0.276**

Alternative:	T2-HREOP		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T2-HREOP		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Alternative:	T2-HREOP		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	4	0.92	0.112	0.103
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	1	0.01	0.078	0.001
Flexibility	3	0.50	0.053	0.027
Reliability	1	0.00	0.102	0.000
Compatibility	1	0.00	0.042	0.000
Annual O&M	1	0.00	0.128	0.000
			Sum Total:	**0.244**

Total Score

Alternative:	T3-CSOTF		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.466**

Alternative:	T3-CSOTF		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.466**

Alternative:	T3-CSOTF		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.434**

Total Score

Alternative:	T3-CSOTF		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.402**

Alternative:	T3-CSOTF		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	1	0.00	0.147	0.000
Pollution Reduction	3	0.90	0.112	0.101
Impact on Habitat, River, Stream etc.	2	0.15	0.108	0.016
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	2	0.15	0.042	0.006
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	1	0.00	0.040	0.000
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.402**

Total Score

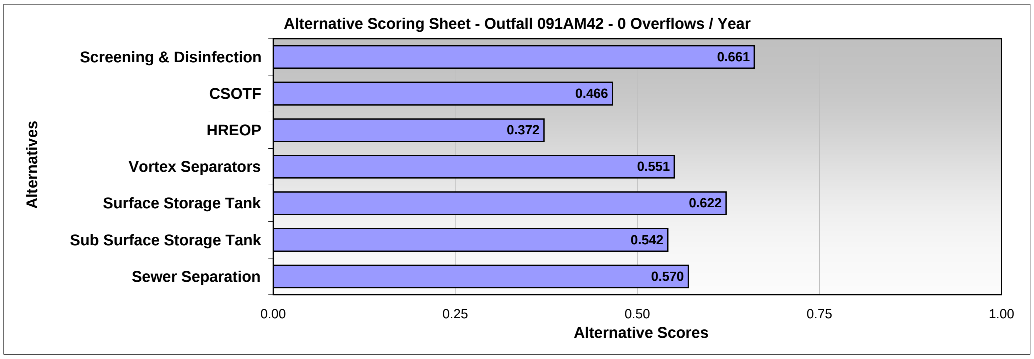
Alternative:	T4-Scr & Dis		Control Level:	0 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.661**

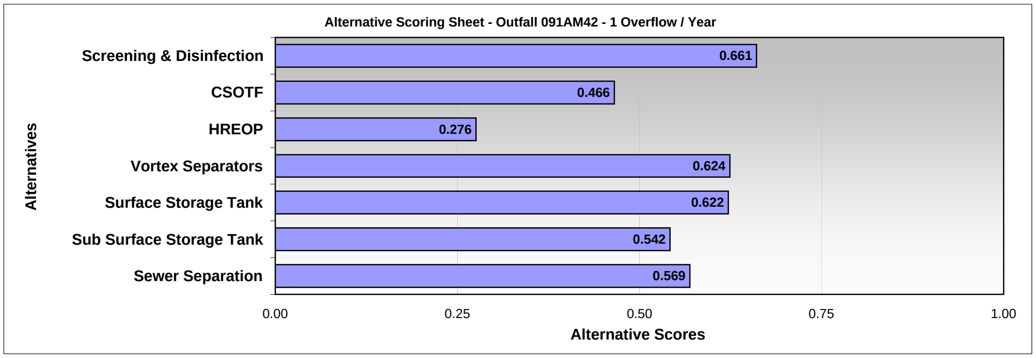
Alternative:	T4-Scr & Dis		Control Level:	1 Overflow / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	5	1.00	0.128	0.128
			Sum Total:	**0.661**

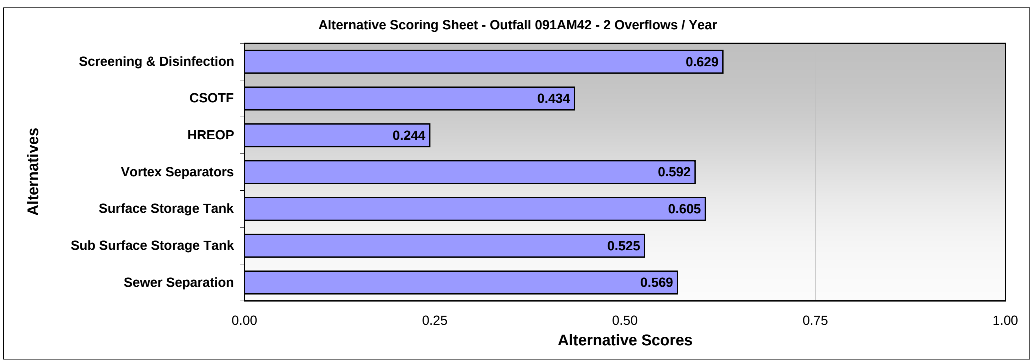
Alternative:	T4-Scr & Dis		Control Level:	2 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.629**

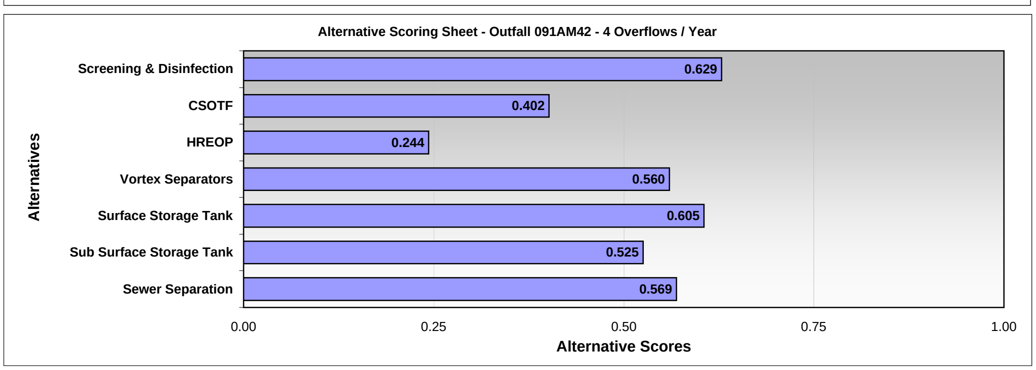
Alternative:	T4-Scr & Dis		Control Level:	4 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	4	0.75	0.128	0.096
			Sum Total:	**0.629**

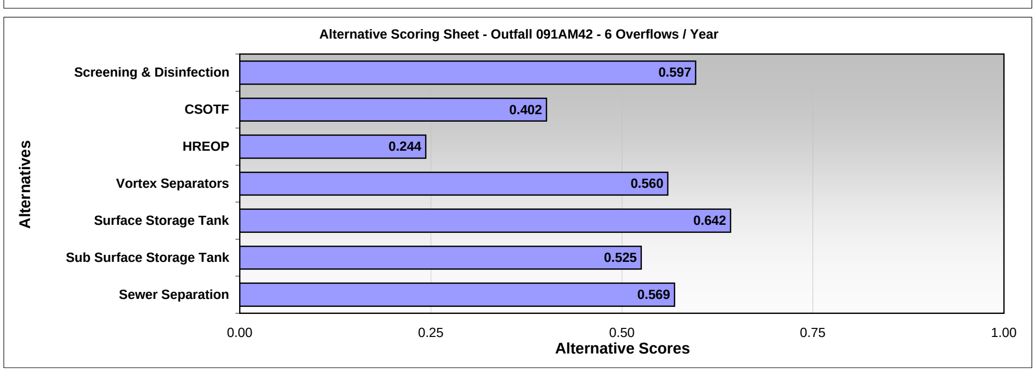
Alternative:	T4-Scr & Dis		Control Level:	6 Overflows / Year
	Objective Score	Subjective Score	Weighting Factor	Weighted Subj. Score
Present Worth Cost	5	1.00	0.147	0.147
Pollution Reduction	2	0.68	0.112	0.077
Impact on Habitat, River, Stream etc.	3	0.50	0.108	0.054
Constructability	3	0.50	0.062	0.031
Permanent Land Requirement	3	0.50	0.042	0.021
Public Acceptance	3	0.50	0.053	0.027
Institutional Constraints	5	1.00	0.033	0.033
Siting Restrictions	3	0.50	0.040	0.020
Operating Complexity	3	0.45	0.078	0.035
Flexibility	3	0.50	0.053	0.027
Reliability	3	0.50	0.102	0.051
Compatibility	2	0.25	0.042	0.011
Annual O&M	3	0.50	0.128	0.064
			Sum Total:	**0.597**


Alternative Scoring Sheet - Outfall 091AM42 - 0 Overflows / Year
Alternatives
Screening & Disinfection 0.661
CSOTF 0.466
HREOP 0.372
Vortex Separators 0.551
Surface Storage Tank 0.622
Sub Surface Storage Tank 0.542
Sewer Separation 0.570
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 091AM42 - 1 Overflow / Year
Alternatives
Screening & Disinfection 0.661
CSOTF 0.466
HREOP 0.276
Vortex Separators 0.624
Surface Storage Tank 0.622
Sub Surface Storage Tank 0.542
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 091AM42 - 2 Overflows / Year
Alternatives
Screening & Disinfection 0.629
CSOTF 0.434
HREOP 0.244
Vortex Separators 0.592
Surface Storage Tank 0.605
Sub Surface Storage Tank 0.525
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 091AM42 - 4 Overflows / Year
Alternatives
Screening & Disinfection 0.629
CSOTF 0.402
HREOP 0.244
Vortex Separators 0.560
Surface Storage Tank 0.605
Sub Surface Storage Tank 0.525
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 091AM42 - 6 Overflows / Year
Alternatives
Screening & Disinfection 0.597
CSOTF 0.402
HREOP 0.244
Vortex Separators 0.560
Surface Storage Tank 0.642
Sub Surface Storage Tank 0.525
Sewer Separation 0.569
0.00 0.25 0.50 0.75 1.00
Alternative Scores

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	0	
Peak Volume	7,098,402	CF
	53.10	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	35.13	CFS
	22.70	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42			
SEWER SEPARATION			
0 Overflows / Year			
1. Sewer Separation Parameters			
Drainage Area - Suburban Areas (Acres)	6,958		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas	100%		Complete Separation
Drainage Area - Urban Areas (Acres)			Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas	100%		Complete Separation
Construction Cost (Sewer Separation) $	**1,043,700,000**		
2. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Reg Mod Only
Number Regulators	1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators) $	**39,000**		
3. Land Acquisition Parameters			
Land Acquisition - Sewer Separation (SF)	3,030,905		1% Drainage Area
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**6,062,000**		
		TOTAL CAPITAL COST $	**1,049,801,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	0	
Peak Volume	7,098,402	CF
	53.10	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	35.13	CFS
	22.70	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42					
SURFACE STORAGE TANK					
0 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		53.10		7,098,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		62.47		8,351,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		Sufficient Depth	Ref: Tech Parmtrs, Rev as Req'd
Length (Ft)		915			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		610			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		62.62		8,372,250	Sufficient Volume
Tank Area (SF)		558,000			= Length x Width
Construction Cost (Storage Tank)		**71,556,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Rev as Req'd Ref: Tech Par
Influent Pumping Rate (MGD / CFS)		22.70		35.13	= Peak Rate
Force Main Diameter (In)		33			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,421,000**	**$**	**41,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		35.13			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,527,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		62,640			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**2,343,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		22.70			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,463,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			Typ 2, Rev as Req'd
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes / Detention (Min)				No Disnfctn	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			No Disinfection
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		811,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**1,622,000**			
			TOTAL CAPITAL COST	**$**	**81,820,000**

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RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	0	
Peak Volume	7,098,402	CF
	53.10	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	35.13	CFS
	22.70	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42

SUB-SURFACE STORAGE TANK

0 Overflows / Year

1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		53.10	7,098,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		62.47	8,351,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		915		= $(Vol / SWD * 1.5)^{1/2}$
Width (Ft)		610		= $(Vol / SWD / 1.5)^{1/2}$
Total Volume (MG / CF)		62.62	8,372,250	**Sufficient Volume**
Tank Area (SF)		558,000		= Length x Width
Construction Cost (Storage Tank)		**164,431,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		53.10	82.16	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		50		Input by Engineer
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**8,129,000**	**$ 60,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		35.13		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		12,527,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		626,350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**14,238,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		22.70		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,463,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes / Detention (Min)			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		811,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**1,622,000**		
			TOTAL CAPITAL COST $	**190,317,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	0	
Peak Volume	7,098,402	CF
	53.10	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	35.13	CFS
	22.70	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
0 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		22.70	35.13	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max		35	**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		3		
Construction Cost (Swirl / Vortex)	**$**	**2,034,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		24.97	38.64	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		34		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,698,000**	**$ 42,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		35.13		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		87,000		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		4,350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**290,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		22.70		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,463,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		24.97		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		79	38	
Passes / Detention (Min)		3	**15.54**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**841,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		24,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**		
			TOTAL CAPITAL COST $	**10,050,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	0	
Peak Volume	7,098,402	CF
	53.10	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	35.13	CFS
	22.70	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42			
SEDIMENTATION BASIN (CSOTF)			
0 Overflows / Year			
1. Sedimentation Basin (CSOTF) Parameters			
Sizing Basis: Peak Flow (MGD / CFS)	22.70	35.13	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)	4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)	6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)	80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)	3,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)	88	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)	44	Area OK	= Area Req'd / Length
Max Length : Width Ratio	3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth	12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)	0.35	46,464	
Construction Cost (CSOTF) $	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)	22.70	35.13	= Peak Flow x % Req Pump
Force Main Diameter (In)	33		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	5.9	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**4,421,000**	**$ 41,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	35.13		Ref: CSO Statistics
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	400		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**335,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	70,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)	3,500		= ACH x Volume / 60
Construction Cost (Odor Control) $	**244,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	22.70		Ref: CSO Statistics
Construction Cost (Screening) $	**1,463,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow (MGD)	22.70		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)	75	36	
Passes / Detention (Min)	3	15.37	Ref: Tech Param-15 min minimum
		OK Detn Time	
Construction Cost (Disinfection) $	**797,000**		
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	Modify Regulator	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - CSOTF (SF)	14,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**28,000**		
		TOTAL CAPITAL COST $	**23,739,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	0	
Peak Volume	7,098,402	CF
	53.10	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	35.13	CFS
	22.70	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42

HIGH RATE END OF PIPE TREATMENT (HREOP)

0 Overflows / Year

1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		22.70	35.13	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		270		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		24	**OK**	Input by Engineer
Width (Ft)		12	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**4,795,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		24.97	38.64	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		34		Input by Engineer
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,698,000**	**$ 42,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		35.13		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**40,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		22.70		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,463,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		24.97		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		79	38	Input by Engineer
Passes / Detention (Min)		3	**15.54**	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	841,000	$ 725,000	
Construction Cost (Disinfection)	**$**	**1,566,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		32,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**64,000**		
			TOTAL CAPITAL COST $	**13,042,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	0	
Peak Volume	7,098,402	CF
	53.10	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	35.13	CFS
	22.70	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SCREENING AND DISINFECTION				
0 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		22.70	35.13	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,463,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		22.70	35.13	= Peak Flow x % Req Pump
Force Main Diameter (In)		33		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,421,000**	**$ 41,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		35.13		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,000		=CFS x 200
Odor Control Flow Rate (CFM)		350		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**40,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		22.70		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		75	36	
Passes / Detention (Min)		3	**15.37**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	797,000	$ 676,000	
Construction Cost (Disinfection)	**$**	**1,473,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		25,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**7,862,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	1	
Peak Volume	2,325,034	CF
	17.39	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	33.94	CFS
	21.93	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SEWER SEPARATION				
1 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		6,958		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**1,043,700,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		3,030,905		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**6,062,000**		
			TOTAL CAPITAL COST $	**1,049,801,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	1	
Peak Volume	2,325,034	CF
	17.39	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	33.94	CFS
	21.93	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42			
SURFACE STORAGE TANK			
1 Overflows / Year			
1. Tank Parameters			
Storage Type (1=Surface; 2=Subsurface)	1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)	17.39	2,325,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)	85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)	20.46	2,735,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth	15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)	524		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)	350		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)	20.58	2,751,000	**Sufficient Volume**
Tank Area (SF)	183,000		= Length x Width
Construction Cost (Storage Tank)	**21,200,000**		
2. Influent Pump Station / Force Main Parameters			
Volume Requiring Pumping (%)	100%		Ref: Technical Parameters
Dewatering Time (Days)	1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)	21.93	33.94	= Peak Rate
Force Main Diameter (In)	32		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)	6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)	100		Input by Engineer
Construction Cost (PS / Force Main) $	**4,328,000**	**$ 40,000**	
3. Consolidation and/or Outfall Pipe Parameters			
Peak Flow (CFS)	33.94		Ref: Technical Parameters
Diameter (In)	48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)	400		Input by Engineer
Depth (Ft)	20		Input by Engineer
Construction Cost (Pipe) $	**335,000**		
4. Odor Control Parameters			
Air Changes / Hour (ACH)	3		Ref: Technical Parameters
Volume of Ventilated Space (CF)	4,103,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)	20,520		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control) $	**977,000**		
5. Screening Parameters			
Screening Required (Yes = 1; No = 2)	1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)	21.93		Ref: CSO Statistics
Construction Cost (Screening) $	**1,428,000**		
6. Disinfection Parameters			
Disinfection Required (Yes = 1; No = 2)	2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)	0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)			
Passes		**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank) $	-	$ -	
Construction Cost (Disinfection) $	**-**		**No Disinfection**
7. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Input by Engineer
Number Regulators	1		Input by Engineer
Construction Cost (Regulators) $	**39,000**		
8. Land Acquisition Parameters			
Land Required - Tank (SF)	278,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$ 2		Ref: Technical Parameters
Land Acquisition Cost $	**556,000**		
		TOTAL CAPITAL COST $	**28,903,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	1	
Peak Volume	2,325,034	CF
	17.39	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	33.94	CFS
	21.93	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42

SUB-SURFACE STORAGE TANK

1 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		17.39		2,325,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		20.46		2,735,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		524			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		350			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		20.58		2,751,000	**Sufficient Volume**
Tank Area (SF)		183,000			= Length x Width
Construction Cost (Storage Tank)		**54,473,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		17.39		26.91	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		29			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,773,000**	**$**	**37,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		33.94			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		4,103,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		205,150			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**5,937,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		21.93			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,428,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		278,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**556,000**			
			TOTAL CAPITAL COST	**$**	**66,578,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	1	
Peak Volume	2,325,034	CF
	17.39	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	33.94	CFS
	21.93	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42					
SWIRL CONCENTRATOR / VORTEX SEPARATOR					
1 Overflows / Year					
1. Swirl Concentrator / Vortex Separator Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		21.93		33.94	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000		0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max				**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0			
Construction Cost (Swirl / Vortex)	**$**	**-**			**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		24.13		37.33	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		34			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,595,000**	**$**	**42,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		33.94			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		0			= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		21.93			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,428,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow (MGD)		24.13			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		77		37	
Passes		3		**15.26**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**825,000**			
7. Regulator / Vortex Drop Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
New Vortex Drop Shaft		1			**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**			
8. Land Acquisition Parameters					
Land Required - Swirl / Vortex (SF)		23,000			= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**46,000**			
				TOTAL CAPITAL COST	**$ 7,570,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	1	
Peak Volume	2,325,034	CF
	17.39	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	33.94	CFS
	21.93	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42

SEDIMENTATION BASIN (CSOTF)

1 Overflows / Year

1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		21.93	33.94	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		3,700		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		87	**OK**	=(Surf Area x 2)$^{1/2}$
Width (Ft)		44	**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1	**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		**Typ 12, Rev as Req'd**
Storage Volume @ Selected Dimensions (MG / CF)		0.34	45,936	
Construction Cost (CSOTF)	**$**	**16,371,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		21.93	33.94	= Peak Flow x % Req Pump
Force Main Diameter (In)		32		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,328,000**	**$ 40,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		33.94		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		69,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,450		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**242,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		21.93		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,428,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		21.93		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		74	35	
Passes		3	**15.26**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**783,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		14,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**28,000**		
		TOTAL CAPITAL COST	**$**	**23,594,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	1	
Peak Volume	2,325,034	CF
	17.39	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	33.94	CFS
	21.93	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
1 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		21.93		33.94	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		260			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		24		**OK**	Input by Engineer
Width (Ft)		12		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**4,671,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		24.13		37.33	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		34			Input by Engineer
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,595,000**	**$**	**42,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		33.94			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		7,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		350			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**40,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		21.93			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,428,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		24.13			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		77		37	Input by Engineer
Passes		3		**15.26**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	825,000	$	700,000	
Construction Cost (Disinfection)	**$**	**1,525,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		32,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**64,000**			
				TOTAL CAPITAL COST	**$ 12,739,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	1	
Peak Volume	2,325,034	CF
	17.39	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	33.94	CFS
	21.93	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42

SCREENING AND DISINFECTION

1 Overflows / Year

1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		21.93	33.94	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,428,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		21.93	33.94	= Peak Flow x % Req Pump
Force Main Diameter (In)		32		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,328,000**	**$ 40,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		33.94		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,800		=CFS x 200
Odor Control Flow Rate (CFM)		340		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**39,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		21.93		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		74	35	
Passes		3	**15.26**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	783,000	$ 660,000	
Construction Cost (Disinfection)	**$**	**1,443,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		25,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**		
			TOTAL CAPITAL COST $	**7,702,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	2	
Peak Volume	1,407,996	CF
	10.53	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	30.80	CFS
	19.90	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SEWER SEPARATION				
2 Overflows / Year				
1. Sewer Separation Parameters				
Drainage Area - Suburban Areas (Acres)		6,958		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas		100%		Complete Separation
Drainage Area - Urban Areas (Acres)		0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas		100%		Complete Separation
Construction Cost (Sewer Separation)	**$**	**1,043,700,000**		
2. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Reg Mod Only
Number Regulators		1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators)	**$**	**39,000**		
3. Land Acquisition Parameters				
Land Acquisition - Sewer Separation (SF)		3,030,905		1% Drainage Area
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**6,062,000**		
			TOTAL CAPITAL COST $	**1,049,801,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	2	
Peak Volume	1,407,996	CF
	10.53	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	30.80	CFS
	19.90	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SURFACE STORAGE TANK				
2 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		10.53	1,408,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		12.39	1,656,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		408		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		272		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		12.45	1,664,640	**Sufficient Volume**
Tank Area (SF)		111,000		= Length x Width
Construction Cost (Storage Tank)		**12,272,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		19.90	30.80	= Peak Rate
Force Main Diameter (In)		31		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,080,000**	**$ 39,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		30.80		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,484,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		12,420		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**659,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		19.90		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,334,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		176,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**352,000**		
			TOTAL CAPITAL COST $	**19,110,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	2	
Peak Volume	1,407,996	CF
	10.53	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	30.80	CFS
	19.90	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42

SUB-SURFACE STORAGE TANK

2 Overflows / Year

1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		2		Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		10.53		1,408,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		12.39		1,656,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		408			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		272			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		12.45		1,664,640	**Sufficient Volume**
Tank Area (SF)		111,000			= Length x Width
Construction Cost (Storage Tank)		**33,348,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		10.53		16.30	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		22			Input by Engineer
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,855,000**	**$**	**30,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		30.80			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		2,484,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		124,200			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**4,006,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		19.90			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,334,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		176,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**352,000**			
				TOTAL CAPITAL COST $	**42,299,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	2	
Peak Volume	1,407,996	CF
	10.53	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	30.80	CFS
	19.90	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
2 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		19.90	30.80	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		21.89	33.88	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		32		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,323,000**	**$ 40,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		30.80		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		19.90		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,334,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		21.89		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		74	35	
Passes		3	**15.29**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**782,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		21,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**42,000**		
			TOTAL CAPITAL COST	**$ 7,155,000**

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Capital Costs

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	2	
Peak Volume	1,407,996	CF
	10.53	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	30.80	CFS
	19.90	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42					
SEDIMENTATION BASIN (CSOTF)					
2 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		19.90		30.80	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		3,400			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		83		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		42		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.31		41,832	
Construction Cost (CSOTF)	**$**	**16,372,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		19.90		30.80	= Peak Flow x % Req Pump
Force Main Diameter (In)		31			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		5.9		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,080,000**	**$**	**39,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		30.80			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		63,000			=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		3,150			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**225,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		19.90			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,334,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		19.90			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		70		34	
Passes		3		15.46	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**743,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		13,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**26,000**			
			TOTAL CAPITAL COST	**$**	**23,193,000**

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RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	2	
Peak Volume	1,407,996	CF
	10.53	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	30.80	CFS
	19.90	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
2 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		19.90		30.80	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		240			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		23		**OK**	Input by Engineer
Width (Ft)		11		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**4,346,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		21.89		33.88	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		32			Input by Engineer
Force Main Velocity (FPS)		6.1		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,323,000**	**$**	**40,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		30.80			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		19.90			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,334,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		21.89			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		74		35	Input by Engineer
Passes		3		**15.29**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	782,000	$	660,000	
Construction Cost (Disinfection)	**$**	**1,442,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		31,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**62,000**			
				TOTAL CAPITAL COST $	**11,957,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	2	
Peak Volume	1,407,996	CF
	10.53	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	30.80	CFS
	19.90	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42					
SCREENING AND DISINFECTION					
2 Overflows / Year					
1. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Default Value
Peak Flow, into facility (MGD)		19.90		30.80	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,334,000**			
2. Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		19.90		30.80	= Peak Flow x % Req Pump
Force Main Diameter (In)		31			DW Pump Rate / 2FPS
Force Main Velocity (FPS)		5.9		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,080,000**	**$**	**39,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		30.80			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,200			=CFS x 200
Odor Control Flow Rate (CFM)		310			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**37,000**			
5. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Default Value
Peak Flow (MGD)		19.90			Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		70		34	
Passes		3		**15.46**	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	743,000	$	623,000	
Construction Cost (Disinfection)	**$**	**1,366,000**			
6. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
7. Land Acquisition Parameters					
Land Required - Screening & Disinfection (SF)		25,000			=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**50,000**			
				TOTAL CAPITAL COST $	**7,280,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	4	
Peak Volume	1,037,851	CF
	7.76	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	27.33	CFS
	17.66	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42			
SEWER SEPARATION			
4 Overflows / Year			
1. Sewer Separation Parameters			
Drainage Area - Suburban Areas (Acres)	6,958		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas	100%		Complete Separation
Drainage Area - Urban Areas (Acres)	0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas	100%		Complete Separation
Construction Cost (Sewer Separation) $	**1,043,700,000**		
2. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Reg Mod Only
Number Regulators	1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators) $	**39,000**		
3. Land Acquisition Parameters			
Land Acquisition - Sewer Separation (SF)	3,030,905		1% Drainage Area
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**6,062,000**		
		TOTAL CAPITAL COST $	**1,049,801,000**

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RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	4	
Peak Volume	1,037,851	CF
	7.76	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	27.33	CFS
	17.66	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42					
SURFACE STORAGE TANK					
4 Overflows / Year					
1. Tank Parameters					
Storage Type (1=Surface; 2=Subsurface)		1		Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		7.76		1,038,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%			Ref: Technical Parameters
Required Storage Volume (MG / CF)		9.13		1,221,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15		**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		350			= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		234			= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		9.19		1,228,500	**Sufficient Volume**
Tank Area (SF)		82,000			= Length x Width
Construction Cost (Storage Tank)		**8,801,000**			
2. Influent Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		17.66		27.33	= Peak Rate
Force Main Diameter (In)		29			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,807,000**	**$**	**37,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		27.33			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,832,000			=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		9,160			= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**519,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		17.66			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,230,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		2			**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)					
Passes				**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$	-	
Construction Cost (Disinfection)	**$**	**-**			**No Disinfection**
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - Tank (SF)		135,000			=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**270,000**			
				TOTAL CAPITAL COST $	**15,038,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	4	
Peak Volume	1,037,851	CF
	7.76	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	27.33	CFS
	17.66	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SUB-SURFACE STORAGE TANK				
4 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		7.76	1,038,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		9.13	1,221,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		350		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		234		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		9.19	1,228,500	**Sufficient Volume**
Tank Area (SF)		82,000		= Length x Width
Construction Cost (Storage Tank)		**24,822,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		7.76	12.01	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		19		Input by Engineer
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,571,000**	**$ 27,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		27.33		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		1,832,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		91,600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**3,156,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		17.66		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,230,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		135,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**270,000**		
			TOTAL CAPITAL COST $	**32,450,000**

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RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	4	
Peak Volume	1,037,851	CF
	7.76	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	27.33	CFS
	17.66	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42

SWIRL CONCENTRATOR / VORTEX SEPARATOR

4 Overflows / Year

1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		17.66	27.33	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		19.43	30.07	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		30		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.1	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,022,000**	**$ 38,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		27.33		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		17.66		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,230,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		19.43		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		70	33	
Passes		3	**15.37**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**734,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		18,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**36,000**		
			TOTAL CAPITAL COST $	**6,694,000**

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RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	4	
Peak Volume	1,037,851	CF
	7.76	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	27.33	CFS
	17.66	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42					
SEDIMENTATION BASIN (CSOTF)					
4 Overflows / Year					
1. Sedimentation Basin (CSOTF) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		17.66		27.33	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500		0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000		0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%			Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		3,000			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		78		OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		39		Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1		Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.27		36,504	
Construction Cost (CSOTF)	**$**	**16,374,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Dewatering Time (Days)		1			Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		17.66		27.33	= Peak Flow x % Req Pump
Force Main Diameter (In)		29			DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0		Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,807,000**	**$**	**37,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		27.33			Ref: CSO Statistics
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		55,000			=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,750			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**202,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		17.66			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,230,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Typ 1, Rev as Req'd
Peak Flow (MGD)		17.66			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		66		32	
Passes		3		15.45	Ref: Tech Param-15 min minimum
				OK Detn Time	
Construction Cost (Disinfection)	**$**	**700,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		Modify Regulator	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - CSOTF (SF)		12,000			= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**24,000**			
				TOTAL CAPITAL COST **$**	**22,748,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	4	
Peak Volume	1,037,851	CF
	7.76	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	27.33	CFS
	17.66	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
HIGH RATE END OF PIPE TREATMENT (HREOP)				
4 Overflows / Year				
1. High Rate End of Pipe Treatment (HREOP) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		17.66	27.33	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000	0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		210		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21	OK	Input by Engineer
Width (Ft)		11	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Input by Engineer
Construction Cost (HREOP)	**$**	**3,988,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		19.43	30.07	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		30		Input by Engineer
Force Main Velocity (FPS)		6.1	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**4,022,000**	**$ 38,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		27.33		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000		=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		300		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow, into facility (MGD)		17.66		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,230,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Input by Engineer
Peak Flow (MGD)		19.43		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		70	33	Input by Engineer
Passes		3	15.37	Input by Engineer / 12' SWD Basis
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	734,000	$ 614,000	
Construction Cost (Disinfection)	**$**	**1,348,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - HREOP (SF)		30,000		= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**60,000**		
			TOTAL CAPITAL COST $	**11,096,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	4	
Peak Volume	1,037,851	CF
	7.76	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	27.33	CFS
	17.66	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SCREENING AND DISINFECTION				
4 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		17.66	27.33	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,230,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		17.66	27.33	= Peak Flow x % Req Pump
Force Main Diameter (In)		29		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,807,000**	**$ 37,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		27.33		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		5,500		=CFS x 200
Odor Control Flow Rate (CFM)		280		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**34,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		17.66		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		66	32	
Passes		3	**15.45**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	700,000	$ 578,000	
Construction Cost (Disinfection)	**$**	**1,278,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		24,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**		
			TOTAL CAPITAL COST $	**6,808,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	6	
Peak Volume	537,841	CF
	4.02	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	25.73	CFS
	16.63	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42			
SEWER SEPARATION			
6 Overflows / Year			
1. Sewer Separation Parameters			
Drainage Area - Suburban Areas (Acres)	6,958		**Typ 0, Rev as Req'd**
% Separation - Suburban Areas	100%		Complete Separation
Drainage Area - Urban Areas (Acres)	0		Ref: CSO Statistics, Input by Engineer
% Separation - Urban Areas	100%		Complete Separation
Construction Cost (Sewer Separation) $	**1,043,700,000**		
2. Regulator Parameters			
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)	4	**Modify Regulator**	Reg Mod Only
Number Regulators	1		**Typ 1 Reg, Rev as Req'd**
Construction Cost (Regulators) $	**39,000**		
3. Land Acquisition Parameters			
Land Acquisition - Sewer Separation (SF)	3,030,905		1% Drainage Area
Land Required Cost ($ / SF) $	2		Ref: Technical Parameters
Land Acquisition Cost $	**6,062,000**		
		TOTAL CAPITAL COST $	**1,049,801,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	6	
Peak Volume	537,841	CF
	4.02	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	25.73	CFS
	16.63	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SURFACE STORAGE TANK				
6 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		1	Surface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.02	538,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.73	633,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parmtrs, Rev as Req'd**
Length (Ft)		253		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		169		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.80	641,355	**Sufficient Volume**
Tank Area (SF)		43,000		= Length x Width
Construction Cost (Storage Tank)		**4,299,000**		
2. Influent Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Influent Pumping Rate (MGD / CFS)		16.63	25.73	= Peak Rate
Force Main Diameter (In)		28		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,681,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.73		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		950,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		4,750		= ACH x Volume / 60 * 10%
Construction Cost (Odor Control)	**$**	**310,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		16.63		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,182,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		79,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**158,000**		
			TOTAL CAPITAL COST $	**10,040,000**

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RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	6	
Peak Volume	537,841	CF
	4.02	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	25.73	CFS
	16.63	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SUB-SURFACE STORAGE TANK				
6 Overflows / Year				
1. Tank Parameters				
Storage Type (1=Surface; 2=Subsurface)		2	Subsurface Tank	Default Value
Sizing Basis: Peak Volume (MG / CF)		4.02	538,000	Ref: CSO Statistics
Available Capacity (% Tank Vol)		85%		Ref: Technical Parameters
Required Storage Volume (MG / CF)		4.73	633,000	= Peak Vol / Available Capacity
Side-water Depth (Ft), 15' max depth		15	**Sufficient Depth**	**Ref: Tech Parameters, Rev as Req'd**
Length (Ft)		253		= (Vol / SWD * 1.5)$^{1/2}$
Width (Ft)		169		= (Vol / SWD / 1.5)$^{1/2}$
Total Volume (MG / CF)		4.80	641,355	**Sufficient Volume**
Tank Area (SF)		43,000		= Length x Width
Construction Cost (Storage Tank)		**13,304,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		4.02	6.23	= Peak Vol / DW Time x %Req Pump
Force Main Diameter (In)		14		Input by Engineer
Force Main Velocity (FPS)		5.8	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**2,053,000**	**$ 23,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.73		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		950,000		=Required Storage Vol x 1.5
Odor Control Flow Rate (CFM)		47,500		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**1,886,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.63		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,182,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		2		**Typ 2, Rev as Req'd**
Peak Flow (MGD)		0.00		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)				
Passes			**No Disnfctn**	Ref: Tech Param-15 min minimum
Construction Cost (Disinfection / CC Tank)	$	-	$ -	
Construction Cost (Disinfection)	**$**	**-**		**No Disinfection**
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - Tank (SF)		79,000		=(0.291 x Vol (MG) + 0.439) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**158,000**		
			TOTAL CAPITAL COST $	**18,980,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	6	
Peak Volume	537,841	CF
	4.02	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	25.73	CFS
	16.63	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SWIRL CONCENTRATOR / VORTEX SEPARATOR				
6 Overflows / Year				
1. Swirl Concentrator / Vortex Separator Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		16.63	25.73	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		10,000	0.01	Ref: Technical Parameters
Diameter (Ft), 35-ft max			**Diameter OK**	Input by Engineer
Number of Units Required @ Given Loading Rate		0		
Construction Cost (Swirl / Vortex)	**$**	**-**		**Not Applicable - Insufficient Volume**
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Underflow Rate (%)		10%		Ref: Technical Parameters
Dewatering Time (Days)		1		**Typ 1, Rev as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		18.29	28.31	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		29		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.2	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,884,000**	**$ 37,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.73		Ref: Technical Parameters
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		0		= Required Storage Vol x 2, 15' SWD
Odor Control Flow Rate (CFM)		0		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**-**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow, into facility (MGD)		16.63		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,182,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		**Typ 1, Rev as Req'd**
Peak Flow (MGD)		18.29		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		68	32	
Passes		3	**15.37**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**712,000**		
7. Regulator / Vortex Drop Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
New Vortex Drop Shaft		1		**Typ=# Regs, Rev Qty as Req'd**
Construction Cost (Regulators/Vortex)	**$**	**299,000**		
8. Land Acquisition Parameters				
Land Required - Swirl / Vortex (SF)		17,000		= (0.0154 x Swirl Cap(CFS)) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**34,000**		
			TOTAL CAPITAL COST	**$ 6,483,000**

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RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	6	
Peak Volume	537,841	CF
	4.02	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	25.73	CFS
	16.63	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SEDIMENTATION BASIN (CSOTF)				
6 Overflows / Year				
1. Sedimentation Basin (CSOTF) Parameters				
Sizing Basis: Peak Flow (MGD / CFS)		16.63	25.73	Ref: CSO Statistics
Avg Loading Rate (GPD / SF) / (MGD / SF)		4,500	0.005	Ref: Technical Parameters
Max Loading Rate (GPD / SF) / (MGD / SF)		6,000	0.006	Ref: Technical Parameters
Available Capacity (% Basin Vol)		80%		Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		2,800		= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		76	OK	=(Surf Area x 2)$^{1/2}$
Width (Ft)		38	Area OK	= Area Req'd / Length
Max Length : Width Ratio		3:1	Ratio OK	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12		Typ 12, Rev as Req'd
Storage Volume @ Selected Dimensions (MG / CF)		0.26	34,656	
Construction Cost (CSOTF)	**$**	**16,374,000**		
2. Dewatering Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Time (Days)		1		Typ 1, Adjust as Req'd Ref: Tech Par
Dewatering Pumping Rate (MGD / CFS)		16.63	25.73	= Peak Flow x % Req Pump
Force Main Diameter (In)		28		DW Pump Rate / 2 FPS
Force Main Velocity (FPS)		6.0	Check:	OK - Velocity >2 fps/< 10 fps
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,681,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.73		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		52,000		=Storage Vol x 1.5
Odor Control Flow Rate (CFM)		2,600		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**194,000**		
5. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow, into facility (MGD)		16.63		Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,182,000**		
6. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Typ 1, Rev as Req'd
Peak Flow (MGD)		16.63		Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		64	31	
Passes		3	15.42	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection)	**$**	**679,000**		
7. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	Modify Regulator	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
8. Land Acquisition Parameters				
Land Required - CSOTF (SF)		12,000		= (0.006 x Cap(CFS) + 0.1137) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**24,000**		
			TOTAL CAPITAL COST $	**22,544,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	6	
Peak Volume	537,841	CF
	4.02	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	25.73	CFS
	16.63	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42					
HIGH RATE END OF PIPE TREATMENT (HREOP)					
6 Overflows / Year					
1. High Rate End of Pipe Treatment (HREOP) Parameters					
Sizing Basis: Peak Flow (MGD / CFS)		16.63		25.73	Ref: CSO Statistics
Loading Rate (GPD / SF) / (MGD / SF)		85,000		0.085	Ref: Technical Parameters
Surface Area Req'd at Peak Flow (SF)		200			= (MGD x 1,000,000) / (6,000 GPD / SF)
Length (Ft)		21		**OK**	Input by Engineer
Width (Ft)		11		**Area OK**	= Area Req'd / Length
Max Length : Width Ratio		3:1		**Ratio OK**	Ref: Technical Parameters
Side-water Depth (Ft), 12-ft max depth		12			Input by Engineer
Construction Cost (HREOP)	**$**	**3,824,000**			
2. Dewatering Pump Station / Force Main Parameters					
Volume Requiring Pumping (%)		100%			Ref: Technical Parameters
Underflow Rate (%)		10%			Ref: Technical Parameters
Dewatering Time (Days)		1			**Typ 1, Adjust as Req'd Ref: Tech Par**
Dewatering Pumping Rate (MGD / CFS)		18.29		28.31	= Peak Vol / DW Time x % Req Pump
Force Main Diameter (In)		29			Input by Engineer
Force Main Velocity (FPS)		6.2		**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100			Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,884,000**	**$**	**37,000**	
3. Consolidation and/or Outfall Pipe Parameters					
Peak Flow (CFS)		25.73			Ref: Technical Parameters
Diameter (In)		48			<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400			Input by Engineer
Depth (Ft)		20			Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**			
4. Odor Control Parameters					
Air Changes / Hour (ACH)		3			Ref: Technical Parameters
Volume of Ventilated Space (CF)		6,000			=Required Storage Vol x 2
Odor Control Flow Rate (CFM)		300			= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**36,000**			
5. Screening Parameters					
Screening Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow, into facility (MGD)		16.63			Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,182,000**			
6. Disinfection Parameters					
Disinfection Required (Yes = 1; No = 2)		1			Input by Engineer
Peak Flow (MGD)		18.29			Ref: Peak flow of PS
Cl_2 Contact Tank Length / Width (Ft)		68		32	Input by Engineer
Passes		3		**15.37**	Input by Engineer / 12' SWD Basis
				OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	712,000	$	591,000	
Construction Cost (Disinfection)	**$**	**1,303,000**			
7. Regulator Parameters					
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4		**Modify Regulator**	Input by Engineer
Number Regulators		1			Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**			
8. Land Acquisition Parameters					
Land Required - HREOP (SF)		29,000			= (0.0069 x Cap(CFS) + 0.4993) x 43560
Land Required Cost ($ / SF)	$	2			Ref: Technical Parameters
Land Acquisition Cost	**$**	**58,000**			
				TOTAL CAPITAL COST $	**10,698,000**

RESULTS SUMMARY		
Number of Events / Year	56	
Number of Overflows / Year	6	
Peak Volume	537,841	CF
	4.02	MG
Total Volume	19,494,004	CF
	145.82	MG
Peak Rate	25.73	CFS
	16.63	MGD

Capital Costs - 091AM42 / Sewershed ACSO 091AM42				
SCREENING AND DISINFECTION				
6 Overflows / Year				
1. Screening Parameters				
Screening Required (Yes = 1; No = 2)		1		Default Value
Peak Flow, into facility (MGD)		16.63	25.73	Ref: CSO Statistics
Construction Cost (Screening)	**$**	**1,182,000**		
2. Pump Station / Force Main Parameters				
Volume Requiring Pumping (%)		100%		Ref: Technical Parameters
Dewatering Pumping Rate (MGD / CFS)		16.63	25.73	= Peak Flow x % Req Pump
Force Main Diameter (In)		28		DW Pump Rate / 2FPS
Force Main Velocity (FPS)		6.0	**Check:**	**OK - Velocity >2 fps/< 10 fps**
Force Main Length (Ft)		100		Input by Engineer
Construction Cost (PS / Force Main)	**$**	**3,681,000**	**$ 36,000**	
3. Consolidation and/or Outfall Pipe Parameters				
Peak Flow (CFS)		25.73		Ref: CSO Statistics
Diameter (In)		48		<25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120"
Length (Ft)		400		Input by Engineer
Depth (Ft)		20		Input by Engineer
Construction Cost (Pipe)	**$**	**335,000**		
4. Odor Control Parameters				
Air Changes / Hour (ACH)		3		Ref: Technical Parameters
Volume of Ventilated Space (CF)		5,100		=CFS x 200
Odor Control Flow Rate (CFM)		260		= ACH x Volume / 60
Construction Cost (Odor Control)	**$**	**32,000**		
5. Disinfection Parameters				
Disinfection Required (Yes = 1; No = 2)		1		Default Value
Peak Flow (MGD)		16.63		Ref: Peak Flow into Facility
Cl_2 Contact Tank Length / Width (Ft)		64	31	
Passes		3	**15.42**	Ref: Tech Param-15 min minimum
			OK Detn Time	
Construction Cost (Disinfection / CC Tank)	$	679,000	$ 556,000	
Construction Cost (Disinfection)	**$**	**1,235,000**		
6. Regulator Parameters				
Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg)		4	**Modify Regulator**	Input by Engineer
Number Regulators		1		Input by Engineer
Construction Cost (Regulators)	**$**	**39,000**		
7. Land Acquisition Parameters				
Land Required - Screening & Disinfection (SF)		24,000		=(0.0016 x Cap(CFS) + 0.514) x 43560
Land Required Cost ($ / SF)	$	2		Ref: Technical Parameters
Land Acquisition Cost	**$**	**48,000**		
			TOTAL CAPITAL COST $	**6,588,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	22.70	$151,387	20	10.910	$1,651,628
	Tank O&M	No. Events / Yr	56	$213,296	50	14.484	$3,089,298
		Const Cost ($)	$71,556,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	23	$9,412	20	10.910	$102,680
	Odor Control O&M	Capacity (cfm)	62,640	$219,240	20	10.910	$2,391,895
	Reserve / Replace	10% Gravity / 15% Pump					$28,390
			Total Annual O&M	**$594,000**		**Total PW O&M**	**$7,264,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	53.10	$267,056	20	10.910	$2,913,566
	Tank O&M	No. Events / Yr	56	$445,484	50	14.484	$6,452,207
		Const Cost ($)	$164,431,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	23	$9,412	20	10.910	$102,680
	Odor Control O&M	Capacity (cfm)	626,350	$2,192,225	20	10.910	$23,917,042
	Reserve / Replace	10% Gravity / 15% Pump					$75,873
			Total Annual O&M	**$2,915,000**		**Total PW O&M**	**$33,461,000**

Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	22.70	$151,387	20	10.910	$1,651,628
	Sed. Basin O&M	Flow Rate (mgd)	22.70	$2,554	50	14.484	$36,993
	Screening O&M	Flow Rate (mgd)	22.70	$9,412	20	10.910	$102,680
	Disinfection O&M	Flow Rate (mgd)	22.70	$107,749	20	10.910	$1,175,537
	Odor Control O&M	Capacity (cfm)	3,500.00	$12,250	20	10.910	$133,647
	Reserve / Replace	10% Gravity / 15% Pump					$24,849
			Total Annual O&M	**$284,000**		**Total PW O&M**	**$3,125,000**

Operation and Maintenance Costs

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	24.97	$161,341	20	10.910	$1,760,219
	HREP O&M	Flow Rate (mgd)	22.70	$146,124	20	10.910	$1,594,203
	Screening O&M	Flow Rate (mgd)	22.70	$9,412	20	10.910	$102,680
	Disinfection O&M	Flow Rate (mgd)	24.97	$114,191	20	10.910	$1,245,813
	Odor Control O&M	Capacity (cfm)	350.00	$1,225	20	10.910	$13,365
	Reserve / Replace	10% Gravity / 15% Pump					$38,586
			Total Annual O&M	**$433,000**		**Total PW O&M**	**$4,755,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	24.97	$161,341	20	10.910	$1,760,219
	Swirl / Vortex O&M	Flow Rate (mgd)	22.70	$2,554	20	10.910	$27,865
	Screening O&M	Flow Rate (mgd)	22.70	$9,412	20	10.910	$102,680
	Disinfection O&M	Flow Rate (mgd)	24.97	$114,191	20	10.910	$1,245,813
	Odor Control O&M	Capacity (cfm)	4,350.00	$15,225	20	10.910	$166,104
	Reserve / Replace	10% Gravity / 15% Pump					$28,990
			Total Annual O&M	**$303,000**		**Total PW O&M**	**$3,332,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	22.70	$151,387	20	10.910	$1,651,628
	Screening O&M	Flow Rate (mgd)	22.70	$9,412	20	10.910	$102,680
	Disinfection O&M	Flow Rate (mgd)	22.70	$107,749	20	10.910	$1,175,537
	Odor Control O&M	Capacity (cfm)	350.00	$1,225	20	10.910	$13,365
	Reserve / Replace	10% Gravity / 15% Pump					$24,294
			Total Annual O&M	**$270,000**		**Total PW O&M**	**$2,968,000**

Operation and Maintenance Costs

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	21.93	$147,943	20	10.910	$1,614,045
	Tank O&M	No. Events / Yr	56	$87,406	50	14.484	$1,265,959
		Const Cost ($)	$21,200,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	22	$9,342	20	10.910	$101,916
	Odor Control O&M	Capacity (cfm)	20,520	$71,820	20	10.910	$783,552
	Reserve / Replace	10% Gravity / 15% Pump					$24,200
			Total Annual O&M	**$317,000**		**Total PW O&M**	**$3,790,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	17.39	$126,693	20	10.910	$1,382,216
	Tank O&M	No. Events / Yr	56	$170,589	50	14.484	$2,470,740
		Const Cost ($)	$54,473,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	22	$9,342	20	10.910	$101,916
	Odor Control O&M	Capacity (cfm)	205,150	$718,025	20	10.910	$7,833,609
	Reserve / Replace	10% Gravity / 15% Pump					$35,427
			Total Annual O&M	**$1,025,000**		**Total PW O&M**	**$11,824,000**

Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	21.93	$147,943	20	10.910	$1,614,045
	Sed. Basin O&M	Flow Rate (mgd)	21.93	$2,468	50	14.484	$35,740
	Screening O&M	Flow Rate (mgd)	21.93	$9,342	20	10.910	$101,916
	Disinfection O&M	Flow Rate (mgd)	21.93	$105,511	20	10.910	$1,151,121
	Odor Control O&M	Capacity (cfm)	3,450.00	$12,075	20	10.910	$131,738
	Reserve / Replace	10% Gravity / 15% Pump					$24,330
			Total Annual O&M	**$278,000**		**Total PW O&M**	**$3,059,000**

Operation and Maintenance Costs

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	24.13	$157,670	20	10.910	$1,720,165
	HREP O&M	Flow Rate (mgd)	21.93	$143,193	20	10.910	$1,562,227
	Screening O&M	Flow Rate (mgd)	21.93	$9,342	20	10.910	$101,916
	Disinfection O&M	Flow Rate (mgd)	24.13	$111,819	20	10.910	$1,219,937
	Odor Control O&M	Capacity (cfm)	350.00	$1,225	20	10.910	$13,365
	Reserve / Replace	10% Gravity / 15% Pump					$37,690
			Total Annual O&M	**$424,000**		**Total PW O&M**	**$4,655,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	24.13	$157,670	20	10.910	$1,720,165
	Swirl / Vortex O&M	Flow Rate (mgd)	21.93	$2,468	20	10.910	$26,921
	Screening O&M	Flow Rate (mgd)	21.93	$9,342	20	10.910	$101,916
	Disinfection O&M	Flow Rate (mgd)	24.13	$111,819	20	10.910	$1,219,937
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$24,876
			Total Annual O&M	**$282,000**		**Total PW O&M**	**$3,094,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	21.93	$147,943	20	10.910	$1,614,045
	Screening O&M	Flow Rate (mgd)	21.93	$9,342	20	10.910	$101,916
	Disinfection O&M	Flow Rate (mgd)	21.93	$105,511	20	10.910	$1,151,121
	Odor Control O&M	Capacity (cfm)	340.00	$1,190	20	10.910	$12,983
	Reserve / Replace	10% Gravity / 15% Pump					$23,778
			Total Annual O&M	**$264,000**		**Total PW O&M**	**$2,904,000**

Operation and Maintenance Costs

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	19.90	$138,648	20	10.910	$1,512,645
	Tank O&M	No. Events / Yr	56	$65,086	50	14.484	$942,685
		Const Cost ($)	$12,272,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	20	$9,158	20	10.910	$99,911
	Odor Control O&M	Capacity (cfm)	12,420	$43,470	20	10.910	$474,255
	Reserve / Replace	10% Gravity / 15% Pump					$22,067
			Total Annual O&M	**$257,000**		**Total PW O&M**	**$3,052,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	10.53	$90,620	20	10.910	$988,656
	Tank O&M	No. Events / Yr	56	$117,776	50	14.484	$1,705,825
		Const Cost ($)	$33,348,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	20	$9,158	20	10.910	$99,911
	Odor Control O&M	Capacity (cfm)	124,200	$434,700	20	10.910	$4,742,551
	Reserve / Replace	10% Gravity / 15% Pump					$26,173
			Total Annual O&M	**$653,000**		**Total PW O&M**	**$7,563,000**

Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	19.90	$138,648	20	10.910	$1,512,645
	Sed. Basin O&M	Flow Rate (mgd)	19.90	$2,239	50	14.484	$32,432
	Screening O&M	Flow Rate (mgd)	19.90	$9,158	20	10.910	$99,911
	Disinfection O&M	Flow Rate (mgd)	19.90	$99,450	20	10.910	$1,084,992
	Odor Control O&M	Capacity (cfm)	3,150.00	$11,025	20	10.910	$120,282
	Reserve / Replace	10% Gravity / 15% Pump					$22,908
			Total Annual O&M	**$261,000**		**Total PW O&M**	**$2,873,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	21.89	$147,764	20	10.910	$1,612,098
	HREP O&M	Flow Rate (mgd)	19.90	$135,244	20	10.910	$1,475,501
	Screening O&M	Flow Rate (mgd)	19.90	$9,158	20	10.910	$99,911
	Disinfection O&M	Flow Rate (mgd)	21.89	$105,395	20	10.910	$1,149,854
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$35,312
			Total Annual O&M	**$399,000**		**Total PW O&M**	**$4,384,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	21.89	$147,764	20	10.910	$1,612,098
	Swirl / Vortex O&M	Flow Rate (mgd)	19.90	$2,239	20	10.910	$24,430
	Screening O&M	Flow Rate (mgd)	19.90	$9,158	20	10.910	$99,911
	Disinfection O&M	Flow Rate (mgd)	21.89	$105,395	20	10.910	$1,149,854
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$23,393
			Total Annual O&M	**$265,000**		**Total PW O&M**	**$2,910,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	19.90	$138,648	20	10.910	$1,512,645
	Screening O&M	Flow Rate (mgd)	19.90	$9,158	20	10.910	$99,911
	Disinfection O&M	Flow Rate (mgd)	19.90	$99,450	20	10.910	$1,084,992
	Odor Control O&M	Capacity (cfm)	310.00	$1,085	20	10.910	$11,837
	Reserve / Replace	10% Gravity / 15% Pump					$22,396
			Total Annual O&M	**$249,000**		**Total PW O&M**	**$2,732,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	17.66	$128,020	20	10.910	$1,396,686
	Tank O&M	No. Events / Yr	56	$56,409	50	14.484	$817,003
		Const Cost ($)	$8,801,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	18	$8,957	20	10.910	$97,718
	Odor Control O&M	Capacity (cfm)	9,160	$32,060	20	10.910	$349,773
	Reserve / Replace	10% Gravity / 15% Pump					$20,290
			Total Annual O&M	**$226,000**		**Total PW O&M**	**$2,681,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	7.76	$73,913	20	10.910	$806,389
	Tank O&M	No. Events / Yr	56	$96,461	50	14.484	$1,397,108
		Const Cost ($)	$24,822,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	18	$8,957	20	10.910	$97,718
	Odor Control O&M	Capacity (cfm)	91,600	$320,600	20	10.910	$3,497,727
	Reserve / Replace	10% Gravity / 15% Pump					$22,420
			Total Annual O&M	**$500,000**		**Total PW O&M**	**$5,821,000**

Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	17.66	$128,020	20	10.910	$1,396,686
	Sed. Basin O&M	Flow Rate (mgd)	17.66	$1,987	50	14.484	$28,783
	Screening O&M	Flow Rate (mgd)	17.66	$8,957	20	10.910	$97,718
	Disinfection O&M	Flow Rate (mgd)	17.66	$92,474	20	10.910	$1,008,886
	Odor Control O&M	Capacity (cfm)	2,750.00	$9,625	20	10.910	$105,008
	Reserve / Replace	10% Gravity / 15% Pump					$21,332
			Total Annual O&M	**$242,000**		**Total PW O&M**	**$2,658,000**

Operation and Maintenance Costs

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	19.43	$136,437	20	10.910	$1,488,515
	HREP O&M	Flow Rate (mgd)	17.66	$126,074	20	10.910	$1,375,463
	Screening O&M	Flow Rate (mgd)	17.66	$8,957	20	10.910	$97,718
	Disinfection O&M	Flow Rate (mgd)	19.43	$98,002	20	10.910	$1,069,199
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$32,697
			Total Annual O&M	**$371,000**		**Total PW O&M**	**$4,075,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	19.43	$136,437	20	10.910	$1,488,515
	Swirl / Vortex O&M	Flow Rate (mgd)	17.66	$1,987	20	10.910	$21,681
	Screening O&M	Flow Rate (mgd)	17.66	$8,957	20	10.910	$97,718
	Disinfection O&M	Flow Rate (mgd)	19.43	$98,002	20	10.910	$1,069,199
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$21,752
			Total Annual O&M	**$246,000**		**Total PW O&M**	**$2,699,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	17.66	$128,020	20	10.910	$1,396,686
	Screening O&M	Flow Rate (mgd)	17.66	$8,957	20	10.910	$97,718
	Disinfection O&M	Flow Rate (mgd)	17.66	$92,474	20	10.910	$1,008,886
	Odor Control O&M	Capacity (cfm)	280.00	$980	20	10.910	$10,692
	Reserve / Replace	10% Gravity / 15% Pump					$20,875
			Total Annual O&M	**$231,000**		**Total PW O&M**	**$2,535,000**

Operation and Maintenance Costs

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	16.63	$122,970	20	10.910	$1,341,590
	Tank O&M	No. Events / Yr	56	$45,154	50	14.484	$653,991
		Const Cost ($)	$4,299,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	17	$8,865	20	10.910	$96,713
	Odor Control O&M	Capacity (cfm)	4,750	$16,625	20	10.910	$181,378
	Reserve / Replace	10% Gravity / 15% Pump					$19,077
			Total Annual O&M	**$194,000**		**Total PW O&M**	**$2,293,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Sub-Surface Storage Tank	Pump Station O&M	Flow Rate (mgd)	4.02	$47,642	20	10.910	$519,774
	Tank O&M	No. Events / Yr	56	$67,666	50	14.484	$980,053
		Const Cost ($)	$13,304,000				
		Man-hours / Crew	8				
	Screening O&M	Flow Rate (mgd)	17	$8,865	20	10.910	$96,713
	Odor Control O&M	Capacity (cfm)	47,500	$166,250	20	10.910	$1,813,777
	Reserve / Replace	10% Gravity / 15% Pump					$16,721
			Total Annual O&M	**$291,000**		**Total PW O&M**	**$3,427,000**

Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
CSOTF - Detention & Treatment	Pump Station O&M	Flow Rate (mgd)	16.63	$122,970	20	10.910	$1,341,590
	Sed. Basin O&M	Flow Rate (mgd)	16.63	$1,871	50	14.484	$27,100
	Screening O&M	Flow Rate (mgd)	16.63	$8,865	20	10.910	$96,713
	Disinfection O&M	Flow Rate (mgd)	16.63	$89,142	20	10.910	$972,533
	Odor Control O&M	Capacity (cfm)	2,600.00	$9,100	20	10.910	$99,280
	Reserve / Replace	10% Gravity / 15% Pump					$20,608
			Total Annual O&M	**$232,000**		**Total PW O&M**	**$2,558,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
High Rate End-of-Pipe (Ballasted Floc)	Pump Station O&M	Flow Rate (mgd)	18.29	$131,055	20	10.910	$1,429,797
	HREP O&M	Flow Rate (mgd)	16.63	$121,686	20	10.910	$1,327,587
	Screening O&M	Flow Rate (mgd)	16.63	$8,865	20	10.910	$96,713
	Disinfection O&M	Flow Rate (mgd)	18.29	$94,471	20	10.910	$1,030,672
	Odor Control O&M	Capacity (cfm)	300.00	$1,050	20	10.910	$11,455
	Reserve / Replace	10% Gravity / 15% Pump					$31,498
			Total Annual O&M	**$358,000**		**Total PW O&M**	**$3,928,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Swirl / Vortex	Pump Station O&M	Flow Rate (mgd)	18.29	$131,055	20	10.910	$1,429,797
	Swirl / Vortex O&M	Flow Rate (mgd)	16.63	$1,871	20	10.910	$20,413
	Screening O&M	Flow Rate (mgd)	16.63	$8,865	20	10.910	$96,713
	Disinfection O&M	Flow Rate (mgd)	18.29	$94,471	20	10.910	$1,030,672
	Odor Control O&M	Capacity (cfm)	0.00	$0	20	10.910	$0
	Reserve / Replace	10% Gravity / 15% Pump					$20,998
			Total Annual O&M	**$237,000**		**Total PW O&M**	**$2,599,000**

ACSO 091AM42	Requirement	Input Parameter	Input Value	Annual O&M Cost	Service Life (Yr)	Present Worth Factor	Present Worth
Screening & Disinfection	Pump Station O&M	Flow Rate (mgd)	16.63	$122,970	20	10.910	$1,341,590
	Screening O&M	Flow Rate (mgd)	16.63	$8,865	20	10.910	$96,713
	Disinfection O&M	Flow Rate (mgd)	16.63	$89,142	20	10.910	$972,533
	Odor Control O&M	Capacity (cfm)	260.00	$910	20	10.910	$9,928
	Reserve / Replace	10% Gravity / 15% Pump					$20,167
			Total Annual O&M	**$222,000**		**Total PW O&M**	**$2,441,000**

Cost Summary

CS4-Separation — SEWER SEPARATION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$1,049.8	$1,049,801,000	$0
1	$1,049.8	$1,049,801,000	$0
2	$1,049.8	$1,049,801,000	$0
4	$1,049.8	$1,049,801,000	$0
6	$1,049.8	$1,049,801,000	$0

S2-Sub Surf Tnk — SUB-SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$223.8	$190,317,000	$33,461,000
1	$78.4	$66,578,000	$11,824,000
2	$49.9	$42,299,000	$7,563,000
4	$38.3	$32,450,000	$5,821,000
6	$22.4	$18,980,000	$3,427,000

S4-Surf Tnk — SURFACE STORAGE TANK

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$89.1	$81,820,000	$7,264,000
1	$32.7	$28,903,000	$3,790,000
2	$22.2	$19,110,000	$3,052,000
4	$17.7	$15,038,000	$2,681,000
6	$12.3	$10,040,000	$2,293,000

T1-Vortex — SWIRL CONCENTRATOR / VORTEX SEPARATOR

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$13.4	$10,050,000	$3,332,000
1	$10.7	$7,570,000	$3,094,000
2	$10.1	$7,155,000	$2,910,000
4	$9.4	$6,694,000	$2,699,000
6	$9.1	$6,483,000	$2,599,000

T2-HREOP — HIGH RATE END OF PIPE TREATMENT (HREOP)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$17.8	$13,042,000	$4,755,000
1	$17.4	$12,739,000	$4,655,000
2	$16.3	$11,957,000	$4,384,000
4	$15.2	$11,096,000	$4,075,000
6	$14.6	$10,698,000	$3,928,000

T3-CSOTF — SEDIMENTATION BASIN (CSOTF)

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$26.9	$23,739,000	$3,125,000
1	$26.7	$23,594,000	$3,059,000
2	$26.1	$23,193,000	$2,873,000
4	$25.4	$22,748,000	$2,658,000
6	$25.1	$22,544,000	$2,558,000

T4-Scr & Dis — SCREENING AND DISINFECTION

Overflows per year	PW Cost (million)	Capital Cost	PW O&M Cost
0	$10.8	$7,862,000	$2,968,000
1	$10.6	$7,702,000	$2,904,000
2	$10.0	$7,280,000	$2,732,000
4	$9.3	$6,808,000	$2,535,000
6	$9.0	$6,588,000	$2,441,000

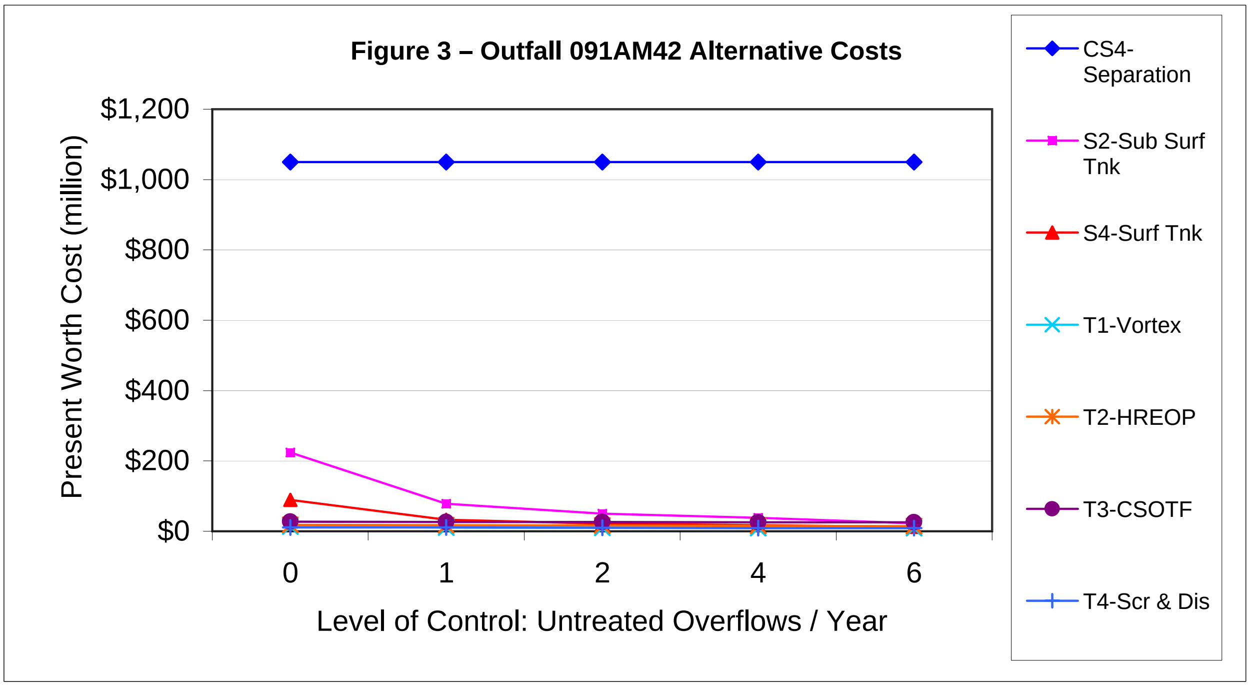


Figure 3 – Outfall 091AM42 Alternative Costs
$1,200
$1,000
$800
$600
$400
$200
$0
Present Worth Cost (million)
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

Region 1

PWSA CSO DISCHARGES
for "Typical Year - 2005"
Base Line Condition

PWSA CSO Team — Partnering to achieve long term benefits — Metcalf & Eddy Baker/Wade-Trim

Structure ID ACSO 091AM42
Location Name Carson Street/Glenwood Bridge
Model ID ADC 091AM42.1
Structure Type Outfall
PWSA Sewershed Streets Run
Stream of Discharge Monongahela River
NPDES Permit Number 091AM42
Owner ALCOSAN

Results Summary

Number of Events:	56
Peak Volume:	7,098,402 ft^3
	53.10 MG
Total Volume:	19,494,004 ft^3
	145.82 MG
Peak Rate:	35.13 cfs

Model Network (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run 2005 Baseline Conditions w/Boundary (8.8.07)

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
1/3/2005 9:05	9023	1/6/2005 0:20	7098401.95	53099.596	0	35.13	0
1/11/2005 8:55	5280	1/14/2005 3:10	2325033.89	17392.416	1	25.73	6
2/14/2005 6:00	2476	2/14/2005 10:35	1407995.99	10532.514	2	20.69	10
3/28/2005 9:05	2369	3/28/2005 19:40	1294831.43	9685.987	3	29.23	3
4/1/2005 19:40	3044	4/2/2005 8:15	1037851.20	7763.646	4	23.31	9
11/29/2005 7:15	1034	11/29/2005 12:00	972886.74	7277.679	5	30.80	2
8/20/2005 18:35	345	8/20/2005 19:50	537841.32	4023.322	6	33.94	1
5/13/2005 22:50	1555	5/14/2005 0:25	497561.78	3722.011	7	25.92	5
10/24/2005 12:20	2189	10/25/2005 18:40	456190.47	3412.533	8	9.18	23
2/20/2005 16:06	1761	2/20/2005 21:00	370872.39	2774.311	9	18.82	11
12/15/2005 11:30	914	12/15/2005 14:35	354188.54	2649.507	10	12.20	15
9/16/2005 21:30	275	9/16/2005 22:15	332136.94	2484.550	11	24.84	7
7/17/2005 16:30	239	7/17/2005 16:55	265898.09	1989.051	12	27.33	4
2/16/2005 5:55	1031	2/16/2005 8:25	263047.16	1967.724	13	11.81	16
3/23/2005 3:35	1152	3/23/2005 14:10	255537.19	1911.546	14	9.56	22
11/16/2005 4:30	632	11/16/2005 7:50	218312.69	1633.088	15	11.50	19
7/5/2005 16:55	274	7/5/2005 17:30	193726.76	1449.173	16	24.58	8
11/14/2005 22:30	658	11/14/2005 23:20	178791.56	1337.450	17	11.64	17
4/22/2005 16:30	1353	4/23/2005 4:40	167120.26	1250.143	18	7.60	27
2/9/2005 15:40	472	2/9/2005 17:25	140965.98	1054.496	19	11.50	18
5/28/2005 9:10	723	5/28/2005 10:00	123453.69	923.495	20	10.33	21
5/23/2005 16:50	247	5/23/2005 17:15	98001.95	733.104	21	16.21	14
9/29/2005 5:50	214	9/29/2005 6:20	97540.99	729.655	22	18.49	12
3/27/2005 17:10	343	3/27/2005 18:10	84279.19	630.450	23	9.06	24
7/26/2005 20:05	179	7/26/2005 20:35	76307.49	570.818	24	18.33	13
9/26/2005 6:30	332	9/26/2005 7:40	63051.08	471.654	25	5.68	33
10/7/2005 10:15	259	10/7/2005 11:15	61197.17	457.785	26	8.67	25
7/15/2005 17:45	179	7/15/2005 18:30	57649.79	431.249	27	10.92	20
10/22/2005 16:20	208	10/22/2005 16:50	45367.70	339.373	28	7.84	26
12/26/2005 6:20	444	12/26/2005 7:20	43844.55	327.979	29	3.01	41
10/21/2005 19:46	218	10/21/2005 20:50	41094.01	307.404	30	5.00	35
6/3/2005 8:45	189	6/3/2005 9:25	40803.46	305.230	31	7.00	28
5/20/2005 6:40	301	5/20/2005 8:00	40583.51	303.585	32	3.98	37

Exceedance Summary

Exceedance Timing			Exceedance Volume			Peak Flow Rate	
Start of Exceedance	Exceedance Duration (minutes)	Time of Peak Flow	(ft^3)	(1,000 gallons)	Number of Exceedances	(cfs)	Number of Exceedances
10/22/2005 6:50	198	10/22/2005 7:30	36278.83	271.384	33	6.04	30
12/25/2005 11:55	269	12/25/2005 14:05	30341.21	226.967	34	4.26	36
7/21/2005 15:08	140	7/21/2005 15:30	27754.52	207.618	35	6.38	29
11/1/2005 16:25	200	11/1/2005 18:00	25593.64	191.453	36	3.38	39
5/11/2005 23:10	144	5/12/2005 0:20	23371.16	174.828	37	5.68	32
1/30/2005 13:35	173	1/30/2005 14:15	20854.71	156.004	38	3.67	38
8/8/2005 9:05	138	8/8/2005 9:35	15836.45	118.465	39	5.12	34
1/15/2005 8:11	341	1/15/2005 10:15	13921.85	104.142	40	1.13	47
8/29/2005 12:25	138	8/29/2005 13:05	12006.59	89.815	41	2.94	42
6/6/2005 9:55	74	6/6/2005 10:20	11897.56	89.000	42	6.01	31
4/20/2005 20:33	158	4/20/2005 21:05	7956.02	59.515	43	1.68	44
5/7/2005 13:50	68	5/7/2005 14:05	5909.41	44.205	44	3.07	40
4/30/2005 6:55	217	4/30/2005 7:15	5290.96	39.579	45	0.70	49
2/26/2005 12:50	133	2/26/2005 13:10	4680.21	35.010	46	1.18	46
6/8/2005 21:30	52	6/8/2005 21:45	3977.82	29.756	47	2.46	43
11/24/2005 11:40	58	11/24/2005 12:10	1659.47	12.414	48	0.76	48
3/24/2005 10:08	92	3/24/2005 10:35	1473.76	11.024	49	0.38	52
2/25/2005 16:21	130	2/25/2005 17:20	1055.82	7.898	50	0.46	50
6/6/2005 17:12	20	6/6/2005 17:20	718.93	5.378	51	1.27	45
1/26/2005 5:55	39	1/26/2005 6:15	644.34	4.820	52	0.44	51
3/12/2005 12:26	34	3/12/2005 12:45	364.94	2.730	53	0.28	53
4/25/2005 7:33	12	4/25/2005 7:40	29.47	0.220	54	0.05	55
4/24/2005 16:52	8	4/24/2005 16:55	19.91	0.149	55	0.05	54

Region 1

PWSA CSO DISCHARGES for "Typical Year - 2005" Base Line Condition

Structure ID	ACSO 091AM42
Location Name	Carson Street/Glenwood Bridge
Model ID	ADC 091AM42.1
Structure Type	Outfall
PWSA Sewershed	Streets Run
Stream of Discharge	Monongahela River
NPDES Permit Number	091AM42
Owner	ALCOSAN
Model Network	(07/19/07) Baseline Conditions#2 - FINAL!#1_1#2
Model Run	2005 Baseline Conditions w/Boundary (8.8.07)

Results Summary

Number of Events:	56
Peak Volume:	7,098,402 ft^3
	53.10 MG
Total Volume:	19,494,004 ft^3
	145.82 MG
Peak Rate:	35.13 cfs

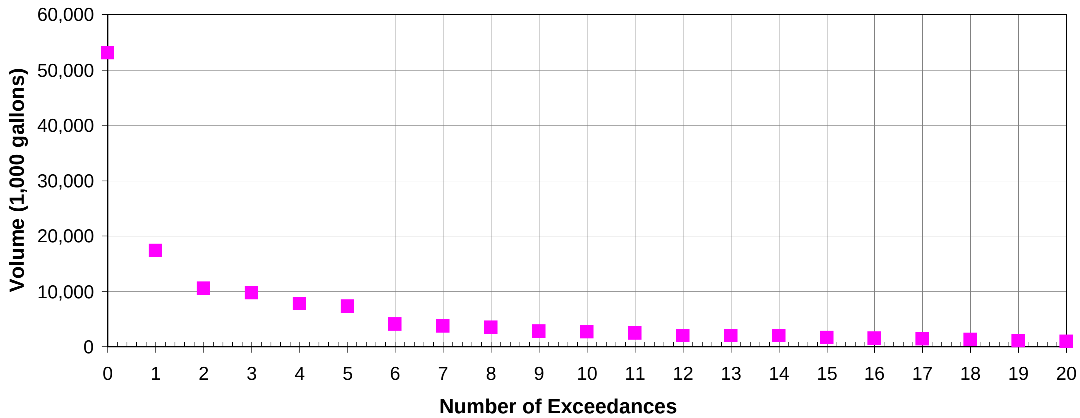


Figure 1 - Outfall 091AM42 CSO Volume

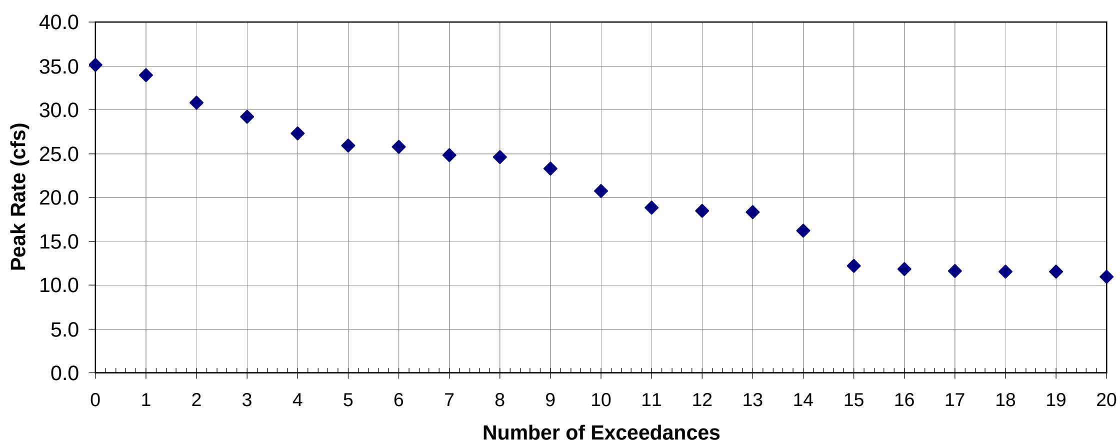


Figure 2 - Outfall 091AM42CSO Peak Flow Rate

D.37.3 M-42 – STREETS RUN SEWERSHED – NPDES# 091AM42

Description of Outfall

Outfall 091AM42 conveys overflows from the ALCOSAN diversion chamber M-42 to the Monongahela River. The outfall is located along Streets Run, east of the Glenwood Bridge interchange, near the existing Sandcastle water park. The M-42 Service Area encompasses approximately 99% of the Streets Run Sewershed area (6,521 acres of residential, business and commercial users) and includes portions of Baldwin Borough, Brentwood Borough, Pleasant Hills Borough, and West Mifflin Borough, as well as the City of Pittsburgh. The Streets Run Sewershed is comprised of approximately 663 manholes and 125,501 linear feet (23.8 miles) of storm, sanitary, and combined sewers up to 60 inches in diameter.

Attachment 1, Tributary Area Map, shows the CSO location and the tributary area.

Outfall 091AM42 typically experiences 56 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 091AM42 is approximately 53.1 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 091AM42 is approximately 35.13 CFS. *Figure 1 – Outfall 091AM42 CSO Volume* and *Figure 2 – Outfall 091AM42 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

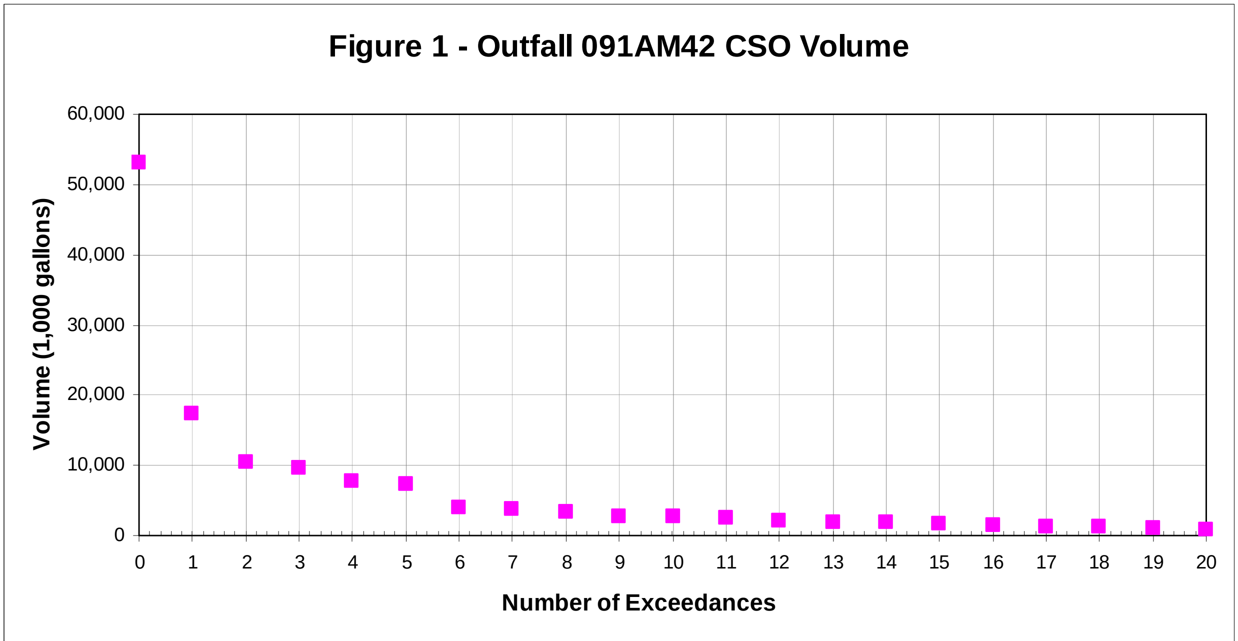


Figure 1 - Outfall 091AM42 CSO Volume
Volume (1,000 gallons)
60,000
50,000
40,000
30,000
20,000
10,000
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

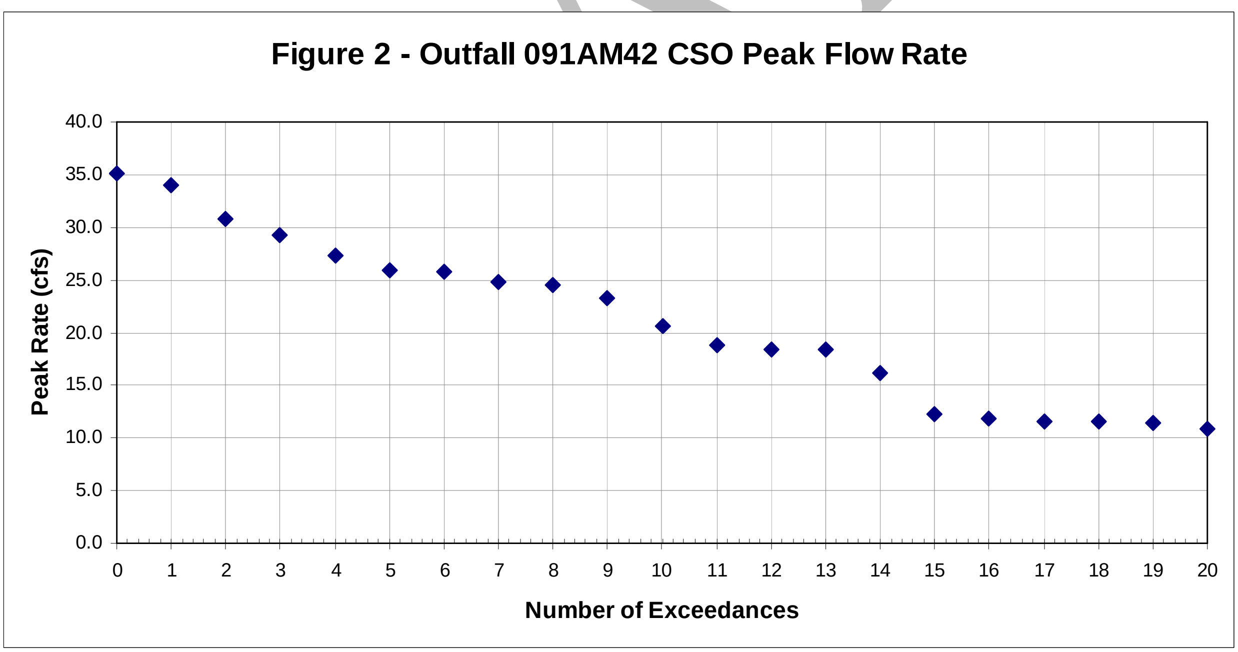


Figure 2 - Outfall 091AM42 CSO Peak Flow Rate
Peak Rate (cfs)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

There appears to be available space for potential storage or treatment facilities to the east of the Glenwood Bridge, just south of the Monongahela River. The site is generally bounded by the Monongahela River to the north, the Glenwood Bridge to the west and private development to the south and east. This outfall requires a significant storage volume and tank footprint for the 0 control level.

Description of Alternatives

Attachment 2 - CSO Alternatives Development Worksheet, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 091AM42. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

Collection System Control Alternatives

CS4-091AM42: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

Storage Alternatives

S2-091AM42: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-091AM42: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

Treatment Alternatives

T1-091AM42: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-091AM42: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

. T3-091AM42: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

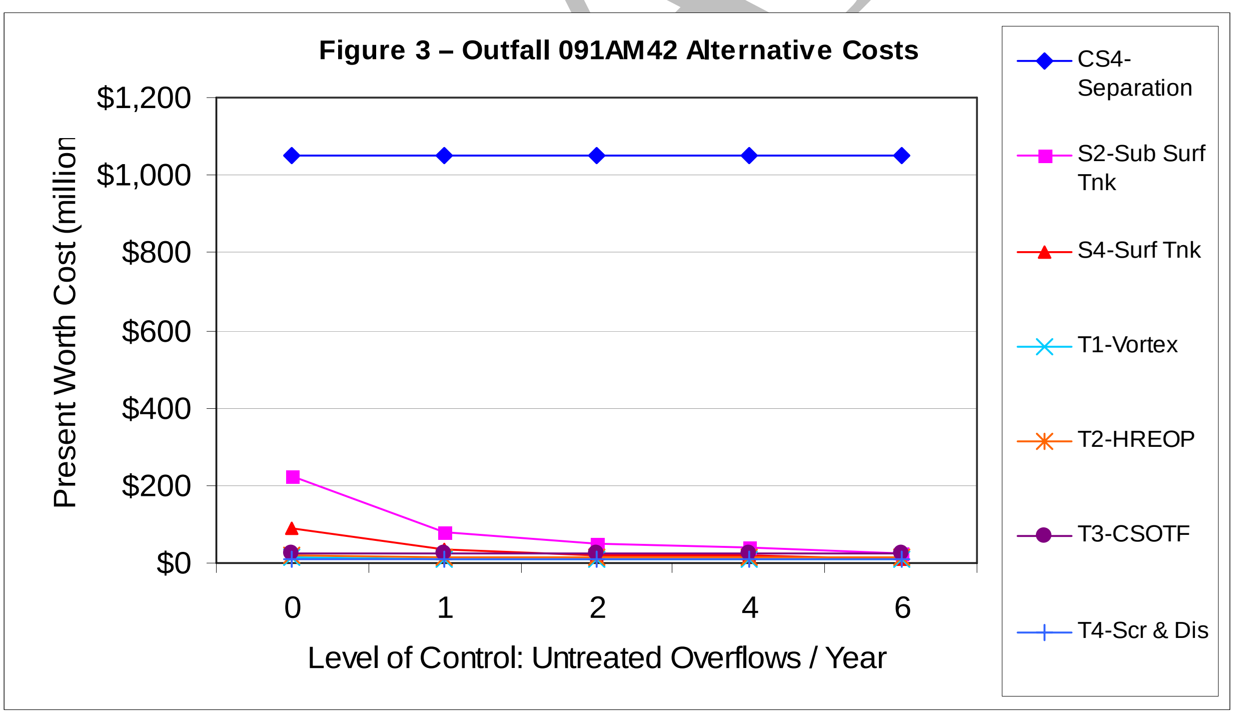
T4-091AM42: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

Figure 3 – Outfall 091AM42 Alternative Costs, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

Attachment 3 – Alternative Scoring Sheet, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

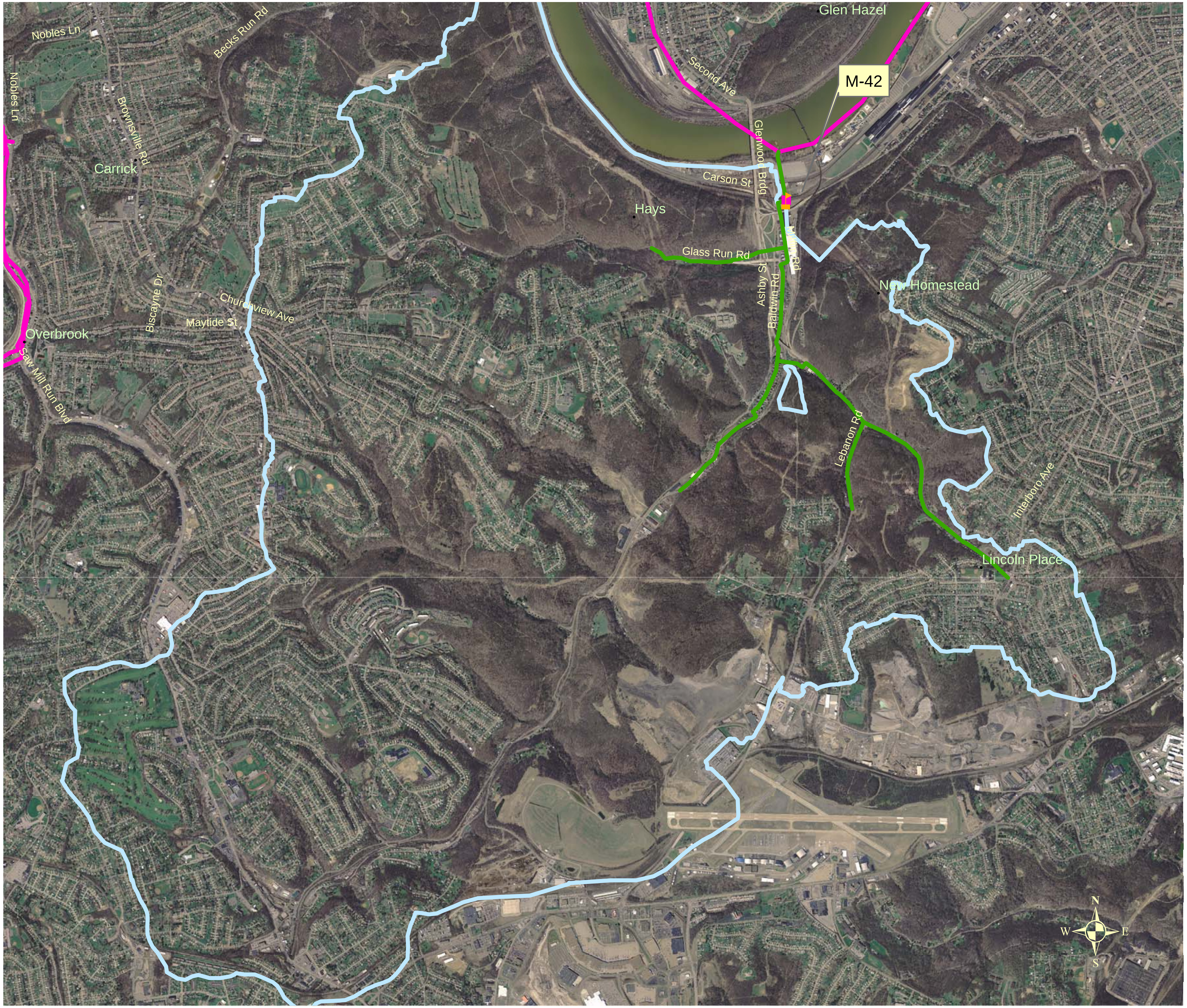
Recommendations

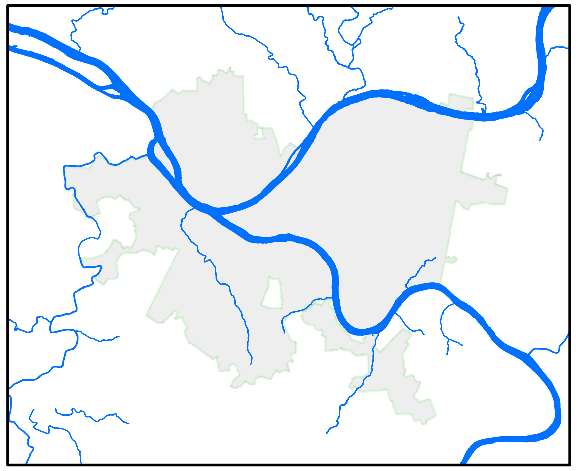
Based upon the above, for control levels 0 through 4, it is recommended that Alternative T4-091AM42: Screening and Disinfection be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control level 6, it is recommended that Alternative S4-091AM42: Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

Attachment 4 – Facilities Boundary Map, illustrates the estimated installation location of this recommended alternative.

Significant Issues

Property acquisition along the Monongahela River is limited. Property procurement from private landowners appears to be required for all control levels.





Area Overview

Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

2,500 0 2,500 Feet

Attachment 1
M-42
Tributary Area Map
Streets Run
Sewershed

CSO Controls Alternatives

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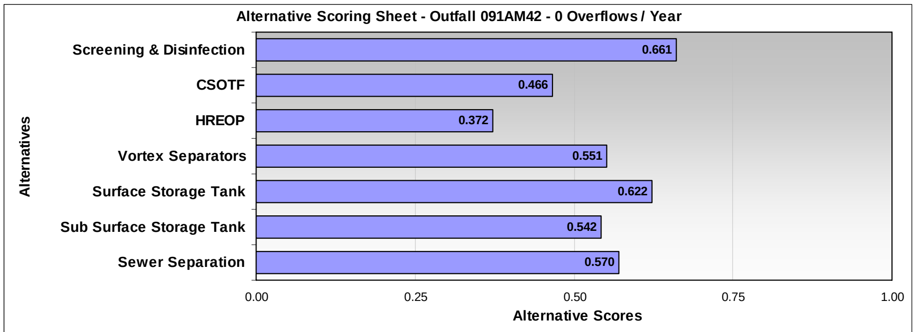
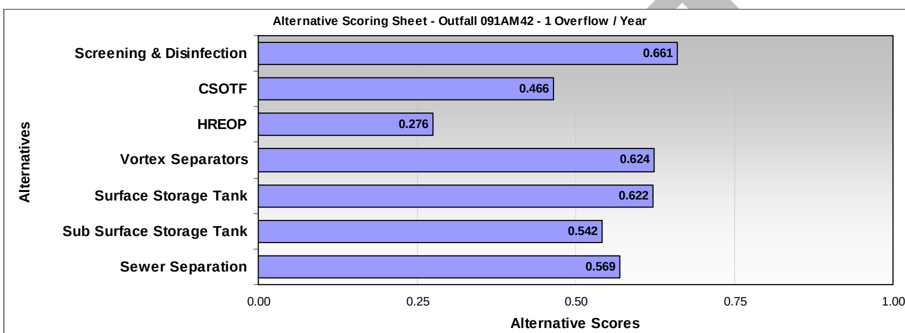
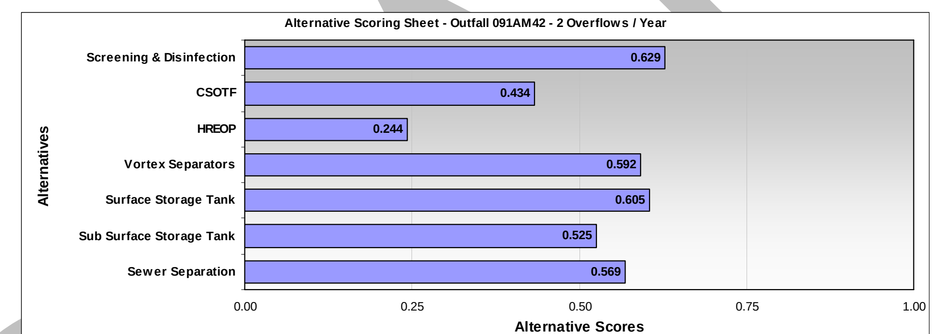
Attachment 2 - CSO Alternatives Development Worksheet

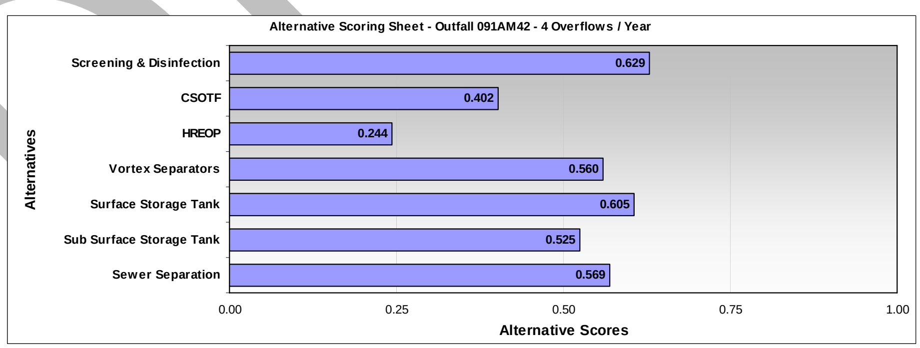
Technology	Considered Y or N	Comments
Source Control:		
Sewer & Manhole Rehabilitation	N	The relatively small amount of groundwater abatement attainable will not provide adequate CSO control.
Collection System Controls:		
Sewer system optimization	N	The amount of sewer system optimization available will not provide adequate CSO control.
Regulator optimization	N	Regulator optimization will not be evaluated.
Inter-basin flow balance / relief	N	Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only.
Sewer separation	Y	Sewer separation within the 6,958 acres of combined sewer area tributary to this outfall will be evaluated.
Storage:		
In-line (existing unused conduits)	N	In-line storage will not be evaluated.
Sub-surface (tunnels, tanks, etc.)	Y	Sub-surface storage in conjunction with screening will be evaluated.
Surface (open tanks, earthen basins)	Y	Surface storage in conjunction with screening will be evaluated.
Treatment:		
Suspended Solids Control (swirl/vortex)	Y	Swirl concentrators in conjunction with screening and disinfection will be evaluated.
Floatables & Coarse Solids Control (screens, nets, etc.)	Y	Screening will be evaluated in conjunction with storage and treatment alternatives.
Disinfection (chlorine, ozone, etc.)	Y	Disinfection will be evaluated in conjunction with treatment alternatives.
High rate end-of-pipe (ballasted floc)	Y	Ballasted flocculation in conjunction with screening and disinfection will be evaluated.
CSO Treatment Facility (CSOTF)	Y	Detention and treatment in conjunction with screening and disinfection will be evaluated.
Other: Sidestream Elevated Pool Aeration	N	Technology does not effectively treat the parameters of concern.

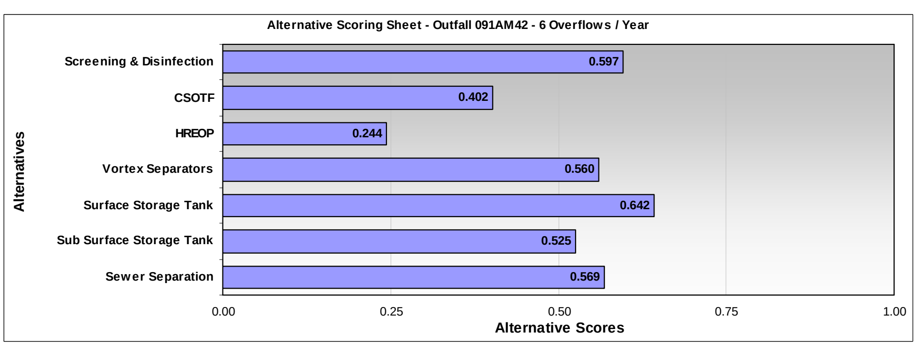
Attachment 3 – Alternative Scoring Sheet

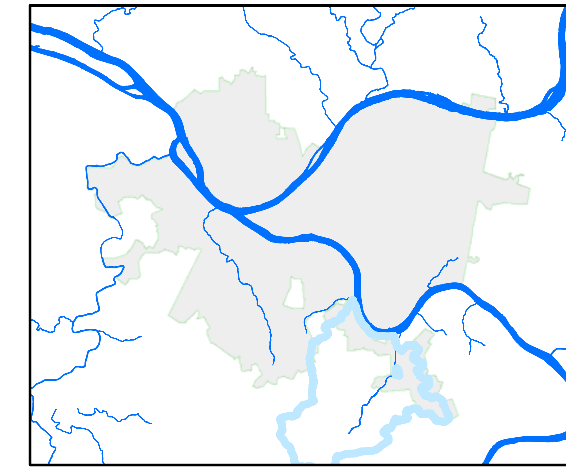












Area Overview

Legend

- Sewershed Boundary
- Facilities Boundary
- **ALCOSAN Interceptor**
- **Trunk Sewer**
- **ALCOSAN Diversion Chamber**
- **Combined Sewer Outfall**

0 390 780 Feet

Attachment 4
M-42
Facilities Boundary Map
Streets Run
Sewershed

CSO Controls Alternatives

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