

Exhibit “Q”

Exhibit Q, DEP permits to be transferred to York Water



Pennsylvania Department of Environmental Protection
One Ararat Boulevard
Harrisburg, PA 17110-9333

DEC 20 1996

Southcentral Regional Office

717-657-4590
FAX - 717-657-4446

Mr. Gregory B. Gruendler, Chairman
Jacobus Borough Sewer Authority
126 North Main Street (Rear)
Jacobus, PA 17407

Re: Sewage
Jacobus Borough Sewer Authority
Part II Permit No. 6796412
Planning Code No. A1-67932-ACT
Jacobus Borough, York County

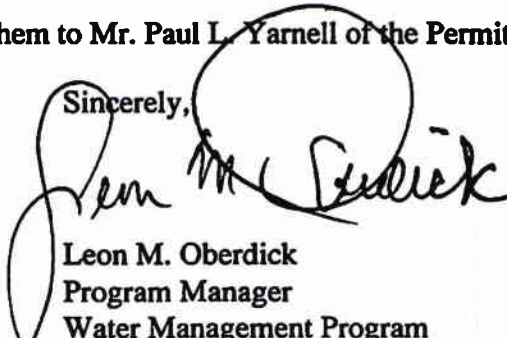
Dear Mr. Gruendler:

Subject permit is enclosed.

The permittee shall comply with all Standard and Special Conditions attached to this Permit. Construction must be done in accordance to the permit application and all supporting documentation. Review the permit conditions and application-supporting documents before starting construction.

If you have any questions, please direct them to Mr. Paul L. Yarnell of the Permits Section.

Sincerely,



Leon M. Oberdick
Program Manager
Water Management Program

Enclosures

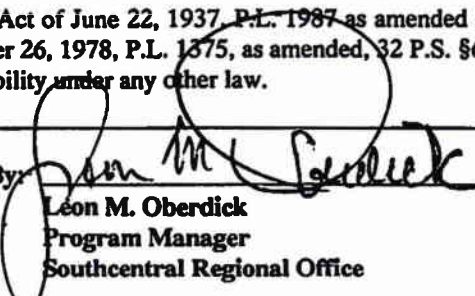
cc: Thomas L. Wallace, P.E., James R. Holly & Associates, Inc.





Pennsylvania Department of Environmental Protection
WATER MANAGEMENT PERMIT

PERMIT NO. 6796412
AMENDMENT NO. _____

A. Permittee (Name and Address) Jacobus Borough Sewer Authority 126 North Main Street (Rear) Jacobus, PA 17407	B. Project: Name <u>Jacobus Borough Sewer System</u> Municipality <u>Jacobus Borough</u> County <u>York</u>												
C. This: <input checked="" type="checkbox"/> Permit <input type="checkbox"/> Permit Amendment <input type="checkbox"/> Impoundment Closure Approves: <input checked="" type="checkbox"/> The construction/operation of: _____ Modifications to the construction/operation of: _____ <table><tr><td><input type="checkbox"/> Sewage Treatment Facilities</td><td><input type="checkbox"/> Industrial Waste Treatment Facilities</td></tr><tr><td><input type="checkbox"/> Land Application Facilities</td><td><input type="checkbox"/> Other: _____</td></tr><tr><td><input checked="" type="checkbox"/> Sewers and Appurtenances</td><td><input checked="" type="checkbox"/> Pump/Stations</td></tr><tr><td><input type="checkbox"/> Impoundment(s) and Liner System</td><td><input type="checkbox"/> Injection Well(s)</td></tr><tr><td><input type="checkbox"/> Stream Crossing(s)</td><td><input type="checkbox"/> Outfall & Headwall(s)</td></tr><tr><td><input type="checkbox"/> Soil Erosion & Sedimentation Control Plan</td><td><input type="checkbox"/> Groundwater Monitoring Well(s)</td></tr></table> Brief description of permitted activity: The Jacobus Borough Sewer Authority sewer system, which entails four pump stations, force mains, pressure sewer system with grinder pumps, and gravity sewers.		<input type="checkbox"/> Sewage Treatment Facilities	<input type="checkbox"/> Industrial Waste Treatment Facilities	<input type="checkbox"/> Land Application Facilities	<input type="checkbox"/> Other: _____	<input checked="" type="checkbox"/> Sewers and Appurtenances	<input checked="" type="checkbox"/> Pump/Stations	<input type="checkbox"/> Impoundment(s) and Liner System	<input type="checkbox"/> Injection Well(s)	<input type="checkbox"/> Stream Crossing(s)	<input type="checkbox"/> Outfall & Headwall(s)	<input type="checkbox"/> Soil Erosion & Sedimentation Control Plan	<input type="checkbox"/> Groundwater Monitoring Well(s)
<input type="checkbox"/> Sewage Treatment Facilities	<input type="checkbox"/> Industrial Waste Treatment Facilities												
<input type="checkbox"/> Land Application Facilities	<input type="checkbox"/> Other: _____												
<input checked="" type="checkbox"/> Sewers and Appurtenances	<input checked="" type="checkbox"/> Pump/Stations												
<input type="checkbox"/> Impoundment(s) and Liner System	<input type="checkbox"/> Injection Well(s)												
<input type="checkbox"/> Stream Crossing(s)	<input type="checkbox"/> Outfall & Headwall(s)												
<input type="checkbox"/> Soil Erosion & Sedimentation Control Plan	<input type="checkbox"/> Groundwater Monitoring Well(s)												
D. This approval is subject to the following conditions: 1. All construction, operations, and procedures shall be in accordance with the application dated September 18, 1996, its supporting documentation, and addenda dated December 5, 1996. Such application, its supporting documentation and/or addenda are hereby made part of this permit. 2. Special Conditions 1 through 14 are attached and made part of this permit.													
E. The authority granted by the permit is subject to the following further qualifications: 1. If there is a conflict between the application or its supporting documents and/or addenda and the Standard or Special Conditions, the Standard or Special Conditions shall apply. 2. Failure to comply with the Rules and Regulations of the Department or with the terms or conditions of this permit shall void the authority given to the permittee by the issuance of the permit. 3. This permit is issued pursuant to The Clean Streams Law, Act of June 22, 1937, P.L. 1987 as amended 35 P.S. §691.1et seq. and/or the Dam Safety and Encroachments Act of November 26, 1978, P.L. 1975, as amended, 32 P.S. §693.1et seq. Issuance of the permit shall not relieve the permittee of any responsibility under any other law.													
Permit Issued: <u>DEC 20 1996</u> Permit Amended: _____	By:  Leon M. Oberdick Program Manager Southcentral Regional Office												



**WATER MANAGEMENT PERMIT
JACOBUS BOROUGH SEWER AUTHORITY
PART II NO. 6796412**

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Jacobus Borough
York County

SPECIAL CONDITIONS:

1. During construction, no changes affecting any engineering design parameter shall be made from the plans, designs, and other data herein approved unless the permittee shall first receive written approval thereof from the Department. The sewerage facilities shall be constructed under expert engineering supervision and competent inspection.
2. The sewers shall have adequate foundation support as soil conditions require. Trenches shall be backfilled such that the sewers will have proper structural stability, with minimum settling and adequate protection against breakage. Concrete used in connection with these sewers shall be protected from injury by water, freezing, drying or other harmful conditions until cured.
3. Manhole inverts shall be so formed as to facilitate the flow of the sewage and to prevent the stranding of sewage solids, and the whole manhole structure shall have proper structural strength and be so constructed as to prevent undue infiltration, entrance of the street wash or grit, and to provide convenient and safe means of access and maintenance.
4. No stormwater from pavements, area ways, roofs, foundation drains or other sources shall be admitted to the sanitary sewers herein approved.
5. The permittee shall adopt and enforce an ordinance requiring the abandonment of privies, cesspools or similar receptacles for human waste and on-lot sewage disposal systems on the premises of occupied structures which are accessible to public sewers and require the connection of such structures to the public sewers.
6. The herein approved sewers shall be maintained in good condition, kept free from deposits by flushing or other proper means of cleaning, and repaired when necessary.
7. The permittee shall file with the Department "as-built" plans showing the correct plan of all sewers and sewerage structures as actually constructed, together with any other related information that may be required.
8. The approval herein given is specifically made contingent upon the permittee acquiring all necessary property rights, by easement or otherwise, providing for the satisfactory construction, operation, maintenance and replacement of all sewers or sewerage structures in, along, or across private property, with full rights of ingress, egress and regress.
9. The attention of the permittee is called to the highly explosive nature of certain gases generated by the digestion of sewage solids when these gases are mixed in proper portions with air, and to the highly toxic character of certain gases arising from such digestion or from sewage in insufficiently ventilated compartments or sewers. Therefore, at all places throughout the sewerage facilities where hazard of fire, explosion, or danger from toxic gases may occur, the permittee shall post conspicuously proper warnings of a permanent and legible character and shall provide for the thorough instruction of all employees concerning these hazards and in first aid and emergency methods of meeting such hazards and shall further provide, in a conveniently accessible place, all necessary equipment and material

**WATER MANAGEMENT PERMIT
JACOBUS BOROUGH SEWER AUTHORITY
PART II NO. 6796412**

PAGE 3

Jacobus Borough
York County

10. Cross connections between the potable water supply and the sewerage system constitute a potential danger to the public health. Therefore, all direct and indirect connections whereby under normal or abnormal conditions the potable water supply may become contaminated from an inferior water supply from any unit of the sewage treatment works, or by any appurtenance thereof, or from any part of a sewerage system are hereby specifically prohibited. The permittee is further warned against permitting to be made permanent any temporary connection with a potable supply designed to be held in place while being used for flushing or other purposes, and is also cautioned against the danger of back siphonage through portable hose lines and similar avenues of possible contamination.
11. The permittee shall construct the sewerage facilities in a manner compatible with good conservation methods in order to minimize the adverse effect on the environment.
12. All industrial waste discharged or proposed for discharge into the sewer system shall be studied to determine the degree of pretreatment necessary in order that the industrial waste will not adversely affect the sewerage facilities or the sewage treatment process. The permittee shall properly control any industrial waste discharge into its sewerage system by regulating the rate of such discharge, requiring necessary pretreatment, and excluding industrial waste, if necessary, to protect the integrity of the permittee's sewerage system.
13. Receipt of this permit does not relieve the permittee of its obligations to comply with all federal, interstate, state, or local laws, ordinances, and regulations applicable to the sewerage facilities authorized herein.
14. This permit does not give any real or personal property rights or grant any exclusive privileges, nor shall it be construed to grant or confirm any right, title easement, or interest in, on, to, or over any lands belonging to the Commonwealth.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER MANAGEMENT PROGRAM

INTERNAL REVIEW AND RECOMMENDATIONS

Name of Applicant Jacobus Borough Sewer Authority Project Location Jacobus Borough York County Permit No. 6796412

BRIEF DESCRIPTION OF PROJECT AND DISCUSSION

This application is for construction and operation of four pump stations, applicable force mains, and gravity sewers. This project will provide public sewers to all serviceable areas of Jacobus Borough and connect to the Springfield Township sewer system for ultimate transportation to and disposal at the proposed Springfield Township sewage treatment plant. The total average and maximum flow from this project is 0.215 mgd and 0.537 mgd, respectively. These flows are based on a total population of 2,134 people, which includes 520 current houses @ 2.8 people/house, recent lots, and sold reservations.

York Road Pump Station:

This pump station is located on the west side of York Road, 500 feet north of Church Street. The average and maximum hydraulic flow rate of the station is 0.094 mgd and 0.346 mgd, respectively. This station is a wet well mounted suction-lift design with a holding capacity of 211.5 gallons. This station will house two 25 BHP pumps which will each provide a pumping rate of 220 gpm at a total dynamic head (TDH) of 129.2 feet.

Greenbriar Drive Pump Station:

This pump station is located on the north side of Greenbriar Drive, 500 feet west of Main Street. The average and maximum hydraulic flow rate of the station is 0.007 mgd and 0.029 mgd, respectively. This station is a wet well mounted section-lift design with a holding capacity of 146.9 gallons. This station will house two 10 BHP pumps which will each provide a pumping rate of 136 gpm at a TDH of 82.5 feet.

Continued

CURRENT ESTIMATE OF COMPLETION DATE OF PROJECT (Industrial Wastes Only)

Recommendation and Action

Approve -- Issue by Region	Approve -- Issue by Central Office	Refuse	Signature	Date
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	REVIEWING HYDROGEOLOGIST	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	HYDROGEOLOGIST IN RESPONSIBLE CHARGE	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Paul L. Yarnell, Jr., P.E. REVIEWING ENGINEER	12/19/96
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	G. Roger Muselman, P.E. REGIONAL PERMITS SECTION CHIEF	12/19/96
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Leon M. Oberdick PROGRAM MANAGER	12/20/96

Special Condition Nos. 1 through 14

INTERNAL REVIEW AND RECOMMENDATIONS
JACOBUS BOROUGH SEWER AUTHORITY
Jacobus Borough, York County
Part II Permit No. 6796412
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South Main Street Pump Station:

This pump station is located on the east side of Main Street near School Road. The average and maximum hydraulic flow rate of the station is 0.013 mgd and 0.05 mgd, respectively. This station is a wet well mounted suction-lift design with a holding capacity of 146.9 gallons. This station will house two 5 BHP pumps which will each provide a pumping rate of 135 gpm at a TDH of 45.5 feet.

Water Street Pump Station:

This pump station is located on the south side of Water Street, 1,300 feet west of Main Street. The average and maximum hydraulic flow rate of the station is 0.017 mgd and 0.07 mgd, respectively. This station is a wet well mounted suction-lift design with a holding capacity of 146.9 gallons. This station will house two 15 BHP pumps which will each provide a pumping rate of 100 gpm at a TDH of 108 feet.

Conveyance Systems

Force Mains:

The force main between the York Road pump station to the gravity system (MH271) will consist of approximately 3,150 lineal feet of six inch diameter PVC pipe. The force main between the Greenbriar Road Pump Station to the gravity system (MH20) will consist of approximately 1,340 lineal feet of four inch diameter PVC pipe. The force main between the South Main Street Pump Station to the gravity system (MH75B) will consist of approximately 695 lineal feet of four inch diameter PVC pipe. The force main between the Water Street Pump Station to the gravity system (MH269) will consist of approximately 1,535 lineal feet of four inch diameter PVC pipe.

Pressure Sewers:

230 lineal feet of 1½ inch diameter PVC pipe combined with 860 lineal feet of two inch diameter PVC pipe form a pressurized sewer system to enable residents along Meadow Street to be served by grinder units. It was determined to be more feasible from an economic and construction standpoint to service this area via grinder pumps and low pressure sewer system. These residences were 5 to 70 feet below the elevation of the tie-in point to the main sewer.

Gravity Sewers:

Gravity sewers will be 21,500 lineal feet of eight inch diameter pipe and 1,400 lineal feet of ten inch diameter pipe. The system will contain Manholes Numbers 1 through 8, 13 through 39, 39A, 40 through 60, 60A, 61 through 64, 64A, 64B, 64C, 65 through 67, 67A, 68 through 75, 75A, 75B, 75C, 76 through 85, 85A, 85B, 85C, 86, 100 through 111, 148 through 164, 202 through 217, and 219 through 258.

**INTERNAL REVIEW AND RECOMMENDATIONS
JACOBUS BOROUGH SEWER AUTHORITY
Jacobus Borough, York County
Part II Permit No. 6796412
Page 3**

Planning approval No. A1-67932-ACT was issued on December 7, 1994.

MH64 is where the Jacobus Borough sewer system connects to the Springfield Township system.

The tributary sewage treatment plant is the Springfield Township Board of Supervisors in Springfield Township, which is permitted under NPDES Permit Number PA 0086860 and Part II Permit Number 6796410, both issued on October 23, 1996.

The York County Conservation District adequacy letter is dated October 17, 1996.

The issuance of a permit is recommended.

JAMES R. HOLLEY & ASSOCIATES, INC.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS

18 S. GEORGE ST., SUITE 501
P.O. BOX 43
YORK, PA 17405
PHONE 717-846-4373
FAX 717-843-1568

December 4, 1996

Pennsylvania Department of Environmental Protection
Bureau of Water Quality Management
One Ararat Boulevard
Harrisburg, PA 17110

RECEIVED
DEC 05 1996
DEP - SOUTHCENTRAL REGION
WATER MANAGEMENT PROGRAM

Attention: Paul Yamell

Reference: BWQM Part II Application #6796412
Sanitary Sewerage Collection System
Jacobus Borough Sewer Authority
York County, Pennsylvania

Gentlemen:

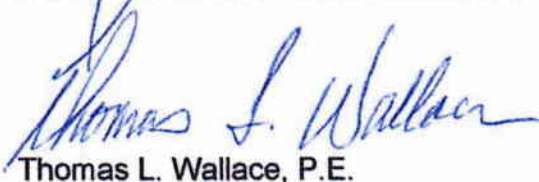
Please find enclosed two (2) copies of the following items regarding our December 3rd, 1996 phone conversation:

1. Revised Sheet No. 1 from the Design Engineer's Report. The 4" force main length has been corrected.
2. Revised Calculation Sheet 8D for the Greenbriar Drive Pump Station indicating the proper force main length

Should you have any questions concerning this information, please contact this office.

Very truly yours,

JAMES R. HOLLEY & ASSOCIATES, INC.



Thomas L. Wallace, P.E.
Vice President

TLW/rcf

cc: Jacobus Borough Sewer Authority

**DESIGN ENGINEER'S REPORT
JACOBUS BOROUGH SEWER AUTHORITY
SEPTEMBER 18, 1996
REVISED DECEMBER 3, 1996
JRH NO. 950735**

I. BACKGROUND

James R. Holley & Associates, Inc. has been retained by the Jacobus Borough Authority to design, permit, and observe the construction of the proposed sanitary sewer facilities.

II. GENERAL PROJECT DESCRIPTION

The proposed sanitary sewer facilities can be summarized as follows:

Location: Jacobus Borough, York County, Pennsylvania

Gravity Sewer: 8" PVC 21,500 L.F.
10" PVC 1,400 L.F.

Pressure Sewer: 1½" PVC 230 L.F.
2" PVC 860 L.F.

Pump Stations: Greenbriar Dr. - duplex, suction lift pumps
10 BHP, 136.0 gpm @ 82.5' TDH
S. Main St. - duplex, suction lift pumps
5 BHP, 135.0 gpm @ 45.5' TDH
Water St. - duplex, suction lift pumps
15 BHP, 100.0 gpm @ 103.0' TDH
York St. - duplex, suction lift pumps
25 BHP, 220.0 gpm @ 129.2' TDH

Force Main: 4" PVC 3,570 L.F.
6" PVC 3,200 L.F.

III. DESIGN INFORMATION

The following paragraphs describe the design of the sanitary sewers and pump stations. The paragraph numbers refer to the applicable section of the "DOMESTIC WASTEWATER FACILITIES MANUAL," DER # 1357-8/91.

**DESIGN ENGINEER'S REPORT
JACOBUS BOROUGH SEWER AUTHORITY
SEPTEMBER 18, 1996
REVISED DECEMBER 3, 1996
JRH NO. 950735**

I. BACKGROUND

James R. Holley & Associates, Inc. has been retained by the Jacobus Borough Authority to design, permit, and observe the construction of the proposed sanitary sewer facilities.

II. GENERAL PROJECT DESCRIPTION

The proposed sanitary sewer facilities can be summarized as follows:

Location: Jacobus Borough, York County, Pennsylvania

Gravity Sewer: 8" PVC 21,500 L.F.
10" PVC 1,400 L.F.

Pressure Sewer: 1½" PVC 230 L.F.
2" PVC 860 L.F.

Pump Stations: Greenbriar Dr. - duplex, suction lift pumps
10 BHP, 136.0 gpm @ 82.5' TDH
S. Main St. - duplex, suction lift pumps
5 BHP, 135.0 gpm @ 45.5' TDH
Water St. - duplex, suction lift pumps
15 BHP, 100.0 gpm @ 103.0' TDH
York St. - duplex, suction lift pumps
25 BHP, 220.0 gpm @ 129.2' TDH

Force Main: 4" PVC 3,570 L.F.
6" PVC 3,200 L.F.

III. DESIGN INFORMATION

The following paragraphs describe the design of the sanitary sewers and pump stations. The paragraph numbers refer to the applicable section of the "DOMESTIC WASTEWATER FACILITIES MANUAL," DER # 1357-8/91.

Project Name: Jacobus Borough - Sewer Authority
Greenbriar Dr. Pump Station

Project Number: 950735

Date: December 3, 1996

Engineer: Jack N. Powell, P.E.

Filename:950735GP.WK1

Begin Elevation: ft 551.00 Starting GPM: 50 Kin. Visc. (s.f./sec) 1.00E-05
End Elevation: ft 624.00 GPM Interval: 10

Pipe Number:	1	2	3	4	5
Length	ft 10.0	1,340.0			
Diam.	in. 4	4			
Spec. Rough.	ft 0.000008	0.000005			
Air Discharge	0	1			
Increaser	0	0			
Reducer	0	0			
Gate Vlv.	0	0			
Globe Vlv.	1	0			
Check Vlv.	1	0			
90 Bend	3	2			
45 Bend	0	4			
Tee (Through)	0	0			
Tee (Branch)	1	0			

Flow (gpm)	Velocities (fps)					Head F. (ft)	Head V. (ft)	TDH (ft)
	Pipe 1	Pipe 2	Pipe 3	Pipe 4	Pipe 5			
50	1.3	1.3	0.0	0.0	0.0	2.50	0.05	75.55
60	1.5	1.5	0.0	0.0	0.0	3.48	0.07	76.55
70	1.8	1.8	0.0	0.0	0.0	4.61	0.10	77.71
80	2.0	2.0	0.0	0.0	0.0	5.85	0.13	78.98
90	2.3	2.3	0.0	0.0	0.0	7.24	0.16	80.40
100	2.6	2.6	0.0	0.0	0.0	8.75	0.20	81.95
110	2.8	2.8	0.0	0.0	0.0	10.38	0.24	83.62
120	3.1	3.1	0.0	0.0	0.0	12.20	0.29	85.49
130	3.3	3.3	0.0	0.0	0.0	14.33	0.34	87.67
140	3.6	3.6	0.0	0.0	0.0	16.63	0.40	90.03
150	3.8	3.8	0.0	0.0	0.0	19.10	0.46	92.56
160	4.1	4.1	0.0	0.0	0.0	21.75	0.52	95.27
170	4.3	4.3	0.0	0.0	0.0	24.57	0.59	98.16
180	4.6	4.6	0.0	0.0	0.0	27.56	0.66	101.22
190	4.9	4.9	0.0	0.0	0.0	30.73	0.73	104.46

Project Name: Jacobus Borough - Sewer Authority
Greenbriar Dr. Pump Station

Project Number: 950735

Date: December 3, 1996

Engineer: Jack N. Powell, P.E.

Filename: 950735GP.WK1

Begin Elevation: ft 551.00 Starting GPM: 50 Kin. Visc. (s.f./sec) 1.00E-05
End Elevation: ft 624.00 GPM Interval: 10

Pipe Number:		1	2	3	4	5
Length	ft	10.0	1,340.0			
Diam.	in.	4	4			
Spec. Rough.	ft	0.000008	0.000005			
Air Discharge		0	1			
Increaser		0	0			
Reducer		0	0			
Gate Vlv.		0	0			
Globe Vlv.		1	0			
Check Vlv.		1	0			
90 Bend		3	2			
45 Bend		0	4			
Tee (Through)		0	0			
Tee (Branch)		1	0			

Flow (gpm)	Velocities (fps)					Head F. (ft)	Head V. (ft)	TDH (ft)
	Pipe 1	Pipe 2	Pipe 3	Pipe 4	Pipe 5			
50	1.3	1.3	0.0	0.0	0.0	2.50	0.05	75.55
60	1.5	1.5	0.0	0.0	0.0	3.48	0.07	76.55
70	1.8	1.8	0.0	0.0	0.0	4.61	0.10	77.71
80	2.0	2.0	0.0	0.0	0.0	5.85	0.13	78.98
90	2.3	2.3	0.0	0.0	0.0	7.24	0.16	80.40
100	2.6	2.6	0.0	0.0	0.0	8.75	0.20	81.95
110	2.8	2.8	0.0	0.0	0.0	10.38	0.24	83.62
120	3.1	3.1	0.0	0.0	0.0	12.20	0.29	85.49
130	3.3	3.3	0.0	0.0	0.0	14.33	0.34	87.67
140	3.6	3.6	0.0	0.0	0.0	16.63	0.40	90.03
150	3.8	3.8	0.0	0.0	0.0	19.10	0.46	92.56
160	4.1	4.1	0.0	0.0	0.0	21.75	0.52	95.27
170	4.3	4.3	0.0	0.0	0.0	24.57	0.59	98.16
180	4.6	4.6	0.0	0.0	0.0	27.56	0.66	101.22
190	4.9	4.9	0.0	0.0	0.0	30.73	0.73	104.46

Conveyance

The force main between the York Road pump station to the gravity system will consist of approximately 1545 ^{lined} feet of 6 inch diameter PVC pipe. The force main between the Dakenbrun ^{Sheet 1 of 48} ~~load~~ pump station to the gravity system will consist of approximately 509 + lined feet of 4 inch diameter PVC pipe. The force main between the South Main Street pump station to the gravity system (MH 109) will consist of approximately 275 lined feet of ~~4"~~ 4 inch diameter PVC pipe. The force main between the Water Street pump stations to the gravity system (MH 269) will consist of approximately 1540 lined feet of 4 inch diameter PVC pipe.

- 1, 2, 3, 4, 5, 6, 7, 8 13, 14, 15, 16, 17, 18 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 28, 30, 31, 32, 33, 34, 35
- 36, 37, 38, 39, 39A, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64A, 64B, 64C 65A, 65B, 65C
- 64, 65, 66, 67, 67A, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86,
- 100, 101, 102, 103, 104, 105, 106 107, 108, 109, 110, 111
- 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164 202, 203, 204, 205, 206, 207
- 262, 263, 264, 265, 266, 267, 268 208, 209, 210, 211, 212, 213, 214, 215, 216, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230
- 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279 231, 232, 233, 234, 235, 236
- 279, 280, 281, 282, 283, 284, 285, 286 237, 238, 239, 240, 241, 242
- 243, 244, 245, 246, 247, 250, 251, 252, 253, 254, 255, 256
- 257, 258, 259, 260, 261

Springfield Township

Gravity lines 21,500 lined feet of 8 inch diameter pipe and 1400 lined feet of 10 inch diameter pvc pipe

Stream crossings ?

Planning Approval - AI-67932-ACT was issued 12/7/94

The York County Conservation District adequacy letter is dated October 17, 1996

This application is for construction and operation of four pump stations, applicable force main and gravity sewers. This project will provide public sewers to all serviceable areas of Jacobs Crough ~~and to connect~~ and connect to the Springfield Township sewer system for ultimate transportation to and disposal at the proposed Springfield ~~and~~ Township sewage treatment plant.

The total flow ^{and peak instantaneous} from this project is .215 mgd and .537 mgd, respectively.

These flows are based on a ~~proposed~~ ~~total~~ total population of ~~12~~ 2134 people which include ~~residents~~ @ 520 current houses @ 2.8 people/house, vacant lots and sold reservations.

York Road Pump Station

This pump station is located on the west side of York Road, 500 feet north of Church Street. The average and maximum hydraulic flow rate of the station is .094 mgd and .346 mgd, respectively. This station is a wet well mounted suction-lift design with a holding capacity of 211.5 gallons. This station will house ~~two~~

The two ~~25~~ BHP pumps will each provide a pumping rate of 220 gpm at a total dynamic head (TDH) of 129.2 feet.

Greenbriar Drive Pump Station

This pump station is located on the north side of Greenbriar Drive, 500 feet west of Main Street. The average and maximum hydraulic flow rate of the station is .007 ^{mgd} and .029 mgd, respectively. This station is a ~~wet well mounted~~ wet well mounted suction-lift design with a holding capacity of 146.9 gallons. This station will house two

The two ~~10~~ BHP pumps will each provide a pumping rate of 136 gpm at a total dynamic head (TDH) of 82.5 ft.

Main Street Pump Station

This pump station is located on the East side of Main Street near school road. The average and maximum hydraulic flow rate of the station is 0.013 mgd and .05 mgd, respectively. This station is a well wet well mounted suction-lift design with a holding capacity of 146.9 gallons. The station will house two

The two 5 BHP pumps will each provide a pumping rate of 135 gpm at a total dynamic head (TDH) of 45.5 feet.

Water Street Pump Station

This pump station is located on the south side of Water Street, 1300 feet west of Main Street. The average and maximum hydraulic flow rate of the station is .017 mgd and .070, respectively. This station is a well wet well mounted suction-lift design with a holding capacity of 146.9 gallons. The station will house two

The two 15 BHP pumps will each provide a pumping rate of 100 gpm at a total dynamic head (TDH) of 103 feet.

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DEP - SOUTH CENTRAL REGION WATER MANAGEMENT PROGRAM TABLE 1 - SEWER SYSTEM

1. Class of construction New System Replacement of Existing System Sanitary Combined
 2. Initial Population _____, Design Year Population _____

3. DESIGN FLOW DATA

(a) Laterals and Submain Sewers	(GPCD)	400
(b) Interceptors	(GPCD)	250
(c) Average Daily Flow	(MGD)	0.215
(d) Infiltration/Inflow	(MGD)	Incl. Above
(e) Industrial Waste Flow	(MGD)	-0-
(f) Total Average Design Flow	(MGD)	0.215
(g) Maximum Expected Flow Rate	(MGD)	0.537

4. General Information:

- (a) Describe measures taken to reduce I/I in the system including leakage test and reference applicable portion of the specifications. All gravity sewers will be constructed with SDR 35 PVC sewer pipe with rubber ring joints. All piping must pass low pressure Air Testing and Deflection Testing per Specification Section 02651.
- (b) Describe any overflows or bypasses within the system.
None
- (c) If applicable, describe capacity of receiving sewers and pumping station and submit two copies of the executed inter municipal agreement. All receiving sewers and pumping stations are new and are being designed for the flows indicated. Two copies of the Intermunicipal Agreement with Springfield Township are attached.

TABLE 2 - PUMP STATION (Submit separate table for each pump station)

1. Pump Station Name: York Road Pump Station
 2. Location: West side of York Road, 500 feet north of Church Street
 3. Type (Conventional, suction lift, Ejector or submersible) Suction Lift
 4. Initial Population to be served: 574, Design year population to be served. 938
 5. DESIGN INFORMATION

	AVG (MGD)	MAX (MGD)
(a) Domestic Flow Rate (based on Design population to be served)	0.094	0.346
(b) Industrial Flow Rate	-0-	-0-
(c) Infiltration/Inflow Rate	Incl.	Incl.
(d) Design Flow Rate	0.094	0.346
(e) Effective Wet Well Capacity (Gal)	211.5	
(f) Detention Time (Min)	4	
(g) Design Average Velocity in Force Main (Fps)	2.5	
(h) Total Dynamic (Head Pump Station + Force Main)		
	Static Head	112.0 Ft.
	Friction Loss	17.2 Ft.
	TDH	129.2 Ft.

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MODULE 2

6. General Information

- (a) Describe 100 yr. flood elevation, ventilation, emergency power provision and alarm system.
The pump station is not located in or near any 100 year Flood Plan. The Machinery Chamber is equipped with a ventilation blower. The wet well contains no mechanical equipment and has no mechanical ventilation. An automatic dialer is provided to contact operating personnel if an alarm condition exists. A trailer mounted emergency generator is being purchased with this project which will be capable of powering these pumps. Additional information is provided in the Design Engineers' Report.

TABLE 3 - PUMPING FACILITIES												
LIST ALL THE PUMPS IN THE ENTIRE TREATMENT FACILITY												
NUMBER OF IDENTICAL PUMPS	Describe Pump Use	Type of Pump	Check Columns That Apply To Each Pump							Pump Capacity		
			EXISTING	PROPOSED	VARIABLE SPEED	CONSTANT SPEED	AUTOMATIC CONTROL	MANUAL CONTROL	PNEUMATIC EJECTOR	STAND BY OPERATION	(GPM)	TDH (FT.)
2	Raw Unscreened Domestic Sewage	Non-clog Wet-well mounted, vacuum primed Centrifugal Sewage Pumps	X		X	X					220	129.2

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TABLE 1 – SEWER SYSTEM

1. Class of construction New System Replacement of Existing System Sanitary Combined
2. Initial Population _____, Design Year Population _____
3. DESIGN FLOW DATA

(a) Laterals and Submain Sewers	(GPCD)	_____
(b) Interceptors	(GPCD)	_____
(c) Average Daily Flow	(MGD)	_____
(d) Infiltration/Inflow	(MGD)	_____
(e) Industrial Waste Flow	(MGD)	_____
(f) Total Average Design Flow	(MGD)	_____
(g) Maximum Expected Flow Rate	(MGD)	_____
4. General Information:
 - (a) Describe measures taken to reduce I/I in the system including leakage test and reference applicable portion of the specifications.

 - (b) Describe any overflows or bypasses within the system.

 - (c) If applicable, describe capacity of receiving sewers and pumping station and submit two copies of the executed inter municipal agreement.

TABLE 2 – PUMP STATION (Submit separate table for each pump station)

1. Pump Station Name: Greenbriar Drive
2. Location: North side Greenbriar Drive, 500 feet west of Main Street
3. Type (Conventional, suction lift, Ejector or submersible) Suction Lift
4. Initial Population to be served: 51, Design year population to be served. 73
5. DESIGN INFORMATION

	AVG (MGD)	MAX (MGD)
(a) Domestic Flow Rate (based on Design population to be served)	<u>0.007</u>	<u>0.029</u>
(b) Industrial Flow Rate	<u>-0-</u>	<u>-0-</u>
(c) Infiltration/Inflow Rate	<u>Incl.</u>	<u>Incl.</u>
(d) Design Flow Rate	<u>0.007</u>	<u>0.029</u>
(e) Effective Wet Well Capacity (Gal)	<u>146.9</u>	
(f) Detention Time (Min)	<u>16</u>	
(g) Design Average Velocity in Force Main (Fps)	<u>3.5</u>	
(h) Total Dynamic (Head Pump Station + Force Main)		
	Static Head	<u>73.0</u> Ft.
	Friction Loss	<u>9.5</u> Ft.
	TDH	<u>82.5</u> Ft.

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6. General Information

- (a) Describe 100 yr. flood elevation, ventilation, emergency power provision and alarm system. The pump station is not located in or near any 100 year Flood Plan. The Machinery Chamber is equipped with a ventilation blower. The wet well contains no mechanical equipment and has no mechanical ventilation. An automatic dialer is provided to contact operating personnel if an alarm condition exists. A trailer mounted emergency generator is being purchased with this project which will be capable of powering these pumps. Additional information is provided in the Design Engineers' Report.

TABLE 3 - PUMPING FACILITIES												
LIST ALL THE PUMPS IN THE ENTIRE TREATMENT FACILITY												
NUMBER OF IDENTICAL PUMPS	Describe Pump Use	Type of Pump	Check Columns That Apply To Each Pump							Pump Capacity		
			EXISTING	PROPOSED	VARIABLE SPEED	CONSTANT SPEED	AUTOMATIC CONTROL	MANUAL CONTROL	PNEUMATIC EJECTOR	STAND BY OPERATION	(GPM)	TDH (FT.)
			2	Raw Unscreened Domestic Sewage	Non-clog Wet-well mounted, vacuum primed Centrifugal Sewage Pumps	X		X	X			

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TABLE 1 – SEWER SYSTEM

1. Class of construction New System Replacement of Existing System Sanitary Combined
2. Initial Population _____, Design Year Population _____
3. DESIGN FLOW DATA

(a) Laterals and Submain Sewers	(GPCD)	_____
(b) Interceptors	(GPCD)	_____
(c) Average Daily Flow	(MGD)	_____
(d) Infiltration/Inflow	(MGD)	_____
(e) Industrial Waste Flow	(MGD)	_____
(f) Total Average Design Flow	(MGD)	_____
(g) Maximum Expected Flow Rate	(MGD)	_____
4. General Information:
 - (a) Describe measures taken to reduce I/I in the system including leakage test and reference applicable portion of the specifications.

 - (b) Describe any overflows or bypasses within the system.

 - (c) If applicable, describe capacity of receiving sewers and pumping station and submit two copies of the executed inter municipal agreement.

TABLE 2 – PUMP STATION (Submit separate table for each pump station)

1. Pump Station Name: Main Street Pump Station
2. Location: East side Main Street, near School Road
3. Type (Conventional, suction lift, Ejector or submersible) Suction Lift
4. Initial Population to be served: 82, Design year population to be served. 126
5. DESIGN INFORMATION

	AVG (MGD)	MAX (MGD)
(a) Domestic Flow Rate (based on Design population to be served)	<u>0.013</u>	<u>0.050</u>
(b) Industrial Flow Rate	<u>-0-</u>	<u>-0-</u>
(c) Infiltration/Inflow Rate	<u>Incl.</u>	<u>Incl.</u>
(d) Design Flow Rate	<u>0.013</u>	<u>0.050</u>
(e) Effective Wet Well Capacity (Gal)	<u>146.9</u>	
(f) Detention Time (Min)	<u>10</u>	
(g) Design Average Velocity in Force Main (Fps)	<u>3.5</u>	
(h) Total Dynamic (Head Pump Station + Force Main)		
	Static Head	<u>36.0</u> Ft.
	Friction Loss	<u>9.5</u> Ft.
	TDH	<u>45.5</u> Ft.

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6. General Information

- (a) Describe 100 yr. flood elevation, ventilation, emergency power provision and alarm system. The pump station is not located in or near any 100 year Flood Plan. The Machinery Chamber is equipped with a ventilation blower. The wet well contains no mechanical equipment and has no mechanical ventilation. An automatic dialer is provided to contact operating personnel if an alarm condition exists. A trailer mounted emergency generator is being purchased with this project which will be capable of powering these pumps. Additional information is provided in the Design Engineers' Report.

TABLE 3 - PUMPING FACILITIES												
LIST ALL THE PUMPS IN THE ENTIRE TREATMENT FACILITY												
NUMBER OF IDENTICAL PUMPS	Describe Pump Use	Type of Pump	Check Columns That Apply To Each Pump							Pump Capacity		
			EXISTING	PROPOSED	VARIABLE SPEED	CONSTANT SPEED	AUTOMATIC CONTROL	MANUAL CONTROL	PNEUMATIC EJECTOR	STAND BY OPERATION	(GPM)	TDH (FT.)
2	Raw Unscreened Domestic Sewage	Non-clog Wet-well mounted, vacuum primed Centrifugal Sewage Pumps		X		X	X				135	45.5

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WATER POLLUTION CONTROL
MODULE 2

TABLE 1 – SEWER SYSTEM

1. Class of construction New System Replacement of Existing System Sanitary Combined
2. Initial Population _____, Design Year Population _____
3. DESIGN FLOW DATA

(a) Laterals and Submain Sewers	(GPCD)	_____ .
(b) Interceptors	(GPCD)	_____ .
(c) Average Daily Flow	(MGD)	_____ .
(d) Infiltration/Inflow	(MGD)	_____ .
(e) Industrial Waste Flow	(MGD)	_____ .
(f) Total Average Design Flow	(MGD)	_____ .
(g) Maximum Expected Flow Rate	(MGD)	_____ .
4. General Information:
 - (a) Describe measures taken to reduce I/I in the system including leakage test and reference applicable portion of the specifications.

 - (b) Describe any overflows or bypasses within the system.

 - (c) If applicable, describe capacity of receiving sewers and pumping station and submit two copies of the executed inter municipal agreement.

TABLE 2 – PUMP STATION (Submit separate table for each pump station)

1. Pump Station Name: Water Street Pump Station
2. Location: South side of Water Street, 1300 feet west of Main Street
3. Type (Conventional, suction lift, Ejector or submersible) Suction Lift
4. Initial Population to be served: 157, Design year population to be served: 174
5. DESIGN INFORMATION

	AVG (MGD)	MAX (MGD)
(a) Domestic Flow Rate (based on Design population to be served)	<u>0.017</u>	<u>0.070</u>
(b) Industrial Flow Rate	<u>-0-</u>	<u>-0-</u>
(c) Infiltration/Inflow Rate	<u>Incl.</u>	<u>Incl.</u>
(d) Design Flow Rate	<u>0.017</u>	<u>0.070</u>
(e) Effective Wet Well Capacity (Gal)	<u>146.9</u>	
(f) Detention Time (Min)	<u>8</u>	
(g) Design Average Velocity in Force Main (Fps)	<u>2.6</u>	
(h) Total Dynamic (Head Pump Station + Force Main)		
	Static Head	<u>97.0</u> Ft.
	Friction Loss	<u>11.0</u> Ft.
	TDH	<u>108.00</u> Ft.

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 MODULE 2

6. General Information

(a) Describe 100 yr. flood elevation, ventilation, emergency power provision and alarm system.

The pump station is not located in or near any 100 year Flood Plan. The Machinery Chamber is equipped with a ventilation blower. The wet well contains no mechanical equipment and has no mechanical ventilation. An automatic dialer is provided to contact operating personnel if an alarm condition exists. A trailer mounted emergency generator is being purchased with this project which will be capable of powering these pumps. Additional information is provided in the Design Engineers' Report.

TABLE 3 - PUMPING FACILITIES												
LIST ALL THE PUMPS IN THE ENTIRE TREATMENT FACILITY												
NUMBER OF IDENTICAL PUMPS	Describe Pump Use	Type of Pump	Check Columns That Apply To Each Pump						Pump Capacity			
			EXISTING	PROPOSED	VARIABLE SPEED	CONSTANT SPEED	AUTOMATIC CONTROL	MANUAL CONTROL	PNEUMATIC EJECTOR	STAND BY OPERATION	(GPM)	TDH (FT.)
2	Raw Unscreened Domestic Sewage	Non-clog Wet-well mounted, vacuum primed Centrifugal Sewage Pumps		X	X	X					100	108.0

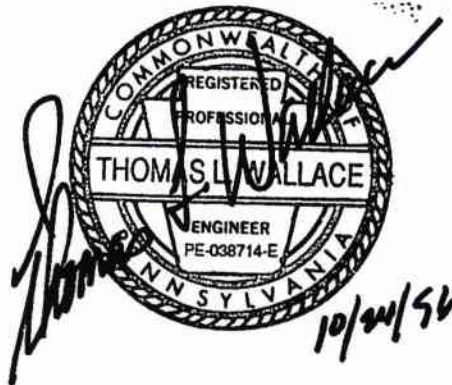
DESIGN ENGINEER'S REPORT

**GRAVITY COLLECTION SYSTEM
PRESSURE SEWER SYSTEM,
PUMP STATIONS AND
FORCE MAINS**

RECEIVED
OCT 29 1996
DEP - SOUTH CENTRAL REGION
WATER MANAGEMENT PROGRAM

FOR

**JACOBUS BOROUGH
SEWER AUTHORITY**
JACOBUS BOROUGH
YORK COUNTY, PENNSYLVANIA



SEPTEMBER 18, 1996

PREPARED BY:

JAMES R. HOLLEY & ASSOCIATES, INC.
ENGINEERS - PLANNERS
LANDSCAPE ARCHITECTS - SURVEYORS
18 SOUTH GEORGE STREET
YORK, PA 17401
717-846-4373

**DESIGN ENGINEER'S REPORT
JACOBUS BOROUGH SEWER AUTHORITY
SEPTEMBER 18, 1996**

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PUMP STATION CALCULATIONS

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**DESIGN ENGINEER'S REPORT
JACOBUS BOROUGH SEWER AUTHORITY**

**DESIGN ENGINEER'S REPORT
JACOBUS BOROUGH SEWER AUTHORITY
SEPTEMBER 18, 1996**

I. BACKGROUND

James R. Holley & Associates, Inc. has been retained by the Jacobus Borough Authority to design, permit, and observe the construction of the proposed sanitary sewer facilities.

II. GENERAL PROJECT DESCRIPTION

The proposed sanitary sewer facilities can be summarized as follows:

Location: Jacobus Borough, York County, Pennsylvania

Gravity Sewer: 8" PVC 21,500 L.F.
10" PVC 1,400 L.F.

Pressure Sewer: 1½" PVC 230 L.F.
2" PVC 860 L.F.

Pump Stations: Greenbriar Dr. - duplex, suction lift pumps
10 BHP, 136.0 gpm @ 82.5' TDH
S. Main St. - duplex, suction lift pumps
5 BHP, 135.0 gpm @ 45.5' TDH
Water St. - duplex, suction lift pumps
15 BHP, 100.0 gpm @ 103.0' TDH
York St. - duplex, suction lift pumps
25 BHP, 220.0 gpm @ 129.2' TDH

Force Main: 4" PVC 3,000 L.F.
6" PVC 3,200 L.F.

III. DESIGN INFORMATION

The following paragraphs describe the design of the sanitary sewers and pump stations. The paragraph numbers refer to the applicable section of the "DOMESTIC WASTEWATER FACILITIES MANUAL," DER # 1357-8/91.

20. DESIGN OF SANITARY SEWER SYSTEMS

21. Type of System

The proposed sanitary sewer collection system is comprised of a gravity section and a small section of pressure sewers. Overflows are not anticipated as part of this systems operation.

22. Design Period

The current population served is estimated to be :

520 houses @ 2.8 people/house = 1498 people

The projected future design population served is estimated to be:

762 houses* @ 2.8 people/house = 2134 people

* Projected houses include current houses, vacant lots, and sold reservations.

23. Design Factors

The following factors were considered during the design:

- a. Maximum quantity of domestic flows - 2 x ADF.
- b. Groundwater infiltration - included in domestic inflow.
- c. Topography of area - 0 to 20% slopes.
- d. Location of WWTP - Beck Rd., Springfield Township
- e. Depth of excavation - minimum 4' of cover.
- f. Pumping requirements - pump station inflows estimated at 100 gpcd ADF.

24. Design Basis

24.1 Per Capita Flow - The system was designed upon 100 gpcd (which includes normal infiltration) except as follows:

24.11 Laterals and sub-main sewers - These sections are designed to carry a minimum of 400 gpcd.

24.12 Main, trunk interceptor and outfall sewers - These sections are designed to carry a minimum of 250 gpcd.

24.13 Interceptors carrying combined wastewater - Not Applicable.

24.2 Alternate Method - No deviations from the previously stated per capita rates were utilized in the sewer system design.

25. Details of Design and Construction

25.1 Minimum Size - No gravity sewer sections of the proposed system is less than 8" in diameter.

25.2 Depth - The minimum depth of all proposed sanitary sewers is 4' in order to provide sufficient depth to prevent freezing.

25.3 Slope - As per Specification Section 02601, sewers shall be laid with uniform slope between manholes.

25.31 Sewers on Steep Slopes - None of the proposed sanitary sewers are laid on slopes of 20% or greater.

25.4 Alignment - As per Specification Sections 02601 and 02651, all proposed sanitary sewers shall be laid with straight alignment between manholes. The alignment shall be checked by lamping.

25.5 Increasing Size - Where smaller sewers join larger ones, the 0.8 depth point of both sewers have been placed at the same elevation.

25.6 High Velocity Protection - Velocities greater than 15 fps at peak instantaneous flow are not expected within the proposed sanitary sewer system.

25.7 Materials - The gravity portion shall be installed utilizing SDR-35 PVC piping.

25.8 Installation

25.81 Standards - See Specification Section 02210 for requirements setting forth methods of bedding and backfilling.

25.82 Trenching

- a. Specification Section 02110 states that all trenching shall comply with all appropriate federal and state laws and codes. The trench width shall be not less than 16" plus the O.D. of the pipe to allow ample room for laying, joining and compaction as needed. Vertical sides shall be as vertical as possible.**
- b. Specification Section 02210 states the all ledge rock, boulders and large stones shall be removed to provide a minimum clearance of 4" below and on each side of all pipes.**

25.83 Pipe Embedment - The following paragraphs describe the required pipe bedding, haunching and initial backfill zones material.

- a. Rigid Pipe - Not Applicable**
- b. Flexible Pipe - As per Specification Section 02210, AASHTO No. 7 material shall be used in the bedding, haunching and initial backfill zones up to 6" above the top of the pipe.**

25.84 Remaining Backfill - As per Specification Sections 02210 and 02601,

- a. where approved by the Engineer, suitable material removed from the trench excavation may be used in backfilling the remainder of the trench.
- b. pipe embedment and remaining backfill shall be placed in such a manner as not to disturb the alignment of the pipe.

25.85 Deflection Test - As per Specification Section 02651,

- a. all flexible pipe shall be tested within 30 days after final backfilling,
- b. no pipe shall exceed a deflection of 5%, and
- c. a rigid ball or mandrel having a diameter of not less than 95% of the pipe's base I.D. shall be used in performing the deflection test without the aid of mechanical pulling devices.

25.9 Joint Leakage Tests

25.91 Joints - As per Specification Section 02601, pipe joining methods and materials shall be as per manufacturers recommendations to minimize infiltration and prevent root intrusion throughout the life of the system.

25.92 Leakage Tests - Tests shall be performed as specified in Specification Section 02601.

26. Manholes

26.1 Location - The manholes have been located at all changes in grade and size, changes in alignment, at all intersections, and at a distance not greater than 400' from another manhole. Manholes so indicated on the Plan and Profile Sheets shall be protected with watertight covers.

- 26.2 Drop Type - Due to an elevation variation of greater than 24" between the inlet elevation and the outlet elevation, Manholes so indicated on the Plan and Profile Sheets shall have been designed as drop manholes with the outside drop connection encased in concrete.
- 26.3 Diameter - All manholes specified shall have a diameter is 48" with a minimum access diameter of 22".
- 26.4 Flow Channel - As per Specification Standard Detail No. 9, the flow channel shall conform in shape and slope to that of the sewers and shall provide a smooth transition from the inlet to outlet flow directions.
- 26.5 Watertightness - Manhole covers as specified in Specification Section 02610 and the Plan and Profile Sheets shall be utilized. Manholes shall be pre-cast concrete with the inlet and outlet pipes joined to the manhole with a gasketed watertight connection.
- 26.6 Manhole Testing - Manholes shall be tested in accordance with the procedures outlined in Specification Section 02652.
- 26.7 Electrical - Not Applicable
- 26.8 Venting - Manhole covers as specified in Specification Section 02610 and the Plan and Profile Sheets shall be utilized.

27. Sewers in Relation to Streams

- 27.1 Location of Sewers in Streams - As shown on Plan and Profile Sheets, 3' of cover has been maintained between the stream bottom and the top of the concrete encasement.
- 27.2 Construction - Stream crossings will be accomplished utilizing concrete encased PVC pipe. Erosion and Sediment Control Sheets describe the measures to be taken by the Contractor to control erosion and siltation, and provide for proper restoration.

27.3 The Erosion and Sediment Control Sheets prohibits the Contractor from unnecessarily disturbing or uprooting trees and vegetation along stream banks and in the vicinity of streams, dumping of soil and debris into streams or on banks of streams, changing course of the stream without an encroachment permit, leaving cofferdams in streams, leaving temporary stream crossings for equipment, operating equipment in the stream, or pumping silt-laden water into the stream.

27.4 Inverted Siphons - Not applicable

27.5 Aerial Crossings - Not Applicable

28. Protection of Water Supplies

28.1 Water Supply Interconnections - No physical connections between a water supply system and the sewer are planned. No water pipes pass through or come in contact with any part of a sewer manhole.

28.2 Relation Waterworks Structures - No part of the proposed sanitary sewer system is located within 100' of a public water supply source or 50' of a private water supply.

28.3 Relation to Water Mains

28.31 Horizontal Separation - The proposed sanitary sewers are shown with at least 10' of horizontal separation.

28.32 Vertical Separation - In the crossing situations shown on Plan and Profile Sheets, an 18" minimum vertical separation has been maintained.

29. Alternative Sewer Systems

29.1 Pressure Sewer System

29.11 Application - The pressure sewer system shown on Plan and Profile Sheets is proposed due to:

- a. Topography - Since the residences being serviced are located approximately 5' to 70' below the elevation of the tie-in point to the main sewer, it was determined to be more feasible from an economic and construction standpoint to provide these residences with sewer service via grinder pumps and low pressure sewer system.**
- b. Groundwater - Not Applicable**
- c. Excessive Rock Excavation - It was not deemed practical to lower the remainder of the gravity collection system to provide gravity service to these residences.**

29.12 Design Criteria

- a. Collection System**
 - (1) The smallest pressure sewer line is 1½" I.D.**
 - (2) All of the proposed pressure sewer stations will service only 1 residence each.**
 - (3) Flow in the pressure sewer system was estimated by assuming 1 pump per station, for each station, was pumping at the peak flow time.**
 - (4) The system is laid out in a single line with the individual check-valved stations pumping into it.**

- (5) Cover for the system is a minimum of 4'.**
- (6) System pipe material, as per Specification Section 02601, shall be PVC SDR-21.**
- (7) Clean-out connections are provided at a spacing not exceeding 500 l.f. with appropriate bypass valves and flushing clean-outs at the upstream of the line end.**
- (8) Pressure and vacuum release valves are not required due to the continuous positive downstream slope and termination into a gravity sewer manhole.**
- (9) All pressure sewers shall be identified with a green color coded, 18" wide, 5.5 mil thick metallic tape with the words "CAUTION BURIED SEWER LINE BELOW" imprinted on the color side.**
- (10) No physical connections between a water supply system and the pressure sewer are planned. No water pipes pass through or come in contact with any part of the grinder stations.**

No part of the pressure system is located within 100' of a public water supply source or 50' of a private water supply.

A horizontal separation of 10' and a vertical separation of 18" for a crossing situation, has been maintained between the pressure main and water mains.

- (11) The pressure sewer system is designed to operate at approximately 40 psi maximum.**

- (12) See Specification Section 02651 for testing procedures to be followed prior to start-up.**
- (13) See Specification Section 02210, Plan and Profile Sheets and Detail Sheets for details of construction.**

b. Grinder Pump Units

- (1) See Specifications section for data showing storage capacity and timing of pump events under various scenarios.**
- (2) The grinder stations are replacing existing systems which have been retained and their tankage is being utilized as emergency holding tanks.**
- (3) The pumps produce at least 8 gpm under all conditions.**
- (4) As per Detail Sheets, check and shut-off valves isolate the grinder pump unit from the house service line and the pressure laterals.**
- (5) All of the grinder stations are provided with visual and audio alarms on a separately breakered control circuit.**
- (6) The grinder stations are designed to operate under normal power load fluctuations and contains check valves for protection against back siphonage and over pressure.**
- (7) The grinder pumps as specified are capable of reducing objects to enable passage through the pump, service lateral and force main.**

- (7) The grinder pumps as specified are capable of reducing objects to enable passage through the pump, service lateral and force main.**
- (8) All of the grinder stations are of a duplex design.**
- (9) All of the stations have padlocked access to protect against tampering. Vandalism is not believed to be a problem in these neighborhoods. All of the stations are UL and NSF certified.**
- (10) All pumps are capable of removal via pipe unions without dewatering the collection tank.**

c. Centrifugal Pump Units - Not Applicable

29.13 Operation, Maintenance and Service

- a. Ownership and Repair Services - Pressure sewer will be owned and maintained by Authority. Individual grinder pump units will be given to homeowners and will be installed, operated and maintained by the homeowners. The Authority will maintain two (2) spare pumping units that can be used in an emergency basis by homeowners until repairs can be completed. These units are standard off-the-shelf-units and repair/replacement parts are readily available from the manufacturer.**

30. WASTEWATER PUMPING STATIONS

31. General

- 31.1 Flooding** - A detailed FEMA flood study is unavailable for Jacobus Borough. The pump stations are located in areas that have not experienced flooding to an extent which would result in physical damage to the stations or cause them to cease operations during a 25-year flood event. Access to the stations and emergency generator connections is also available during a 25-year flood event.
- 31.2 Accessibility** - Greenbriar Dr. and Water St. stations are accessible via a PA DOT #3-A aggregate access road, and the S. Main St. and York Rd. stations are accessible via a macadam/PA DOT #3-A aggregate access road.
- All of the stations are fenced except for Greenbriar Dr. which is located in the back yard of a residential area and within view of the neighboring houses. The pumps, controls and valving are located in a padlocked vault and the remaining exposed components (disconnect switch, transfer switch, and wet well) are all independently padlocked.
- 31.3 Grit** - The station bottoms have been sloped at 60° toward the suction pipes to allow any grit which may settle out to be drawn into the suction pipes. An average velocity greater than 2 fps has been maintained to further prevent solids deposition for occurring.
- 31.4 Modification to Existing Pump Stations** - None of the proposed pump stations entail modifications to an existing station since they are of new construction.
- 31.5 Type** - All of the proposed stations are classified as duplex, non-clogging, suction lift pump stations.

32. Wet and Dry Well Pump Stations

32.1 Structures - Not Applicable

32.2 Pumps and Pneumatic Ejectors

32.21 Multiple Units - Since all of the stations each pump less than 1.0 MGD maximum monthly average flow, only two pumps are required. Each station is a duplex station with two identical pumps capable of handling the peak flow.

32.22 Protection Against Clogging - The pumps specified are non-clogging, centrifugal pumps.

32.23 Sphere Passage - As specified, the pumps shall be capable of passing a 3" sphere, and have 4" suction and discharge piping.

32.24 Vacuum Priming Pumps - All of the station pumps have a dedicated vacuum priming pump with vacuum control solenoid valves, prime level sensing probes, and float-operated check valves to protect the vacuum pumps from the wastewater.

32.25 Electrical Equipment - The only electrical components located in the wet well are the sealed floats. The float cable and piping penetrations into the wet well will all have gas tight seals and strain reliefs as per Specification Sections 11306 and 11307 and they comply with NEC Class I, Division I, Group D location usage under corrosive conditions. Each station is also equipped with a fused disconnect switch located above ground, and separated from the station by a minimum of 5' in a NEMA 4X enclosure. Also, a 110 volt GFI outlet is provided at each disconnect switch.

32.26 Intake - Each pump has a dedicated suction line with the All Pumps Off float set to maintain a minimum submergence of 1', as per manufacturer's recommendation to avoid intake turbulence and prevent vortex formation.

32.27 Dry Well Dewatering - As per Specification Section 11307, the Greenbriar Dr. and York Rd. stations will be equipped with a sump pump to prevent water build-up in the recessed pump housing. Dual check valves are not utilized since the housing, while located mainly below grade, has a rim elevation at a minimum of 1' above the surrounding grade to exclude stormwater runoff and is located on top of the wet well.

32.28 Pumping Rates - All of the stations were modeled to ensure operation at varying flow rates (see the Pump Station Calculations section for pump on/off timing data at Min. Flow, ADF, Max. Flow and PDF).

32.29 Wet well Pump Quick Disconnects - Not Applicable

32.3 Controls

32.31 Type - Pump operations will be actuated by encapsulated float switches.

32.32 Location - The floats will be centrally located to reduce the affects of inflow turbulence and pump suction. The control panel contains an alternator which switches the lead pump after each All Pumps Off signal.

32.4 Valves - All station valving is located in the pump housing and consists of a spring loaded external arm, non-slamming check valve and a full port eccentric plug valve, both located in a horizontal section of the discharge piping. The valving is accessible for operation and maintenance once the pump housing is opened.

32.5 Wet Wells

32.51 Divided Wells - The only components in it are the pump control floats and suction pipes. Since the Floats are adjustable from the pump housing area, and the suction pipes are a low maintenance item, dividing the wet well into multiple sections was not deemed necessary.

32.52 Size - The wet well was sized (see Pump Station Calculations section) to provide a holding period of less than 10 minutes at Max. Flow except for the Greenbriar Dr. station. Due to the short tributary flow distance (750 l.f.) for that station, the Max. Flow holding period was allowed to be 16 minutes.

32.53 Floor Slope - As per manufacturer's recommendation, the hopper slope is 60° (1H:1.7V), which is greater than the regulatory minimum of 1:1. The hopper bottom area has been dimensioned per manufacturer's recommendation also.

32.6 Ventilation - All of the stations have a mechanical ventilation system. The recessed pump housing stations at Greenbriar Dr. and York Rd. each have a ventilating blower capable of delivering 40 air changes per hour on a timer controlled intermittent basis.

The above ground pump housings at S. Main St. and Water St. have adjustable ventilating louvers at each end of the fiberglass cover for continuous ventilation in addition to a thermostatically controlled blower to prevent heat build-up.

32.61 Wet Wells - No wet well ventilation is provided at any of the stations since the only components in the wet well are the pump floats (adjustable from the housing) and pump suction lines.

32.62 Dry Wells - Not Applicable

32.7 Flow Measurement - Elapsed time meters are provided for each pump to allow for the calculation of the wastewater amount pumped by each pump.

32.8 Water Supply - Water is supplied to all of the sites by York Water Company via a meter and RPZD. Frost-proof hydrants are provided at each station for the connection of a 1" diameter hose.

33. Suction Lift Pump Stations

All of the stations are vacuum-primed with the pump housing located on top of the wet well. A gas tight seal between the housing and wet well prevents humid or corrosive gases from entering the housing section. All station components except the pump suction pipes and floats are located in the housing. A separate padlocked entrance to the wet well is provided.

33.1 Self-Priming Pumps - Not Applicable

33.2 Vacuum Priming Pumps - All of the station pumps have a dedicated vacuum priming pump with vacuum control solenoid valves, prime level sensing probes, and float-operated check valves to protect the vacuum pumps from the wastewater.

The maximum static suction lift for the stations are as follows:

Greenbriar Dr.	4.79'
S. Main St.	9.50'
Water St.	16.00'
York Rd.	18.79'

34. Submersible Pump Stations - Not Applicable

35. Alarm Systems

All of the station's alarm conditions (power failure, pump failure, use of lag pump, unauthorized entry, or high wastewater level) are telemetered, including identification of the alarm condition to the Springfield Township Sewer Authority's WWTP located at Beck Road in Springfield Township

36. Emergency Operation

None of the stations may be bypassed or have wet well overflow systems.

36.1 Overflow Prevention Methods

36.11 Storage Capacity - The stations were modeled determine event times (Lead Pump On, Lag Pump On, Alarm and Overflow) at various flow conditions (Min. Flow, ADF, Max Flow and PDF) for the following 3 different scenarios:

- Minutes from last "All Pumps Off" event. (Normal Operation)
- Minutes from last "All Pumps Off" event. (assuming failure of lead pump)
- Minutes from last "All Pumps Off" event. (assuming all pumps fail and no line storage)

(See Pump Station Calculations section for the timing of the events during the various flow conditions under the different scenarios.

36.12 In-Place or Portable Pump - Method not utilized due to use of methods as described in paragraphs 36.11 and 36.13.

36.13 Independent Public Utility Sources - An emergency generator unit owned by the Jacobus Borough Sewer Authority will be available to provide emergency power.

36.21 General - The follow paragraphs describe the general physical characteristics, operation and maintenance of the internal combustion engine utilized to drive the generator.

36.211 Engine Protection - As per Specification Section 16622, the unit is designed to be operated without continuous manual supervision. Because of that, the unit will be provided with protective equipment capable of shutting down the engine in the event of high water temperature, low oil pressure, overspeed, and engine overcrank.

36.212 Size - Since the peak anticipated flow at each station can be handled by a single pump, the unit was sized accordingly. Unit is also sufficient to operate at 10% overload for one hour.

36.213 Fuel Type - The generator is driven by a diesel powered internal combustion engine.

36.214 Engine Ventilation - Unit will be trailer mounted with a protective weather housing. The housing includes fixed louvers to ensure adequate continuous ventilation during operations.

36.215 Routine Start-up - A manufacturer's representative will instruct the Authorities personnel on the proper operation and maintenance of the unit. Written instruction for normal operation, routine maintenance requirements, service manuals, oil sampling and analysis for engine wear and emergency maintenance procedures will also be provided to the Authority. The unit will be stored at the

WWTP where it will be maintained in good operating condition and exercised regularly.

36.216 Protection of Equipment - Connection of the unit to the pump station will be by a special adapter plug and a double throw transfer switch to isolate and prevent damage to the unit upon restoration of normal power to the station.

36.22 Engine-Driven Pumping Equipment - Not Applicable

36.23 Engine-Driven Generating Equipment - The following paragraphs describe additional aspects of the portable generator unit.

36.231 Generating Capacity - Size - Since the peak anticipated flow at each station can be handled by a single pump, the unit was sized accordingly. The unit is rated at 100 KW, 125 KVA, at 0.8 power factor, 3 wire, 230 V, 60 Hz at 1800 rpm. Unit is also sufficient to operate at 10% overload for one hour.

Since the generator is sized for 1 pump operation, the operator will access the pump control panel and set the pumps Hand-Off-Automatic switches to Off prior to loading the generator. Once the generator is stabilized the operator will switch one of the pumps on-line for use.

36.232 Operation - The portable generator unit will be manually started and the load then transferred.

36.233 Portable Generating Equipment - As per the pump station modeling, sufficient storage capacity after telemetered notification of a problem has been provided at each station to allow for transport, connection and assumption of the load. The convenience of the emergency generator hook-up locations, special electrical connections, and use of double throw switches along with site accessibility were also considered in the decision to utilize a trailer mounted portable generator for emergency power.

37. Instructions and Equipment

As per Specification Sections 11306 and 11307, a manufacturer's representative will instruct the Authorities personnel on the proper operation and maintenance of the pump stations. Written instructions on the operation and maintenance, wiring schematics, and latest manufacturer's published literature along with 1 complete set of spare parts per pump will be provided for each station.

38. Force Mains

38.1 Velocity - The following is a summary of the F.M. velocities:

<u>Pump Station</u>	<u>F.M. Size & Mat'l</u>	<u>Velocity</u>
Greenbriar Dr.	4" PVC	3.5 fps
S. Main St.	4" PVC	3.5 fps
Water St.	4" PVC	2.6 fps
York Rd.	6" PVC	2.5 fps

38.2 Air and Vacuum Relief Valve - As shown on Plan & Profile Sheets, air relief valves have been placed at the high points to prevent air locking. Vacuum relief valves were not deemed necessary for these force mains.

- 38.3 Termination - All force mains enter the gravity sewer manholes 0.1' above the manhole outlet invert.**
- 38.4 Pipe and Design Pressure - Force main material is C-900 PVC 4" and 6" diameters and is rated for 150 psi working pressure. The force main utilizes concrete reaction blocking at the locations indicated on Plan & Profile Sheets. The reaction blocking is detailed in the Standard Details.**
- 38.5 Special Construction - Where the force main crosses a stream, as shown on Plan & Profile Sheets, 3 feet of cover above the concrete encasement has been maintained.**

The Erosion & Sediment Control Plan and Procedures indicated on Erosion & Sediment Control Sheets shall be utilized during construction.

The Erosion & Sediment Control Sheets prohibits the Contractor from unnecessary disturbing or uprooting trees and vegetation along stream banks and in the vicinity of streams, dumping of soil and debris into streams or on banks of streams, changing course of the stream without an encroachment permit, leaving cofferdams in streams, leaving temporary stream crossings for equipment, operating equipment in the stream, or pumping silt-laden water into the stream.

38.6 Design Friction Losses - Friction losses through the force mains and the system TDH Curve were calculated utilizing the Reynolds Number, Relative Roughness and the Moody Diagram by the following methodology:

Given:

Beginning Elevation, End Elevation (or highest along the route), Kinetic Viscosity (ν) of the fluid pumped, a range of flow rate to be characterized, and the pipe Length (L), diameter (D), specific roughness (e) and type/number of fittings.

Calculations:

Elevation Head	= Head E.	= End Elev. - Begin Elev.	ft
Flow Rate	= q	= Flow(gpm) * 448.831 cfs/gpm	cfs
Pipe Area	= A	= $\pi * (\text{Diameter}^2) / 4$	sf
Velocity	= V	= q / A	fps
Reynolds Number	= Rey	= $(q/A) * D / \nu$	

Relative Roughness = e/D

Friction Factor = f is obtained from a Moody Roughness Chart by entering the x-axis with "Rey", travelling up to the appropriate "e/D" curve, then left to the y-axis to determine "f"

Velocity Pump Head = Head V. = $f * (V^2)/2 * L/D$

Fitting Minor Loss = Head F. = Sum of $K * (V^2)/2$

K is a standard loss number given to each type of fitting

Once these calculations have been performed for each section of pipe, the following calculation is performed for each flow rate to be characterized:

Total Dynamic Head = TDH = Head E + Head V. + Head F.

- 38.7 Minimum Size - All force mains are either 4" or 6" in diameter except for the force mains connected to individual residential grinder pump stations.**
- 38.8 Separation from Water Mains - A 10' horizontal separation has been maintained between the force main and water mains. In crossing situations, a minimum of 18" vertical separation has been shown.**

38.9 Identification of Force Mains and Leakage Testing - As per Specification Section 02601, the force main will be identified with a 18" wide, and 5.5 mil thick metallic type with the words "CAUTION BURIED SEWER PIPES BELOW" imprinted on the color side.

As per Specification Section 02651 the force main will be hydrostatically pressure tested to 150 psig for a period of 2 hrs. During the test period make-up water pumped into the force main to account for leakage maintain the test pressure shall be metered. The allowable leakage shall be calculated utilizing the following formula:

$$L = \frac{N \times D \times P^2}{3,700}$$

L = allowable leakage (gph)
N = number of joints in tested section
D = nominal diameter of pipe (in.)
P = average test pressure (psig)

PUMP STATION CALCULATIONS

PUMP STATION WETWELL SIZING PROGRAM

Project Name: Jacobus Boro - Sewer Authority
 Greenbriar Dr. Pump Station
 Engineer: Jack N. Powell, P.E.

Project Number: 950735
 Date: September 6, 1996
 File: 950735GL.WK1

WETWELL SIZING
 Design Criteria & Calculations

Flow Characteristics:
 Number of People = 73 People
 Per Capita Flow = 100 gpcd
 - or -
 Total Flow (if known) = gpd
 Average Daily Flow = 7,300.0 gpd = 5.07 gpm
 Min Daily Flow = 3,650.0 gpd = 2.53 gpm
 0.5 * ADF
 Max Daily Flow = 14,600.0 gpd = 10.14 gpm
 2.0 * ADF
 Peak Daily Flow = 29,200.0 gpd = 20.28 gpm
 4.00 * ADF

Wetwell Characteristics:
 Wetwell Diameter = 5 ft = 146.9 gal/ft

Item:	Elevation:	
Rim Elev.	555.05 ft	W
Alarm Elev.	553.72 ft	E
Lag On Elev.	553.00 ft	T
Lead On Elev.	552.00 ft	W
All Off Elev.	551.00 ft	E
Bottom Elev.	549.50 ft	L

Pump Characteristics:
 1 Pump = 136.0 gpm @ 82.5 TDH
 2 Pumps = 162.0 gpm @ 86.0 TDH

WETWELL SIZING
 Results

Volume Below All Off Elevation = 220 gal

Minutes from last "All Pumps Off" event.

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Lead Pump On	58	29	14	7
Lag Pump On				
Alarm				
Overflow				
All Pumps Off	59	30	16	9
Max. Starts/Hr.	1	1	2	4

Minutes from last "All Pumps Off" event.
 (assuming failure of lead pump)

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Lead Pump Level	58	29	14	7
Lag Pump On	116	58	29	14
Alarm				
Overflow				
All Pumps Off	118	60	31	17

Minutes from last "All Pumps Off" event.
 (assuming all pumps fail & no line storage)

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Alarm	158	79	39	20
Overflow	235	117	59	29

- Volume Below All Off Elevation = (All Off Elev. - Bottom Elev.) * gal/ft.
- Minutes for Lead Pump On = [(Lead On Elev. - All Off Elev.) * gal/ft] / Inflow (gpm)
- Minutes for Lag Pump On (with Lead Pump failure) = {[(Lag On Elev. - Lead On Elev.) * gal/ft.] / Inflow (gpm)} + Minutes for Lead Pump On
- (with Lead Pump pumping) = {[(Lag On Elev. - Lead On Elev.) * gal/ft.] / (Inflow (gpm) - 1 Pump Flow)} + Minutes for Lead Pump On
- Minutes for Alarm = {[(Alarm Elev. - Lag On Elev.) * gal/ft.] / (Inflow (gpm) - 2 Pump Flow)} + Minutes for Lag Pump On
- Minutes for Overflow = {[(Rim Elev. - Alarm Elev.) * gal/ft.] / (Inflow (gpm) - 2 Pump Flow)} + Minutes for Alarm
- Minutes for All Pumps Off (from Lead Pump On) = {[(Lead On Elev. - All Off Elev.) * gal/ft.] / (1 Pump Flow - Inflow (gpm))} + Minutes for Lead Pump On
- (from Lag Pump On) = {[(Lag On Elev. - All Off Elev.) * gal/ft.] / (2 Pump Flow - Inflow (gpm))} + Minutes for Lag Pump On
- (from Alarm) = With the assumption of constant Inflow, the Inflow is greater than 2 Pump Flow in order for the alarm to activate. Therefore, the station will overflow under this assumption.
- Max. Starts/Hr. = (60 minutes / Minutes for All Pumps Off) / 2 (since the 2 pumps alternate)

Project Name: Jacobus Boro - Sewer Authority
 Greenbriar Dr. Pump Station
 Engineer: Jack N. Powell, P.E.

Project Number: 950735
 Date: September 6, 1996
 Date: 960735GF.WK1

FLOTATION

Design Criteria

Circular Basin:
 Wall Thickness = 6 in.
 Inside Diameter = 5 ft
 Inside Depth = 10.3 ft
 Pad Flange = 0 in.

Rectangular Basin:
 Length Thickness = in.
 Width Thickness = in.
 Inside Length = ft
 Inside Width = ft
 Inside Depth = ft
 Pad Flange = in.

Densities:
 Water = 62.43 pcf
 Basin Material = 150 pcf
 Ballast Material = 150 pcf

Factor of Safety = 1

FLOTATION

Calculations & Results (Program assumes groundwater elev. = rim elev. of basin and does not take into consideration friction from the surrounding soil.)

Basin Volume = $\text{Depth} * \pi * (\text{I.D.} + 2 * \text{Wall Thick.})^2 / 4$ = 291.23 c.f.

Force of Bouyancy on Basin
 = Basin Volume * Density Water = 18,181.22 lbs

Basin Weight = $\text{Density} * \text{Depth} * \pi * (\text{O.D.}^2 - \text{I.D.}^2) / 4$ = 13,347.84 lbs

Assume Pad Dimensions of: Diameter = 6.00 ft
 Thickness = 23.43 in.

Force of Bouyancy on Pad
 = Pad Volume * Density Water = 3,445.79 lbs

Pad Weight = Pad Volume * Density Material = 8,279.16 lbs

Total Force of Bouyancy
 = Force on Basin + Force on Pad = 21,627.00 lbs

Total Weight = Weight of Basin + Weight of Pad = 21,627.00 lbs

Additional Weight Resisting Flotation
 = Total Weight - Total Force of Bouyancy = 0.00 lbs

USE PAD DIMENSIONS OF: Diameter = 6.00 ft
 Thickness = 24.00 in.

Project Name: Jacobus Borough - Sewer Authority
Greenbriar Dr. Pump Station

Project Number: 950735

Date: September 12, 1996

Engineer: Jack N. Powell, P.E.

Filename:950735GP.WK1

Begin Elevation: ft 551.00 Starting GPM: 50 Kin. Visc. (s.f./sec) 1.00E-05
End Elevation: ft 624.00 GPM Interval: 10

Pipe Number:	1	2	3	4	5
Length	ft 10.0	690.0			
Diam.	in. 4	4			
Spec. Rough.	ft 0.000008	0.000005			
Air Discharge	0	1			
Increaser	0	0			
Reducer	0	0			
Gate Vlv.	0	0			
Globe Vlv.	1	0			
Check Vlv.	1	0			
90 Bend	3	2			
45 Bend	0	4			
Tee (Through)	0	0			
Tee (Branch)	1	0			

Flow (gpm)	Velocities (fps)					Head F. (ft)	Head V. (ft)	TDH (ft)
	Pipe 1	Pipe 2	Pipe 3	Pipe 4	Pipe 5			
50	1.3	1.3	0.0	0.0	0.0	1.43	0.05	74.48
60	1.5	1.5	0.0	0.0	0.0	1.99	0.07	75.07
70	1.8	1.8	0.0	0.0	0.0	2.65	0.10	75.75
80	2.0	2.0	0.0	0.0	0.0	3.37	0.13	76.50
90	2.3	2.3	0.0	0.0	0.0	4.18	0.16	77.34
100	2.6	2.6	0.0	0.0	0.0	5.06	0.20	78.26
110	2.8	2.8	0.0	0.0	0.0	6.02	0.24	79.26
120	3.1	3.1	0.0	0.0	0.0	7.08	0.29	80.38
130	3.3	3.3	0.0	0.0	0.0	8.32	0.34	81.66
140	3.6	3.6	0.0	0.0	0.0	9.65	0.40	83.05
150	3.8	3.8	0.0	0.0	0.0	11.09	0.46	84.54
160	4.1	4.1	0.0	0.0	0.0	12.62	0.52	86.14
170	4.3	4.3	0.0	0.0	0.0	14.26	0.59	87.85
180	4.6	4.6	0.0	0.0	0.0	16.00	0.66	89.65
190	4.9	4.9	0.0	0.0	0.0	17.83	0.73	91.56

Project Name: Jacobus Borough - Sewer Authority
Greenbriar Pump Station

Project Number: 950735

Engineer: Jack N. Powell, P.E.

Date: September 12, 1996

This program computes the Total Dynamic Head (TDH) of a single pipe route system in the following manner:

Given: Beginning Elevation, End Elevation (or highest along the route), Kinetic Viscosity (ν) of the fluid pumped, a range of flow rate to be characterized, and the pipe length (L), diameter (D), specific roughness (e) and type/number of fittings.

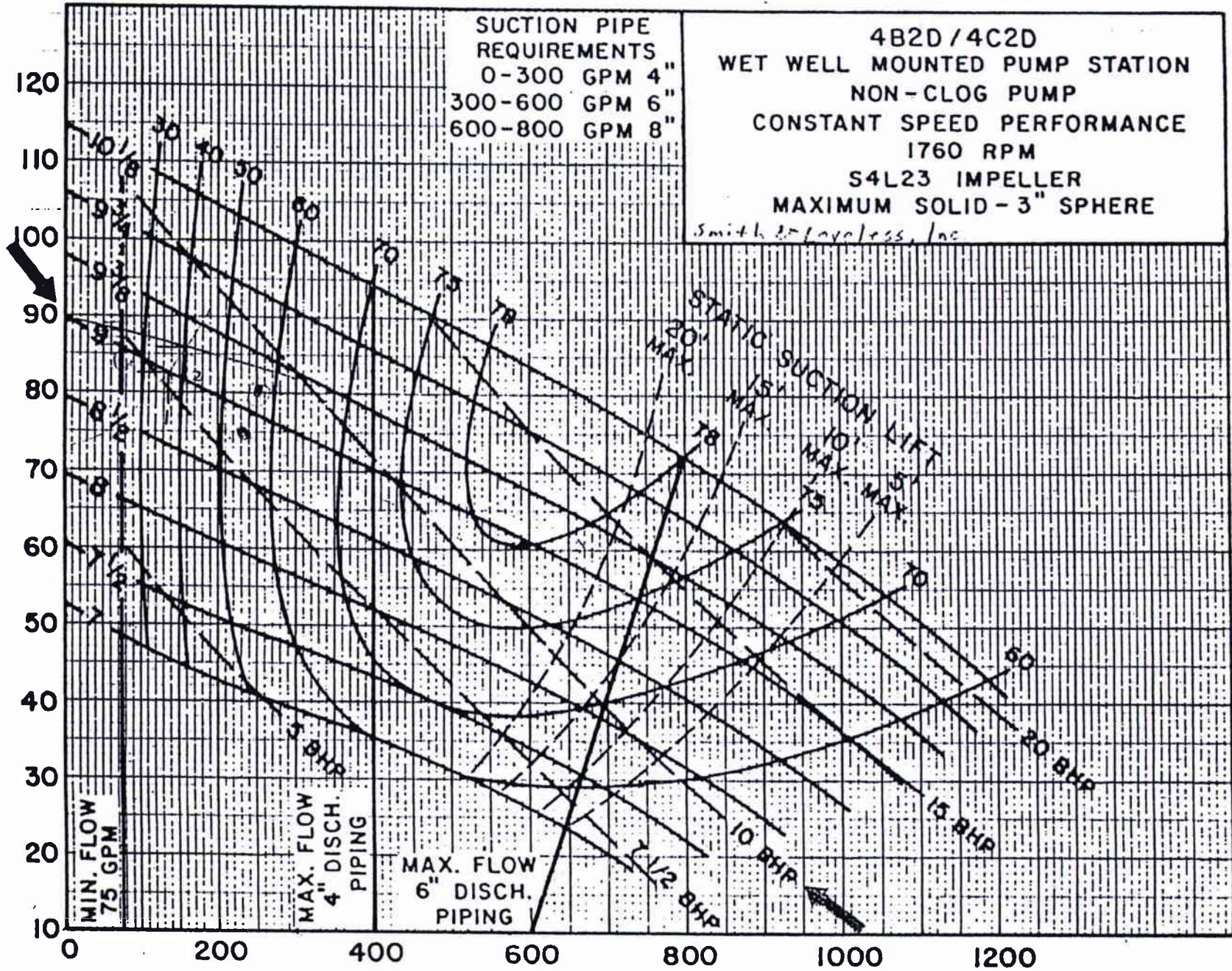
Calculations:

Elevation Head	=	Head E.	=	End Elev. - Begin Elev.	ft
Flow Rate	=	q	=	Flow (gpm) * 448.831 cfs/gpm	cfs
Pipe Area	=	A	=	$\pi * (\text{Diameter}^2) / 4$	sf
Velocity	=	V	=	q / A	fps
Reynolds Number	=	Rey	=	$(q/A) * D / \nu$	
Relative Roughness	=	e/D			
Friction Factor	=	f	is obtained from a Moody Roughness Chart by entering the x-axis with "Rey", traveling up to the appropriate "e/D" curve, then left to the y-axis to determine "f"		
Velocity Pump Head	=	Head V.	=	$f * (V^2) / 2 * L / D$	
Fitting Minor Loss	=	Head F.	=	Sum of $K * (V^2) / 2$	
				K is a standard loss number given to each type of fitting	

Once these calculations have been performed for each section of pipe, the following calculation is performed for each flow rate to be characterized:

Calculations: Total Dynamic Head = TDH = Head E_i + Head V. + Head F.

TOTAL HEAD IN FEET



Water & V
Wet Well
Pump Station

4"-Pumps
PUMP ASSE
DRAWING

Greenbriar Dr.

U.S. GALLONS PER MINUTE

1 Pump = 136 gpm @ 82.5' TDH
 2 Pumps = 162 gpm @ 86.0' TDH

PUMP STATION WETWELL SIZING PROGRAM

Project Name: Jacobus Boro - Sewer Authority
 S. Main Pump Station
 Engineer: Jack N. Powell, P.E.

Project Number: 950735
 Date: September 10, 1996
 File: 950735ML.WK1

WETWELL SIZING
 Design Criteria & Calculations

Flow Characteristics:
 Number of People = 126 People
 Per Capita Flow = 100 gpcd
 - or -
 Total Flow (if known) = gpd
 Average Daily Flow = 12,600.0 gpd = 8.75 gpm
 Min Daily Flow = 6,300.0 gpd = 4.38 gpm
 0.5 * ADF
 Max Daily Flow = 25,200.0 gpd = 17.50 gpm
 2.0 * ADF
 Peak Daily Flow = 50,400.0 gpd = 35.00 gpm
 4.00 * ADF

Wetwell Characteristics:
 Wetwell Diameter = 5 ft = 146.9 gal/ft

Item:	Elevation:	
Rim Elev.	646.50 ft	W
Alarm Elev.	640.89 ft	E
Lag On Elev.	639.00 ft	T
Lead On Elev.	638.00 ft	W
All Off Elev.	637.00 ft	E
Bottom Elev.	635.00 ft	L

Pump Characteristics:
 1 Pump = 135.0 gpm @ 45.5 TDH
 2 Pumps = 155.0 gpm @ 48.0 TDH

WETWELL SIZING
 Results

Volume Below All Off Elevation = 294 gal

Minutes from last "All Pumps Off" event.

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Lead Pump On	34	17	8	4
Lag Pump On				
Alarm				
Overflow				
All Pumps Off	35	18	10	6
Max. Starts/Hr.	1	2	3	5

Minutes from last "All Pumps Off" event.
 (assuming failure of lead pump)

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Lead Pump Level	34	17	8	4
Lag Pump On	67	34	17	8
Alarm				
Overflow				
All Pumps Off	69	36	19	11

Minutes from last "All Pumps Off" event.
 (assuming all pumps fail & no line storage)

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Alarm	131	65	33	16
Overflow	319	159	80	40

Volume Below All Off Elevation = (All Off Elev. - Bottom Elev.) * gal/ft.
 Minutes for Lead Pump On = [(Lead On Elev. - All Off Elev.) * gal/ft.] / Inflow (gpm)
 Minutes for Lag Pump On (with Lead Pump failure) = {[(Lag On Elev. - Lead On Elev.) * gal/ft.] / Inflow (gpm)} + Minutes for Lead Pump On
 (with Lead Pump pumping) = {[(Lag On Elev. - Lead On Elev.) * gal/ft.] / (Inflow (gpm) - 1 Pump Flow)} + Minutes for Lead Pump On
 Minutes for Alarm = {[(Alarm Elev. - Lag On Elev.) * gal/ft.] / (Inflow (gpm) - 2 Pump Flow)} + Minutes for Lag Pump On
 Minutes for Overflow = {[(Rim Elev. - Alarm Elev.) * gal/ft.] / (Inflow (gpm) - 2 Pump Flow)} + Minutes for Alarm
 Minutes for All Pumps Off (from Lead Pump On) = {[(Lead On Elev. - All Off Elev.) * gal/ft.] / (1 Pump Flow - Inflow (gpm))} + Minutes for Lead Pump On
 (from Lag Pump On) = {[(Lag On Elev. - All Off Elev.) * gal/ft.] / (2 Pump Flow - Inflow (gpm))} + Minutes for Lag Pump On
 (from Alarm) = With the assumption of constant Inflow, the Inflow is greater than 2 Pump Flow in order for the alarm to activate. Therefore, the station will overflow under this assumption.
 Max. Starts/Hr. = (60 minutes / Minutes for All Pumps Off) / 2 (since the 2 pumps alternate)

Project Name: Jacobus Boro - Sewer Authority
 S. Main Pump Station
 Engineer: Jack N. Powell, P.E.

Project Number: 950735
 Date: September 10, 1996
 Date: 960735MF.WK1

FLOTATION
 Design Criteria

Circular Basin:
 Wall Thickness = 6 in.
 Inside Diameter = 5 ft
 Inside Depth = 10.2 ft
 Pad Flange = 0 in.

Rectangular Basin:
 Length Thickness = in.
 Width Thickness = in.
 Inside Length = ft
 Inside Width = ft
 Inside Depth = ft
 Pad Flange = in.

Densities:
 Water = 62.43 pcf
 Basin Material = 150 pcf
 Ballast Material = 150 pcf

Factor of Safety = 1

FLOTATION

Calculations & Results (Program assumes groundwater elev. = rim elev. of basin and does not take into consideration friction from the surrounding soil.)

Basin Volume = $\text{Depth} * \pi * (\text{I.D.} + 2 * \text{Wall Thick.})^2 / 4$ = 288.40 c.f.

Force of Bouyancy on Basin
 = Basin Volume * Density Water = 18,004.70 lbs

Basin Weight = $\text{Density} * \text{Depth} * \pi * (\text{O.D.}^2 - \text{I.D.}^2) / 4$ = 13,218.25 lbs

Assume Pad Dimensions of: Diameter = 6.00 ft
 Thickness = 23.20 in.

Force of Bouyancy on Pad
 = Pad Volume * Density Water = 3,412.33 lbs

Pad Weight = Pad Volume * Density Material = 8,198.78 lbs

Total Force of Bouyancy
 = Force on Basin + force on Pad = 21,417.03 lbs

Total Weight = Weight of Basin + Weight of Pad = 21,417.03 lbs

Additional Weight Resisting Flotation
 = Total Weight - Total Force of Bouyancy = 0.00 lbs

USE PAD DIMENSIONS OF: Diameter = 6.00 ft
 Thickness = 24.00 in.

Project Name: Jacobus Borough - Sewer Authority
S. Main St. Pump Station

Project Number: 950735

Date: September 12, 1996

Engineer: Jack N. Powell, P.E.

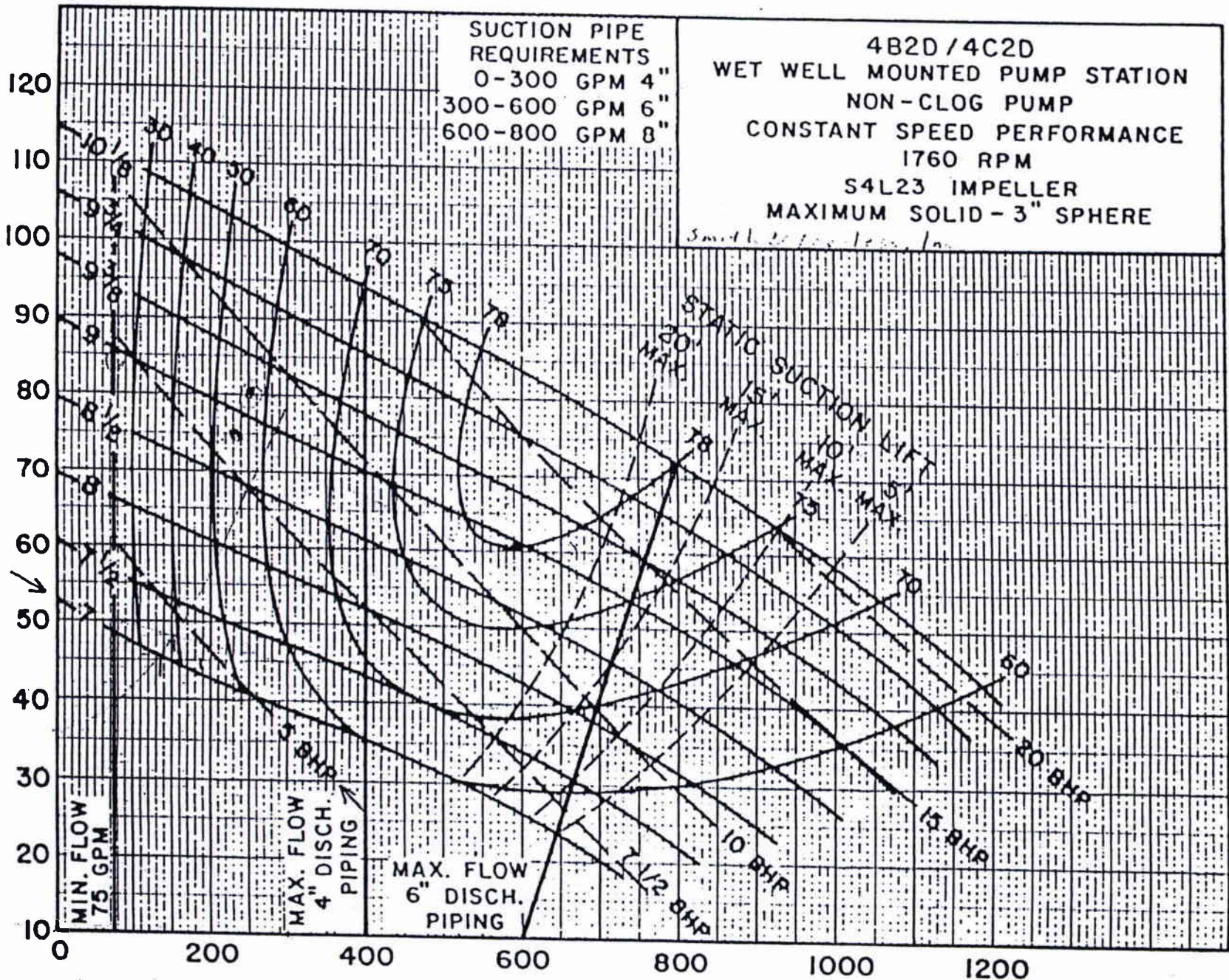
Filename: 950735NP.WK1

Begin Elevation: ft 637.00 Starting GPM: 0 Kin. Visc. (s.f./sec) 1.00E-05
End Elevation: ft 673.00 GPM Interval: 25

Pipe Number:	1	2	3	4	5
Length	ft 10.0	710.0			
Diam.	in. 4	4			
Spec. Rough.	ft 0.000008	0.000005			
Air Discharge	0	1			
Increaser	0	0			
Reducer	0	0			
Gate Vlv.	0	0			
Globe Vlv.	1	0			
Check Vlv.	1	0			
90 Bend	3	0			
45 Bend	0	2			
Tee (Through)	0	0			
Tee (Branch)	1	0			

Flow (gpm)	Velocities (fps)					Head F. (ft)	Head V. (ft)	TDH (ft)
	Pipe 1	Pipe 2	Pipe 3	Pipe 4	Pipe 5			
0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	36.00
25	0.6	0.6	0.0	0.0	0.0	0.41	0.01	36.42
50	1.3	1.3	0.0	0.0	0.0	1.42	0.05	37.47
75	1.9	1.9	0.0	0.0	0.0	2.99	0.11	39.10
100	2.6	2.6	0.0	0.0	0.0	5.02	0.20	41.23
125	3.2	3.2	0.0	0.0	0.0	7.63	0.32	43.94
150	3.8	3.8	0.0	0.0	0.0	11.00	0.46	47.45
175	4.5	4.5	0.0	0.0	0.0	14.99	0.62	51.61
200	5.1	5.1	0.0	0.0	0.0	19.61	0.81	56.42
225	5.7	5.7	0.0	0.0	0.0	24.86	1.02	61.89
250	6.4	6.4	0.0	0.0	0.0	30.13	1.27	67.39
275	7.0	7.0	0.0	0.0	0.0	35.27	1.53	72.80
300	7.7	7.7	0.0	0.0	0.0	40.57	1.82	78.39
325	8.3	8.3	0.0	0.0	0.0	45.97	2.14	84.11
350	8.9	8.9	0.0	0.0	0.0	51.40	2.48	89.88

TOTAL HEAD IN FEET



U.S. GALLONS PER MINUTE



4"-Pump:
PUMP ASS.
DRAWING

PUMP STATION WETWELL SIZING PROGRAM

Project Name: Jacobus Boro - Sewer Authority
 Water St. Pump Station
 Engineer: Jack N. Powell, P.E.

Project Number: 950735
 Date: September 10, 1996
 File: 950735WL.WK1

WETWELL SIZING
 Design Criteria & Calculations

Flow Characteristics:
 Number of People = 174 People
 Per Capita Flow = 100 gpcd
 - or -
 Total Flow (if known) = gpd
 Average Daily Flow = 17,400.0 gpd = 12.08 gpm
 Min Daily Flow = 8,700.0 gpd = 6.04 gpm
 0.5 * ADF
 Max Daily Flow = 34,800.0 gpd = 24.17 gpm
 2.0 * ADF
 Peak Daily Flow = 69,600.0 gpd = 48.33 gpm
 4.00 * ADF

Wetwell Characteristics:
 Wetwell Diameter = 5 ft = 146.9 gal/ft

Item:	Elevation:	
Rim Elev.	586.00 ft	W
Alarm Elev.	573.50 ft	E
Lag On Elev.	572.00 ft	T
Lead On Elev.	571.00 ft	W
All Off Elev.	570.00 ft	E
Bottom Elev.	568.50 ft	L

Pump Characteristics:
 1 Pump = 100.0 gpm @ 108.0 TDH
 2 Pumps = 101.5 gpm @ 110.5 TDH

WETWELL SIZING
 Results

Volume Below All Off Elevation = 220 gal

Minutes from last "All Pumps Off" event.

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Lead Pump On	24	12	6	3
Lag Pump On				
Alarm				
Overflow				
All Pumps Off	26	14	8	6
Max. Starts/Hr.	1	2	4	5

Minutes from last "All Pumps Off" event.
 (assuming failure of lead pump)

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Lead Pump Level	24	12	6	3
Lag Pump On	49	24	12	6
Alarm				
Overflow				
All Pumps Off	52	28	16	12

Minutes from last "All Pumps Off" event.
 (assuming all pumps fail & no line storage)

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Alarm	85	43	21	11
Overflow	389	194	97	49

- Volume Below All Off Elevation = (All Off Elev. - Bottom Elev.) * gal/ft.
- Minutes for Lead Pump On = [(Lead On Elev. - All Off Elev.) * gal/ft] / Inflow (gpm)
- Minutes for Lag Pump On (with Lead Pump failure) = {[(Lag On Elev. - Lead On Elev.) * gal/ft.] / Inflow (gpm)} + Minutes for Lead Pump On
- (with Lead Pump pumping) = {[(Lag On Elev. - Lead On Elev.) * gal/ft.] / (Inflow (gpm) - 1 Pump Flow)} + Minutes for Lead Pump On
- Minutes for Alarm = {[(Alarm Elev. - Lag On Elev.) * gal/ft.] / (Inflow (gpm) - 2 Pump Flow)} + Minutes for Lag Pump On
- Minutes for Overflow = {[(Rim Elev. - Alarm Elev.) * gal/ft.] / (Inflow (gpm) - 2 Pump Flow)} + Minutes for Alarm
- Minutes for All Pumps Off (from Lead Pump On) = {[(Lead On Elev. - All Off Elev.) * gal/ft.] / (1 Pump Flow - Inflow (gpm))} + Minutes for Lead Pump On
- (from Lag Pump On) = {[(Lag On Elev. - All Off Elev.) * gal/ft.] / (2 Pump Flow - Inflow (gpm))} + Minutes for Lag Pump On
- (from Alarm) = With the assumption of constant Inflow, the Inflow is greater than 2 Pump Flow in order for the alarm to activate. Therefore, the station will overflow under this assumption.
- Max. Starts/Hr. = (60 minutes / Minutes for All Pumps Off) / 2 (since the 2 pumps alternate)

Project Name: Jacobus Boro - Sewer Authority
 Water St. Pump Station
 Engineer: Jack N. Powell, P.E.

Project Number: 950735
 Date: September 10, 1996
 Date: 960735WF.WK1

FLOTATION
 Design Criteria

Circular Basin:
 Wall Thickness = 6 in.
 Inside Diameter = 5 ft
 Inside Depth = 17.5 ft
 Pad Flange = 0 in.

Rectangular Basin:
 Length Thickness = in.
 Width Thickness = in.
 Inside Length = ft
 Inside Width = ft
 Inside Depth = ft
 Pad Flange = in.

Densities:
 Water = 62.43 pcf
 Basin Material = 150 pcf
 Ballast Material = 150 pcf

Factor of Safety = 1

FLOTATION

Calculations & Results (Program assumes groundwater elev. = rim elev. of basin and does not take into consideration friction from the surrounding soil.)

$$\text{Basin Volume} = \text{Depth} * \pi * (\text{I.D.} + 2 * \text{Wall Thick.})^2 / 4 = 494.80 \text{ c.f.}$$

$$\begin{aligned} \text{Force of Bouyancy on Basin} \\ = \text{Basin Volume} * \text{Density Water} &= 30,890.42 \text{ lbs} \end{aligned}$$

$$\text{Basin Weight} = \text{Density} * \text{Depth} * \pi * (\text{O.D.}^2 - \text{I.D.}^2) / 4 = 22,678.37 \text{ lbs}$$

$$\begin{aligned} \text{Assume Pad Dimensions of:} \\ \text{Diameter} &= 6.00 \text{ ft} \\ \text{Thickness} &= 39.80 \text{ in.} \end{aligned}$$

$$\begin{aligned} \text{Force of Bouyancy on Pad} \\ = \text{Pad Volume} * \text{Density Water} &= 5,854.49 \text{ lbs} \end{aligned}$$

$$\text{Pad Weight} = \text{Pad Volume} * \text{Density Material} = 14,066.54 \text{ lbs}$$

$$\begin{aligned} \text{Total Force of Bouyancy} \\ = \text{Force on Basin} + \text{Force on Pad} &= 36,744.91 \text{ lbs} \end{aligned}$$

$$\text{Total Weight} = \text{Weight of Basin} + \text{Weight of Pad} = 36,744.91 \text{ lbs}$$

$$\begin{aligned} \text{Additional Weight Resisting Flotation} \\ = \text{Total Weight} - \text{Total Force of Bouyancy} &= 0.00 \text{ lbs} \end{aligned}$$

$$\begin{aligned} \text{USE PAD DIMENSIONS OF:} \\ \text{Diameter} &= 6.00 \text{ ft} \\ \text{Thickness} &= 40.00 \text{ in.} \end{aligned}$$

Project Name: Jacobus Borough - Sewer Authority
Water St. Pump Station

Project Number: 950735

Date: September 12, 1996

Engineer: Jack N. Powell, P.E.

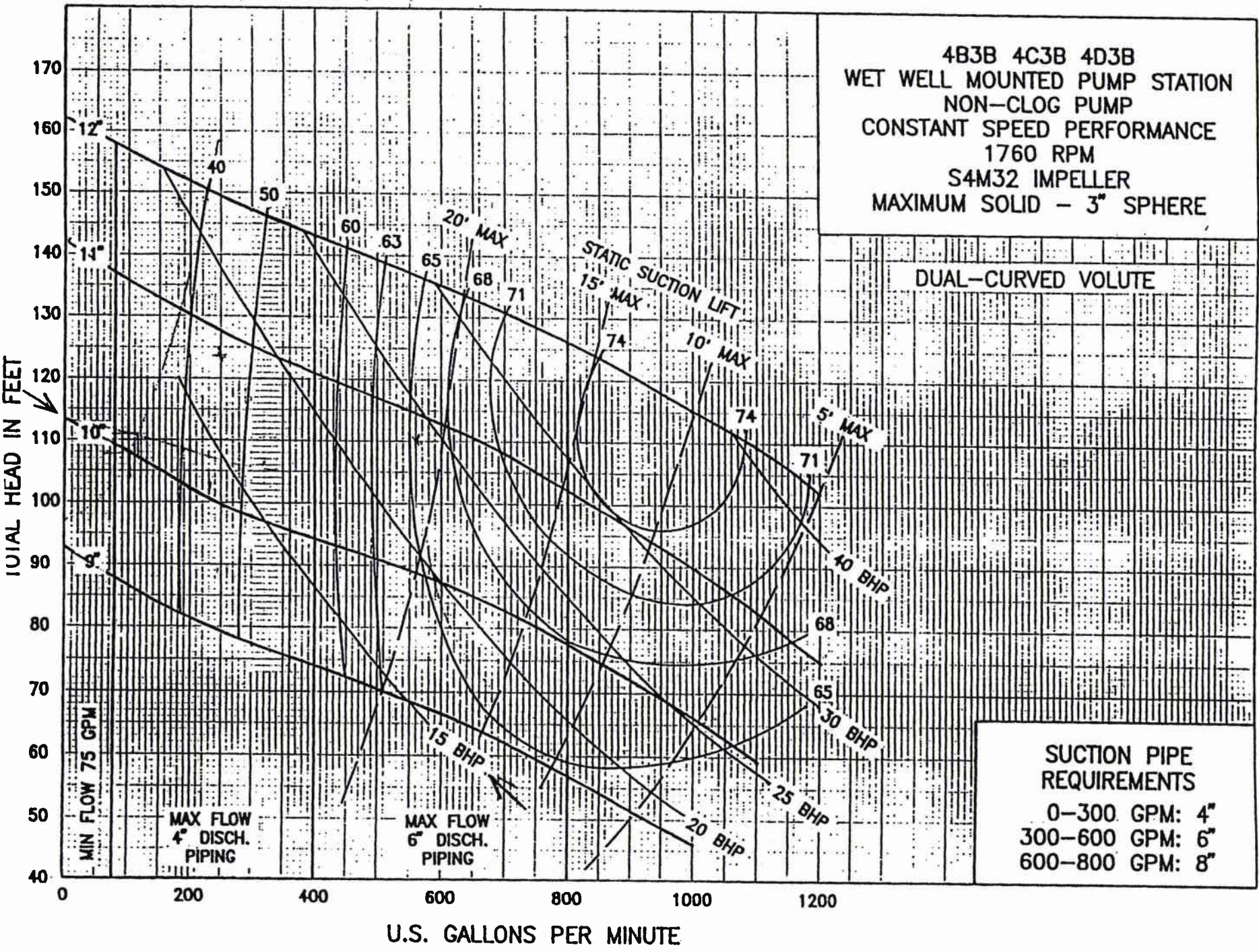
Filename: 950735WP.WK1

Begin Elevation: ft 570.00 Starting GPM: 0 Kin. Visc. (s.f./sec) 1.00E-05
End Elevation: ft 667.00 GPM Interval: 25

Pipe Number:	1	2	3	4	5
Length	ft 10.0	1,575.0			
Diam.	in. 4	4			
Spec. Rough.	ft 0.000008	0.000005			
Air Discharge	0	1			
Increaser	0	0			
Reducer	0	0			
Gate Vlv.	0	0			
Globe Vlv.	1	0			
Check Vlv.	1	0			
90 Bend	3	0			
45 Bend	0	8			
Tee (Through)	0	0			
Tee (Branch)	1	0			

Flow (gpm)	Velocities (fps)					Head F. (ft)	Head V. (ft)	TDH (ft)
	Pipe 1	Pipe 2	Pipe 3	Pipe 4	Pipe 5			
0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	97.00
25	0.6	0.6	0.0	0.0	0.0	0.84	0.01	97.85
50	1.3	1.3	0.0	0.0	0.0	2.89	0.05	99.94
75	1.9	1.9	0.0	0.0	0.0	6.02	0.11	103.14
100	2.6	2.6	0.0	0.0	0.0	10.09	0.20	107.29
125	3.2	3.2	0.0	0.0	0.0	15.26	0.32	112.58
150	3.8	3.8	0.0	0.0	0.0	22.02	0.46	119.47
175	4.5	4.5	0.0	0.0	0.0	30.02	0.62	127.64
200	5.1	5.1	0.0	0.0	0.0	39.28	0.81	137.09
225	5.7	5.7	0.0	0.0	0.0	49.80	1.02	147.82
250	6.4	6.4	0.0	0.0	0.0	60.23	1.27	158.50
275	7.0	7.0	0.0	0.0	0.0	70.28	1.53	168.81
300	7.7	7.7	0.0	0.0	0.0	80.55	1.82	179.37
325	8.3	8.3	0.0	0.0	0.0	90.90	2.14	190.04
350	8.9	8.9	0.0	0.0	0.0	101.21	2.48	200.69

Water



PUMP STATION WETWELL SIZING PROGRAM

Project Name: Jacobus Boro - Sewer Authority
 York Rd. Pump Station
 Engineer: Jack N. Powell, P.E.

Project Number: 950735
 Date: September 11, 1996
 File: 950735YL.WK1

WETWELL SIZING
 Design Criteria & Calculations

Flow Characteristics:
 Number of People = 938 People
 Per Capita Flow = 100 gpcd
 - or -
 Total Flow (if known) = gpd
 Average Daily Flow = 93,800.0 gpd = 65.14 gpm
 Min Daily Flow = 46,900.0 gpd = 32.57 gpm
 0.5 * ADF
 Max Daily Flow = 187,600.0 gpd = 130.28 gpm
 2.0 * ADF
 Peak Daily Flow = 281,400.0 gpd = 195.42 gpm
 3.00 * ADF

Wetwell Characteristics:
 Wetwell Diameter = 6 ft = 211.5 gal/ft

Item:	Elevation:	
Rim Elev.	578.05 ft	W
Alarm Elev.	562.81 ft	E
Lag On Elev.	562.00 ft	T
Lead On Elev.	561.00 ft	W
All Off Elev.	560.00 ft	E
Bottom Elev	558.50 ft	L

Pump Characteristics:
 1 Pump = 220.0 gpm @ 129.2 TDH
 2 Pumps = 250.0 gpm @ 240.4 TDH

WETWELL SIZING
 Results

Volume Below All Off Elevation = 317 gal

Minutes from last "All Pumps Off" event.

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Lead Pump On	6	3	2	1
Lag Pump On				
Alarm				
Overflow				
All Pumps Off	8	5	4	10
Max. Starts/Hr.	4	7	8	3

Minutes from last "All Pumps Off" event.
 (assuming failure of lead pump)

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Lead Pump Level	6	3	2	1
Lag Pump On	13	6	3	2
Alarm				
Overflow				
All Pumps Off	15	9	8	19

Minutes from last "All Pumps Off" event.
 (assuming all pumps fail & no line storage)

	@ Min Flow	@ ADF	@ Max Flow	@ PDF
Alarm	18	9	5	3
Overflow	117	59	29	20

- Volume Below All Off Elevation = (All Off Elev. - Bottom Elev.) * gal/ft.
- Minutes for Lead Pump On = [(Lead On Elev. - All Off Elev.) * gal/ft] / Inflow (gpm)
- Minutes for Lag Pump On (with Lead Pump failure) = {[(Lag On Elev. - Lead On Elev.) * gal/ft.] / Inflow (gpm)} + Minutes for Lead Pump On
- (with Lead Pump pumping) = {[(Lag On Elev. - Lead On Elev.) * gal/ft.] / (Inflow (gpm) - 1 Pump Flow)} + Minutes for Lead Pump On
- Minutes for Alarm = {[(Alarm Elev. - Lag On Elev.) * gal/ft.] / (Inflow (gpm) - 2 Pump Flow)} + Minutes for Lag Pump On
- Minutes for Overflow = {[(Rim Elev. - Alarm Elev.) * gal/ft.] / (Inflow (gpm) - 2 Pump Flow)} + Minutes for Alarm
- Minutes for All Pumps Off (from Lead Pump On) = {[(Lead On Elev. - All Off Elev.) * gal/ft.] / (1 Pump Flow - Inflow (gpm))} + Minutes for Lead Pump On
- (from Lag Pump On) = {[(Lag On Elev. - All Off Elev.) * gal/ft.] / (2 Pump Flow - Inflow (gpm))} + Minutes for Lag Pump On
- (from Alarm) = With the assumption of constant inflow, the inflow is greater than 2 Pump Flow in order for the alarm to activate. Therefore, the station will overflow under this assumption.
- Max. Starts/Hr. = (60 minutes / Minutes for All Pumps Off) / 2 (since the 2 pumps alternate)

Project Name: Jacobus Boro - Sewer Authority
 York Rd. Pump Station
 Engineer: Jack N. Powell, P.E.

Project Number: 950735
 Date: September 11, 1996
 Date: 950735YF.WK1

FLOTATION :

Design Criteria

Circular Basin:
 Wall Thickness = 7 in.
 Inside Diameter = 6 ft
 Inside Depth = 19.55 ft
 Pad Flange = 0 in.

Rectangular Basin:
 Length Thickness = in.
 Width Thickness = in.
 Inside Length = ft
 Inside Width = ft
 Inside Depth = ft
 Pad Flange = in.

Densities:
 Water = 62.43 pcf
 Basin Material = 150 pcf
 Ballast Material = 150 pcf

Factor of Safety = 1

FLOTATION

Calculations & Results (Program assumes groundwater elev. = rim elev. of basin and does not take into consideration friction from the surrounding soil.)

Basin Volume = $\text{Depth} * \pi * (\text{I.D.} + 2 * \text{Wall Thick.})^2 / 4$ = 788.63 c.f.

Force of Bouyancy on Basin
 = Basin Volume * Density Water = 49,233.92 lbs

Basin Weight = $\text{Density} * \text{Depth} * \pi * (\text{O.D.}^2 - \text{I.D.}^2) / 4$ = 35,379.41 lbs

Assume Pad Dimensions of: Diameter = 7.17 ft
 Thickness = 47.06 in.

Force of Bouyancy on Pad
 = Pad Volume * Density Water = 9,877.09 lbs

Pad Weight = Pad Volume * Density Material = 23,731.61 lbs

Total Force of Bouyancy
 = Force on Basin + Force on Pad = 59,111.01 lbs

Total Weight = Weight of Basin + Weight of Pad = 59,111.01 lbs

Additional Weight Resisting Flotation
 = Total Weight - Total Force of Bouyancy = 0.00 lbs

USE PAD DIMENSIONS OF: Diameter = 7.17 ft
 Thickness = 48.00 in.

Project Name: Jacobus Borough - Sewer Authority
York Rd. Pump Station

Project Number: 950735

Date: September 12, 1996

Engineer: Jack N. Powell, P.E.

Filename:950735YP.WK1

Begin Elevation: ft 560.00 Starting GPM: 100 Kin. Visc. (s.f./sec) 1.00E-05
End Elevation: ft 672.00 GPM Interval: 25

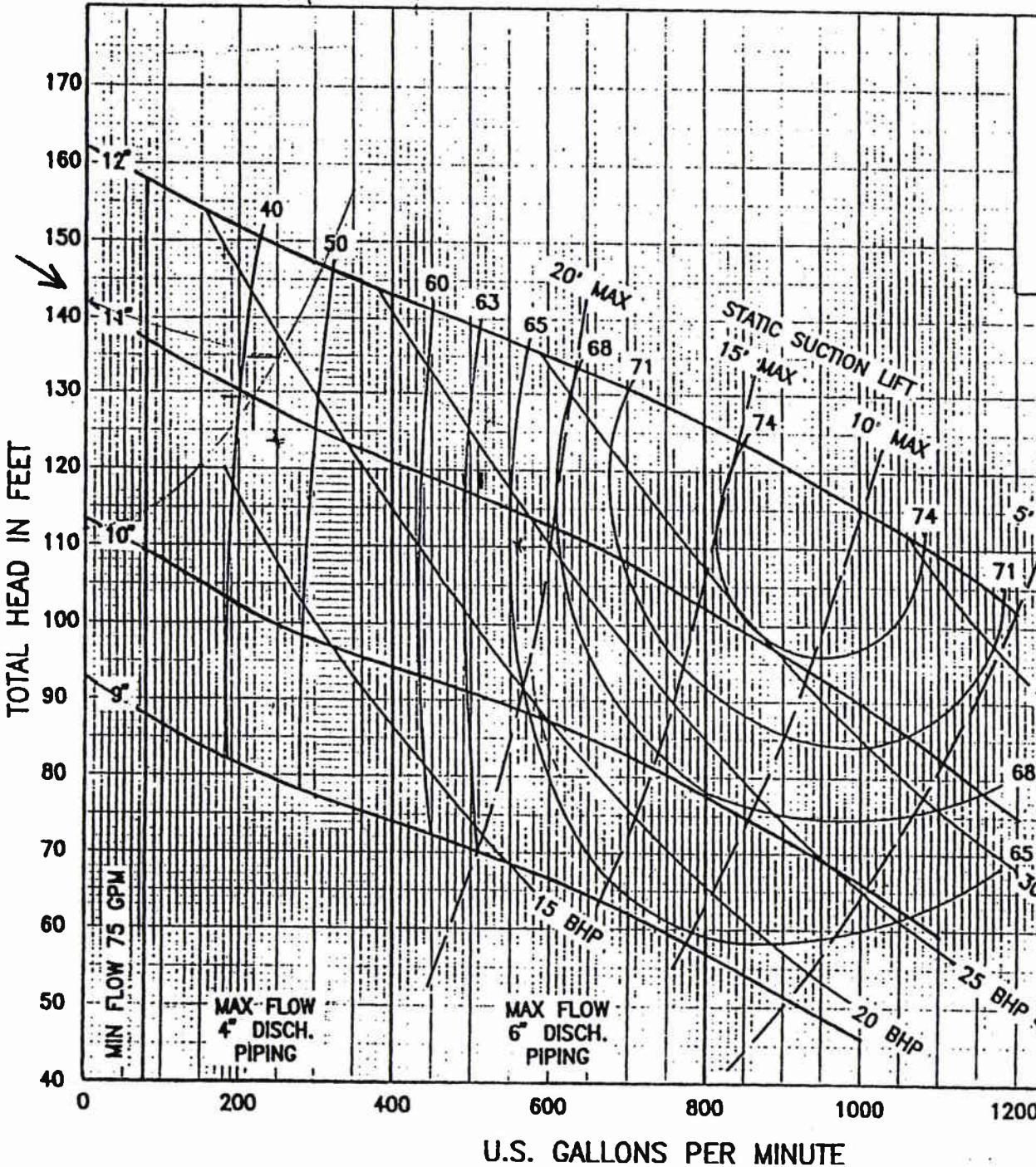
Pipe Number:	1	2	3	4	5
Length	ft 10.0	3,150.0			
Diam.	in. 4	6			
Spec. Rough.	ft 0.000008	0.000005			
Air Discharge	0	1			
Increaser	1	0			
Reducer	0	0			
Gate Vlv.	0	0			
Globe Vlv.	1	0			
Check Vlv.	1	0			
90 Bend	3	0			
45 Bend	0	18			
Tee (Through)	0	0			
Tee (Branch)	1	0			

Flow (gpm)	Velocities (fps)					Head F. (ft)	Head V. (ft)	TDH (ft)
	Pipe 1	Pipe 2	Pipe 3	Pipe 4	Pipe 5			
100	2.6	1.1	0.0	0.0	0.0	3.80	0.12	115.93
125	3.2	1.4	0.0	0.0	0.0	5.74	0.19	117.93
150	3.8	1.7	0.0	0.0	0.0	8.04	0.27	120.31
175	4.5	2.0	0.0	0.0	0.0	10.69	0.37	123.06
200	5.1	2.3	0.0	0.0	0.0	13.98	0.48	126.47
225	5.7	2.6	0.0	0.0	0.0	17.74	0.61	130.36
250	6.4	2.8	0.0	0.0	0.0	21.95	0.76	134.71
275	7.0	3.1	0.0	0.0	0.0	26.62	0.92	139.53
300	7.7	3.4	0.0	0.0	0.0	31.74	1.09	144.83
325	8.3	3.7	0.0	0.0	0.0	37.33	1.28	150.61
350	8.9	4.0	0.0	0.0	0.0	43.38	1.48	156.86
375	9.6	4.3	0.0	0.0	0.0	48.96	1.70	162.67
400	10.2	4.5	0.0	0.0	0.0	54.64	1.94	168.58
425	10.9	4.8	0.0	0.0	0.0	60.48	2.19	174.67
450	11.5	5.1	0.0	0.0	0.0	66.46	2.45	180.91

4B3B 4C3B 4D3B
 WET WELL MOUNTED PUMP STATION
 NON-CLOG PUMP
 CONSTANT SPEED PERFORMANCE
 1760 RPM
 S4M32 IMPELLER
 MAXIMUM SOLID - 3" SPHERE

DUAL-CURVED VOLUTE

SUCTION PIPE REQUIREMENTS
 0-300 GPM: 4"
 300-600 GPM: 6"
 600-800 GPM: 8"



AGREEMENTS AND NOTIFICATIONS

JAMES R. HOLLEY & ASSOCIATES, INC.
 ENGINEERS • PLANNERS
 LANDSCAPE ARCHITECTS • SURVEYORS

18 S. GEORGE ST., SUITE 501
 P.O. BOX 43
 YORK, PA 17405
 PHONE 717-846-4373
 FAX 717-843-1568

CERTIFIED MAIL NO. Z 124 123 194

August 27, 1996

Jacobus Borough
 126 North Cherry Lane
 Jacobus, PA 17407

Reference: Jacobus Borough Sewer Authority
 Sanitary Sewage Collection System
 Water Quality Management Permit Application
 Act 14 Notification

Gentlemen:

Act 14, PL 834, of the Commonwealth of Pennsylvania requires an applicant for certain permits to notify each municipality and county in which the activity is located.

Please be advised that the Jacobus Borough Sewer Authority is applying to the Pennsylvania Department of Environmental Protection, Bureau of Water Quality Management for a permit to construct a Sanitary Sewage Collection System in the Borough of Jacobus.

Should you require any further information regarding this application, please contact this office.

Very truly yours,

JAMES R. HOLLEY & ASSOCIATES, INC.

Thomas L. Wallace
 Thomas L. Wallace, P.E.
 Vice President

TLW/rcf

TLW 956735

Is your RETURN ADDRESS completed on the reverse side?	SENDER:	<ul style="list-style-type: none"> • Complete Items 1 and/or 2 for additional services. • Complete Items 3, 4a, and 4b. • Print your name and address on the reverse of this form so that we can return this card to you. • Attach this form to the front of the mailpiece, or on the back if space does not permit. • Write "Return Receipt Requested" on the mailpiece below the article number. • The Return Receipt will show to whom the article was delivered and the date delivered. 	I also wish to receive the following services (for an extra fee): 1. <input type="checkbox"/> Addressee's Address 2. <input type="checkbox"/> Restricted Delivery Consult postmaster for fee.
	3. Article Addressed to:	4a. Article Number	
	<i>Jacobus Borough</i>	<i>Z 124 123 194</i>	
	<i>126 North Cherry Lane</i>	4b. Service Type	
	<i>Jacobus, PA 17401</i>	<input type="checkbox"/> Registered <input checked="" type="checkbox"/> Certified <input type="checkbox"/> Express Mail <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Return Receipt for Merchandise <input type="checkbox"/> COD	
5. Received By: (Print Name)	7. Date of Delivery		
	<i>AUG 30 1996</i>		
6. Signature (Addressee or Agent)	8. Addressee's Address (Only if requested and fee is paid)		
<i>X</i> <i>Thomas L. Wallace</i>			

PS Form 3811, December 1994 11 Domestic Return Receipt

JAMES R. HOLLEY & ASSOCIATES, INC.
 ENGINEERS • PLANNERS
 LANDSCAPE ARCHITECTS • SURVEYORS

18 S. GEORGE ST., SUITE 501
 P.O. BOX 43
 YORK, PA 17405
 PHONE 717-846-4373
 FAX 717-843-1568

CERTIFIED MAIL NO. Z 124 122 374

August 27, 1996

Springfield Township
 Municipal Building
 RR #2 Box 206
 Seven Valleys, PA 17360

Reference: Jacobus Borough Sewer Authority
 Sanitary Sewage Collection System
 Water Quality Management Permit Application
 Act 14 Notification

Gentlemen:

Act 14, PL 834, of the Commonwealth of Pennsylvania requires an applicant for certain permits to notify each municipality and county in which the activity is located.

Please be advised that the Jacobus Borough Sewer Authority is applying to the Pennsylvania Department of Environmental Protection, Bureau of Water Quality Management for a permit to construct a Sanitary Sewage Collection System in the Borough of Jacobus.

Should you require any further information regarding this application, please contact this office.

Very truly yours,

JAMES R. HOLLEY & ASS

Thomas L. Wallace
 Thomas L. Wallace, P.E.
 Vice President

TLW/rcf

TLW 956735

Is your RETURN ADDRESS completed on the reverse side?	SENDER:		I also wish to receive the following services (for an extra fee): 1. <input type="checkbox"/> Addressee's Address 2. <input type="checkbox"/> Restricted Delivery Consult postmaster for fee.
	<input type="checkbox"/> Complete Items 1 and/or 2 for additional services. <input type="checkbox"/> Complete Items 3, 4a, and 4b. <input type="checkbox"/> Print your name and address on the reverse of this form so that we can return this card to you. <input type="checkbox"/> Attach this form to the front of the mailpiece, or on the back if space does not permit. <input type="checkbox"/> Write "Return Receipt Requested" on the mailpiece below the article number. <input type="checkbox"/> The Return Receipt will show to whom the article was delivered and the date delivered.		
	3. Article Addressed to:		
	4a. Article Number		
	4b. Service Type		
5. Received By: (Print Name)		7. Date of Delivery	
6. Signature: (Addressee or Agent)		8. Addressee's Address (Only if requested and fee is paid)	

Springfield Township
 Municipal Building
 R.R. #2 Box 206
 Seven Valleys, PA 17360

Z 124 122 374

Registered Certified
 Express Mail Insured
 Return Receipt for Merchandise COD

8-30-96

X *Barbara P. Switzer*

PS Form 3811, December 1994 Domestic Return Receipt

JAMES R. HOLLEY & ASSOCIATES, INC.
 ENGINEERS • PLANNERS
 LANDSCAPE ARCHITECTS • SURVEYORS

18 S. GEORGE ST., SUITE 501
 P.O. BOX 43
 YORK, PA 17405
 PHONE 717-846-4373
 FAX 717-843-1568

CERTIFIED MAIL NO. Z 124 123 193

August 27, 1996

York County Commissioners
 One West Marketway
 4th Floor
 York, PA 17401

Reference: Jacobus Borough Sewer Authority
 Sanitary Sewage Collection System
 Water Quality Management Permit Application
 Act 14 Notification

Lady and Gentlemen:

Act 14, PL 834, of the Commonwealth of Pennsylvania requires an applicant for certain permits to notify each municipality and county in which the activity is located.

Please be advised that the Jacobus Borough Sewer Authority is applying to the Pennsylvania Department of Environmental Protection, Bureau of Water Quality Management for a permit to construct a Sanitary Sewage Collection System in the Borough of Jacobus.

Should you require any further information regarding this application, please contact this office.

Very truly yours,

JAMES R. HOLLEY & ASS

Thomas L. Wallace
 Thomas L. Wallace, P.E.
 Vice President

TLW/rcf

TLW 950735

Is your RETURN ADDRESS completed on the reverse side?	SENDER: ■ Complete items 1 and/or 2 for additional services. ■ Complete items 3, 4a, and 4b. ■ Print your name and address on the reverse of this form so that we can return this card to you. ■ Attach this form to the front of the mailpiece, or on the back if space does not permit. ■ Write "Return Receipt Requested" on the mailpiece below the article number. ■ The Return Receipt will show to whom the article was delivered and the date delivered.		I also wish to receive the following services (for an extra fee): 1. <input type="checkbox"/> Addressee's Address 2. <input type="checkbox"/> Restricted Delivery Consult postmaster for fee.
	3. Article Addressed to: York County Commissioners One West Marketway 4th Floor York, PA 17401	4a. Article Number 2 124 123 193	
	5. Received By: (Print Name) 6. Signature: (Addressee or Agent) X <i>[Signature]</i>	4b. Service Type <input checked="" type="checkbox"/> Registered <input checked="" type="checkbox"/> Certified <input type="checkbox"/> Express Mail <input type="checkbox"/> Insured <input checked="" type="checkbox"/> Return Receipt for Merchandise <input type="checkbox"/> COD	
	7. Date of Delivery AUG 28 1996		8. Addressee's Address (Only if requested and fee is paid)

APPLICATIONS - PART II

FILE COPY
10/30/96

Industrial Waste and Sewage Applications under the Clean Stream Law, Act of June 22, 1937 (P.L. 1987, No. 394) (35 P.S. §§ 691.1001).

Southcentral Regional Office: Water Management Program Manager, One Ararat Boulevard, Harrisburg, PA 17110, telephone: 717-657-4590.

Industrial Waste Application Number submitted by Spring Glen Fresh Foods, Inc., 314 Spring Glen Drive, P.O. Box 518, Ephrata, PA 17522 in Ephrata Township, Lancaster County for the conversion of the existing clarification facilities.

Sewage Application Number 6796412 submitted by Jacobus Borough Sewer Authority, 126 North Main Street (rear), Jacobus, PA 17407 in Jacobus Borough, York County to construct sanitary sewer facilities was received in the Southcentral Region on October 29, 1996.

Sewage Application Number 6791411 Amendment 96-1 submitted by Spring Garden Township, 558 S. Ogontz Street, York, PA 17403 in Spring Garden Township, West Mancester Township, and the City of York in York County to revise the Construction Drawings to reflect a new point of connection to the York City system at City Manhold No. 68 located approximately 200' east of Richland Avenue was received in the Southcentral Avenue on October 29, 1996.



Pennsylvania Department of Environmental Protection

**One Ararat Boulevard
Harrisburg, PA 17110-9333
October 30, 1996**

**(717) 657-4590
FAX (717) 657-4446**

Southcentral Regional Office

**Jacobus Borough Sewer Authority
126 North Main Street (rear)
Jacobus, PA 17407**

**RE: Administrative Completeness Review
Part II Permit No. 6796412
Jacobus Borough, York County**

Dear Applicant:

This is to inform you that the Department has reviewed the above referenced application in order to determine whether it contains the information, maps, fees, and other documents necessary for administrative completeness. Please be advised that your application has been determined to be administratively complete and will be processed for technical review.

During the technical review, Paul Yarnell has been assigned as the lead reviewer for your application. The lead reviewer will evaluate the adequacy of the application and its components to determine if sufficient information exists to render a decision on the technical merits of your application. This individual will also coordinate comments from other technical staff as may be necessary for a comprehensive evaluation of the application.

You will be notified in writing if additional information is required before a technical decision can be rendered. The Department will make every effort to be clear and concise. The Department will send only one technical deficiency letter. Upon notification of any technical deficiencies, you will be given a stated period of time in which to submit the material requested. When you submit a satisfactory response to the Department's request, the Department will proceed with its technical evaluation.



If, after completing the technical review, the Department is inclined to deny the application, you will be sent a pre-denial letter. The letter will outline the reason for denial. You will have one final opportunity to correct the deficiencies in your proposal before the Department makes a final decision. In the event you receive a pre-denial letter, you will be provided an opportunity to meet with Department staff to discuss the unresolved issues.

Under normal circumstances, completed applications can generally be processed within 120 days from the date of acceptance. Obviously, those applications which are complete and require little or no additional information can usually be processed more quickly.

For questions about your application, please contact Paul Yarnell and refer to your application.

Sincerely,



Kelly L. Rathfon
Permits Section
Water Management Program

cc: Thomas L. Wallace, P.E., James R. Holley & Associates, Inc.

FILE COPY

JAMES R. HOLLEY & ASSOCIATES, INC.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS

18 S. GEORGE ST., SUITE 501
P.O. BOX 43
YORK, PA 17405
PHONE 717-846-4373
FAX 717-843-1568

October 24, 1996

Pennsylvania Department of Environmental Protection
Bureau of Water Quality Management
One Ararat Boulevard
Harrisburg, PA 17110

Reference: BWQM Part II Application
Sanitary Sewerage Collection System
Jacobus Borough Sewer Authority
York County, Pennsylvania

Gentlemen:

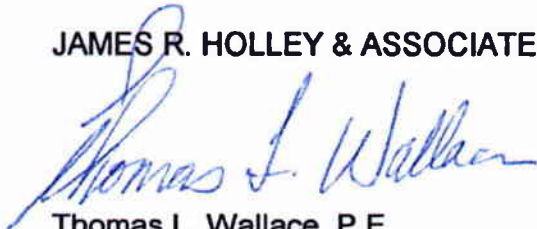
Please find enclosed two (2) copies of the following information:

1. BWQM Permit Application
2. Application Fee - Check No. 1073, Dated 10/23/96 - \$500.00
3. Design Engineer's Report
4. Module No. 2
5. Design Drawings - 48 sheets
6. Technical Specifications
7. Erosion and Sedimentation Control Plan & Narrative
8. Act 14 notification letters (incl./w Design Engineer's Report)
9. Letter dated 10/17/96 from York County Conservation District
10. Act 537 approval letter dated 12/7/94
11. Sewage Capital Contribution and Treatment Agreement dated 8/16/95.

Should you have any questions concerning this application or if additional information is required, please contact this office.

Very truly yours,

JAMES R. HOLLEY & ASSOCIATES, INC.



Thomas L. Wallace, P.E.
Vice President

TLW/rcf

cc: Jacobus Borough Sewer Authority

RECEIVED
OCT 29 1996
DEP - SOUTH CENTRAL REGION
WATER MANAGEMENT PROGRAM

DATE PREPARED
8-20-96

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF WATER QUALITY MANAGEMENT

RECEIVED

FILE COPY

6796412

FOR DEPARTMENT USE ONLY

OCT 29 1996 APPLICATION FOR PART II
WATER QUALITY MANAGEMENT PERMIT
SEWERAGE

DEP - SOUTH CENTRAL REGION
WATER MANAGEMENT PROGRAM

APPLICANT NAME Jacobus Borough Sewer Authority	PROJECT DESCRIPTION NAME OF PROJECT, OR MUNICIPALITY SERVED: Jacobus Borough
TELEPHONE NO. 717-428-1752	PROJECT LOCATION: COUNTY: York
MAILING ADDRESS: 126 N. Main Street (rear) Jacobus, PA 17407	MUNICIPALITY: Jacobus Borough

HEREBY APPLIES FOR: (CHECK APPROPRIATE BLOCKS IN SPACES A,B,AND C)

A. APPROVAL OF PLANS FOR CONSTRUCTION OF:

- SEWERS AND APPURTENANCES
- PUMP STATIONS
- SEWAGE TREATMENT PLANT
- OUTFALL AND HEADWALL
- STREAM CROSSING
- IMPOUNDMENT

B. APPROVAL TO OPERATE
SEWERAGE FACILITIES

DATE OF APPLICATION

C. APPROVAL OF AN
EROSION AND SEDIMENTATION CONTROL PLAN

(ALL DISCHARGES OF WASTES ARE PURSUANT TO "THE CLEAN STREAMS LAW" AND NPDES PART I PERMIT)

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA, COUNTY OF York

I, Gregory B. Gruendler BEING DULY SWORN, ACCORDING TO LAW, DEPOSE AND SAY THAT I (AM THE APPLICANT) (AM AN OFFICER OR OFFICIAL OF THE APPLICANT) (HAVE THE AUTHORITY TO MAKE THIS APPLICATION) AND THAT THE PLANS, REPORTS AND DOCUMENTS DESIGNATED AND ATTACHED HERE WITH AS PART OF THE APPLICATION ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

Signature Gregory B. Gruendler

Date September 18, 1996

Title Chairman

SWORN AND SUBSCRIBED TO BEFORE ME THIS

18th DAY OF September 1996

Dena D. Seifert
Notary Public

Notarial Seal
Dena D. Seifert, Notary Public
York Twp, York County
My Commission Expires July 8, 2000

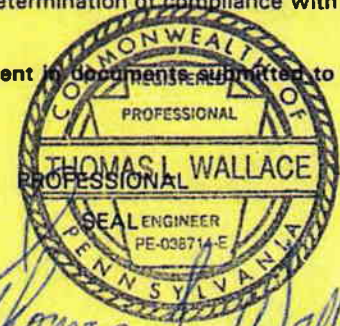
Member, Pennsylvania Association of Notaries

THIS SECTION TO BE COMPLETED BY THE REGISTERED PROFESSIONAL ENGINEER WHO PREPARES THIS APPLICATION, ACCOMPANYING REPORT AND SUPPORTING DOCUMENTATION:

This is to certify that I have personally reviewed all engineering information contained in the accompanying modules, drawings, specifications, and other documents which are part of this application and that I have found it to be good engineering quality, true and correct, and is in conformance with the requirements of the Department of Environmental Resources, and it does not, to the best of my knowledge, withhold information that is pertinent to a determination of compliance with the requirements of the Department.

NOTICE: It is an offense under Pennsylvania Crimes Code to affirm a false statement in documents submitted to the Department.

Name of Design Engineer: Thomas L. Wallace P.E.
 Design Firm: James R. Holley & Assoc., Inc.
 Mailing Address: 18 S. George Street
P.O. Box 43
York, PA 17405
 Telephone: 717 - 846-4373
 AC



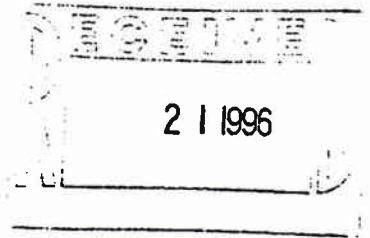
Signature of Professional Engineer



York County Conservation District

118 Pleasant Acres Road • York, Pennsylvania 17402 • Telephone (717) 840-7430 • Fax (717) 755-0301

October 17, 1996



MR GREGORY GRUENDLER
JACOBUS BORO SEWER AUTHORITY
126 NORTH CHERRY LANE
JACOBUS PA 17407

**RE: ACKNOWLEDGMENT OF RECEIPT OF COMPLETE APPLICATION
NPDES PERMIT FOR DISCHARGE OF STORM WATER FROM
CONSTRUCTION ACTIVITIES**

Dear Applicant:

Your application for an NPDES Permit, site name Jacobus Boro Sewer Authority - Sanitary Sewage Collection System was received on *October 11, 1996*, by the York County Conservation District.

The application was checked for completeness and all necessary items were found to be included. It has been assigned Permit Number PAR10Y234. For general permit applications, notification will be published in the Pennsylvania Bulletin. For individual permit applications, a thirty day comment period follows from the date the application is published.

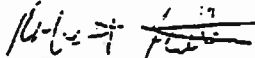
The erosion and sedimentation control plan will be reviewed and studied for adequacy of protection and compliance with the Department of Environmental Protection (DEP) rules and regulations by District staff and/or by agency technical representatives cooperating with the District. The Conservation District Board of Directors and staff may discuss the results of the district review at their next meeting.

When the review of the erosion and sedimentation control plan reveals deficiencies, you will be notified by a review letter. Revised plans will be required for review before the application processing can continue. For individual NPDES Permit applications, upon approval of the erosion and sedimentation control plan, the Conservation District will forward its recommendation for permit issuance to the Soil and Waterways Section, South Central Regional Office.

For individual permit applications, you will be notified by the Field Operations Regional Office concerning other permits or approvals necessary for the proposed activity.

Inquiries regarding the status of the application should be directed to the York County Conservation District, phone (717) 840-7430.

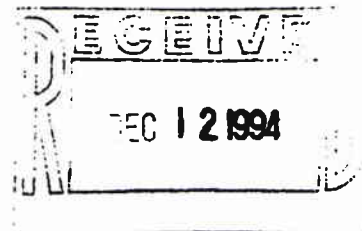
Sincerely,


Robert Fetter
Erosion Control Technician
York Co. Conservation District

cc: Thomas L. Wallace, P. E., James R. Holley and Assoc., Inc.
Jacobus Boro/Springfield Township
file



One Ararat Boulevard
Harrisburg, PA 17110
December 7, 1994



(717) 657-4590

Southcentral Regional Office

Jacobus Borough
c/o George E. Keeney, Jr., Mayor
26 Valley Road
Jacobus, PA 17407

Re: Act 537 Planning
Jacobus Borough, York County
DER Code No. A1-67932-ACT

Ladies and Gentlemen:

The Department of Environmental Resources has reviewed your April 1994 Act 537 Plan, submitted July 18, 1994. The submission is consistent with the planning requirements given in Chapter 71 of the Rules and Regulations of the Department and is therefore approved with the following conditions:

1. The approved project will require an NPDES Permit for the proposed effluent discharge. The permit application must be submitted in the name of the municipality/authority.
2. The approved project will require a Water Management Part II Permit for the construction and operation of the proposed sewerage facilities (collection system, 4 PS & FM). The permit application must be submitted in the name of the municipality/authority. Issuance of a Part II Permit will be based upon a technical evaluation of the permit application and supporting documentation. Starting construction prior to obtaining a Part II Permit is a violation of The Clean Streams Law.
3. Other Departmental permits may be required for construction, if encroachment to streams or wetlands will result. Information regarding the requirements for such permits or approvals can be obtained from the Department's Soils and Waterways Section, Water Management Program, Southcentral Regional Office, One Ararat Boulevard, Harrisburg, Pennsylvania 17110, telephone (717) 541-7901.

It is now Jacobus Borough's responsibility to implement the 537 Plan in accordance with the schedules contained within the Plan.

Since your Plan has been approved by the Department, you are now eligible to receive a 50% planning cost reimbursement as provided under Section 6 of the Sewage Facilities Act (Act 537). A copy of the reimbursement application is attached. You are reminded that reimbursement applications must show detailed cost breakdowns of tasks completed or you will place your reimbursement in jeopardy.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Market Street State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, (717) 787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, (800) 654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at (717) 787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

If you have any questions concerning this letter, please contact me at the above telephone number.

Sincerely,

SIGLE

Leon M. Oberdick
Program Manager
Water Management Program

cc: James R. Holley & Associates
York County Planning Commission
C. S. Davidson, Inc.

RECEIVED
OCT 29 1996

DEP-SOUTH CENTRAL REGION
WATER MANAGEMENT PROGRAM

SEWAGE CAPITAL CONTRIBUTION AND TREATMENT AGREEMENT

THIS AGREEMENT, dated as of Aug 16, 1995, by and among
SPRINGFIELD TOWNSHIP ("ST"), party of the first part, and the JACOBUS
BOROUGH SEWER AUTHORITY ("JBSA"), party of the second part, all of York
County, Pennsylvania.

BACKGROUND

ST is undertaking the construction of sewage collection facilities,
sewage interceptor facilities and sewage treatment facilities,
including pumping station and force main facilities. ST will operate
the facilities being constructed by it or cause the facilities to be
operated by a municipal authority formed by ST.

JBSA intends to construct a sewer system for the collection and
transportation of sewage and wastes to be connected to the ST Sewer
System for ultimate transportation to and disposal at the Treatment
Plant.

JBSA is interested in and desires to utilize portions of the ST
Sewer System and for that purpose is entering into this Agreement to
define the extent and terms of its capital contribution to the Project
and to define future terms, conditions of and charges for the Parties'
use of the ST facilities.

ST is interested in and desires to utilize portions of the JBSA
Sewer System and for that purpose is entering into this Agreement to
define the terms, conditions of and charges for the Parties' use of the
JBSA facilities.

In furtherance of the Project ST will enter into substantially
similar agreements with other municipal contributors to the ST Sewer

System who have elected to reserve capacity in the facilities to be constructed in the Project and/or who discharge sewage into the ST Sewer System for treatment.

NOW THEREFORE, ST and JBSA, for and in consideration of the mutual promises and covenants hereby contained and intending to be legally bound hereby, do covenant and agree as follows:

1. DEFINITIONS. The following terms and phrases shall, unless the context clearly otherwise requires, for the purpose of this Agreement have the following meanings:

"Construction Cost" means the actual costs or expenses or the estimated costs or expenses, as applicable, of acquisition and construction of new and additional property chargeable to a plant or equipment account under generally accepted accounting principles and/or engineering practice, including, without intending to limit the generality of the foregoing, land, rights of way, easements, licenses, rights and similar interests in real property, and additions, extensions, alterations and improvements of or to the Treatment Plant, pumping station and sewer lines, as applicable, including, without intending to limit the generality of the foregoing, buildings, basins, machinery, mains, conduits, pipes, pipe lines, tanks, shops, fixtures, engines, boilers, pumps, meters, instruments, and other equipment and personal property, and Extraordinary Repairs, in each case made, constructed or acquired by ST after the date hereof, and which are used, useful or convenient in connection with the Treatment Plant, pumping station and sewer lines, including property in the process of

construction or erection, and any audits required by this Agreement to determine actual Construction Cost.

"Cost of Operation" means the actual costs or expenses or the estimated costs or expenses, as applicable, expended in operating, repairing and maintaining the Treatment Plant, pumping station or sewer line, as applicable, as determined in accordance with generally accepted accounting principles and/or engineering practices, including, without intending to limit the generality of the foregoing, expenses and costs of operation (including fines, penalties and judgments imposed by any agency of the United States, Commonwealth of Pennsylvania or any Court having jurisdiction and not recovered from a third party, as well as the costs incident to the preparation for, conducting or the settlement of litigation or threatened litigation, concerning any Party's sewer system), maintenance (including insurance), repair, auditing, administration and inspection and other expenses in relation to the Treatment Plant, pumping station or sewer line, as applicable, and including income, profits, property, or franchise taxes, if any, payable with respect to the Treatment Plant, pumping station or sewer line, as applicable, which costs and expenses shall not include any amount attributable to debt service requirements with respect to indebtedness of any portion of the JBSA Sewer System or the ST Sewer System, and which costs and expenses shall be determined in accordance with generally accepted accounting principles and/or engineering practices; Provided, however, that all reimbursements, subsidies or other payments made by the Commonwealth of Pennsylvania, the United States of America, or any agency of either thereof, for costs of

operation of any Party's sewer system or any portion thereof and all miscellaneous income attributable to or in connection with any Party's sewer system or any portion thereof, including but not limited to revenues derived from compost sales, treatment of sewage from bulk haulers, industrial waste surcharges and management and operation service fees, but excluding all revenues from treatment service charges under this or any similar agreement from any Party's direct customers, shall be deducted from the above costs in determining the costs of operation for any Party's sewer system or portion thereof. If a Party's method of financing causes ST to lose any state or federal grants concerning the operation of its Treatment Plant, the amount of such lost grant money shall be added to the Cost of Operation to determine the amount to be shared by such Party. Cost of Operation shall not include depreciation.

"DER" shall mean the Commonwealth of Pennsylvania Department of Environmental Resources or the successor Department or agency of the Commonwealth of Pennsylvania charged with the responsibility of regulating environmental matters as they relate to the ST Sewer System.

"Design Flow Capacity" shall mean the capacity of a facility measured in EDU's.

"EDU" shall mean a dwelling consisting of a room, group of rooms, manufactured housing or other enclosure occupied or intended for occupancy as separate living quarters for a family, persons living together or persons living alone. In non-dwelling settings, an EDU shall be considered an average of 280 gallons per day of water usage.

"EPA" shall mean the United States Environmental Protection Agency or the successor Department or agency of the United States of America charged with the responsibility of regulating environmental matters as they relate to the ST Sewer System.

"Extraordinary Maintenance and Repairs" shall mean any alterations, repairs, renewals, improvements or replacements with respect to any Party's sewer system which are necessary or desirable for the proper operation and maintenance thereof and which are of a type which ordinarily would not be made out of current sewer system operating expense funds.

"Industrial Connection" shall mean a sewer system connection by any contributor whose sewage or waste discharge is of a volume or contains wastes of a character, type or strength as are subject to ST ordinances or regulations from time to time in effect concerning discharge of industrial wastes.

"JBSA" shall mean the Jacobus Borough Sewer Authority, a Pennsylvania municipality authority.

"JBSA Sewer System" shall mean the sewage collection system and sewage transmission facilities, including all related and necessary facilities, from time to time owned by JBSA for operation and use, including all future additions, alterations and improvements thereto.

"Net Capital Cost" shall mean (i) a lump sum payment, the total capital contribution or portion thereof as calculated in paragraph 4, below, (ii) an annual sum to amortize debt of ST, amounts sufficient, from time to time, to pay the debt service on any sums borrowed to pay for the Project, or (iii) a combination of (i) and (ii). In the event

that the payment of debt service is structured in a fashion that requires the payment of cover or creates funds that will earn interest used to offset payments of principal and interest on the debt, Net Capital Cost shall include such additional requirements as cover and exclude interest earned by funds in an indenture or similar instrument as is used for such offsets.

"Party" shall mean and refer to any one or both of JBSA and ST as the context of use of the term shall make appropriate, being sometimes collectively referred to as "Parties".

"Project" shall mean the undertakings necessary in connection with facilities planning, design, construction, acquisition and financing by ST of the ST Sewer System.

"Reserved Capacity" shall mean the treatment or conveyance capacity in the ST Sewer System, as appropriate, as set forth in subparagraphs A and B, respectively, of paragraph 4 hereof as has been reserved for the Parties as shown on Exhibit "B" attached hereto.

"Shared Facilities" shall mean ST's pumping station in the vicinity of Nixon Drive, its associated force main and all associated facilities to, but not including, the flow meter at the Treatment Plant.

"ST" shall mean Springfield Township, a Pennsylvania township of the second class.

"ST Sewer System" shall mean the sewage collection system, sewage interceptor system, pumping station and force main facilities, and sewage treatment plant, including all related and necessary facilities,

from time to time owned by ST and all future additions, alterations and improvements thereto.

"Test Year" shall mean the calendar year 199_ and each calendar year thereafter.

"Treatment Plant" shall mean the sewage treatment and disposal facilities constituting part of the ST Sewer System to be constructed as part of the Project.

2. CONSTRUCTION. The Parties will pursue, with due diligence, the design of and bidding for their respective sewer systems and, upon receipt of satisfactory construction bids and satisfactory financing arrangements and all requisite governmental approvals, covenant to complete the construction of their respective sewer systems in accordance with plans and specifications prepared by their respective consulting engineers, or in accordance with such changes or modifications which do not make substantial changes in such plans and specifications. Each Party shall secure all required permits or approvals from DER and EPA and any other governmental body having jurisdiction necessary for the acquisition and construction of its sewer system. The Parties will keep each other advised of the progress of the work on their respective Sewer Systems. Any proposed change order involving the expenditure of \$10,000 or more by ST shall be given to the consulting engineer of JBSA for review and comment seven (7) days before its implementation.

3. SEWAGE TRANSPORTATION AND TREATMENT AFTER CONSTRUCTION. ST covenants that it will receive, transport, treat and dispose of all sewage and waste flows from the JBSA Sewer system after construction of

the Project and JBSA will, after notice to it, make all necessary connections of the JBSA Sewer System to the new facilities constructed under the Project at the connecting points shown on Exhibit "A" attached hereto. JBSA covenants that it will receive and transport all sewage and waste flows from ST customers who will be connecting at points or along sewer lines of JBSA as shown on Exhibit "A" attached hereto.

4. CALCULATION OF CAPITAL CONTRIBUTION.

A. Treatment Plant. The Parties agree that the Treatment Plant, as constructed as part of the Project, has been designed for flows to be allocated and capacity to be reserved for the Parties during the term of this Agreement, all as set forth in Exhibit "B" attached hereto and made a part hereof. The capital cost of the Treatment Plant to JBSA shall be calculated in the following manner:

(1) The capital cost of the Treatment Plant attributable to a Party shall be calculated separately in the following manner:

(a) The consulting engineers for ST shall determine the Construction Cost of the Treatment Plant portion of the Project.

(b) The percentage which the Design Flow Capacity of the Treatment Plant reserved for a Party, expressed in EDU's, bears to the total Design Flow Capacity of the Treatment Plant, expressed in EDU's, shall be applied to the Construction Cost of the Treatment Plant determined under subparagraph (a) above. The result shall equal the capital cost of the Treatment Plant attributable to a Party; provided,

however, that such amount shall be subject to adjustment, as appropriate, as hereinafter provided in subparagraph C of this paragraph 4.

B. Shared Facilities. The Parties agree that the Shared Facilities portion of the Project has been initially designed with a Design Flow Capacity to be allocated and reserved for the Parties, which Design Flow Capacity is set forth in Exhibit "B" attached hereto and made a part hereof. The capital cost of such Shared Facilities attributable to JBSA shall be calculated in the following manner:

(1) The capital cost of the Shared Facilities portion of the Project attributable to a Party and others, shall be calculated separately in the following manner:

(a) The consulting engineers for ST shall determine the Construction Cost of the Shared Facilities portion of the Project.

(b) The percentage which the Design Flow Capacity of the Shared Facilities portion of the Project under consideration reserved for a Party, expressed in EDU's, bears to the total Design Flow Capacity of the Shared Facilities, expressed in EDU's, shall be applied to the Construction Cost of the Shared Facilities portion of Project under consideration determined under subparagraph (a) above. The result shall equal the capital cost of the Shared Facilities portion of the Project under consideration attributable to a Party; provided, however, that such amount shall be subject to adjustment, as appropriate, as hereinafter provided in subparagraph C of this paragraph 4.