



January 12, 2022

VIA E-MAIL AND FIRST CLASS MAIL

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Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg PA 17120

Re: In re: Application of Pennsylvania-American Water Company under Section 1102(a) of the Pennsylvania Public Utility Code, 66 Pa C.S. § 1102(a), for approval of (1) the transfer, by sale, to Pennsylvania-American Water Company, of substantially all of the assets, properties and rights related to the wastewater collection and treatment system owned by the York City Sewer Authority and operated by the City of York, (2) the rights of Pennsylvania-American Water Company to begin to offer or furnish wastewater service to the public in the City of York, Pennsylvania, and to three bulk service interconnection points located in North York Borough, Manchester Township and York Township, York County, Pennsylvania, and (3) the rights of Pennsylvania-American Water Company to begin to offer and furnish Industrial Pretreatment Program to qualifying industrial customers in Manchester Township, Spring Garden Township and West Manchester Township, York County, Pennsylvania; Docket No. A-2021-3024681 et. al.

Appendices Regarding Bulk Agreements

Dear Secretary Chiavetta:

Enclosed for filing with the Commission please find a copy of Appendix A-25.7 to the above-referenced Application. Appendix A-25.7 is a *Pro Forma* Wastewater Treatment and Conveyance Agreement ("Municipalities Bulk Agreement") that Pennsylvania-American Water Company ("PAWC") has negotiated with Manchester Township, North York Borough, Spring Garden Township, West Manchester Township, and York Township ("Municipalities"). Appendix A-25.7 supplants Appendices A-25.1, A-25.2, A-25.3, A-25.4, and A-25.5 of the Application ("Existing Municipal Agreements"). PAWC is requesting approval of the Municipalities Bulk Agreement under 66 Pa, .C.S. § 507 in lieu of approval of the Existing Municipal Agreements. Please note that there are five "Appendix A's" (one for each municipality, which will be filed separately because they constitute **CONFIDENTIAL PUBLIC UTILITY SECURITY INFORMATION**).

PAWC is filing a *pro forma* agreement because the Municipalities have not yet executed agreements in conformity with the Municipalities Bulk Agreement due to municipal approval processes and public meeting requirements. PAWC will file a copy of the fully-executed agreement with each of the Municipalities prior to Closing on the transaction.

Also enclosed for filing with the Commission is a copy of Appendix A-25.8 (**CONFIDENTIAL**) to the above-referenced Application. Appendix A-25.8 is the *Pro Forma* Articles of Agreement ("Springettsbury Bulk Agreement") between PAWC and Springettsbury Township ("Springettsbury"). Appendix A-25.8 (**CONFIDENTIAL**) supplants Appendix A-25.6 of the Application ("Existing Springettsbury Agreement"). PAWC is requesting approval of the Springettsbury Bulk Agreement under 66 Pa. C.S. § 507 in lieu of approval of the Existing Springettsbury Agreement.

As with the Municipalities Bulk Agreement, PAWC is filing a *pro forma* agreement because Springettsbury has not yet executed an agreement in conformity with the Springettsbury Bulk Agreement due to municipal approval processes and public meeting requirements. PAWC will file a copy of the fully-executed agreement with Springettsbury prior to Closing on the transaction.

Due to the negotiation of the Municipalities Bulk Agreement and the Springettsbury Bulk Agreement, there is no longer a need for the Commission to modify the Existing Municipal Agreements and the Existing Springettsbury Agreement under 66 Pa. C.S. § 508. Accordingly, PAWC is withdrawing that request for relief with respect to the Municipalities and Springettsbury.

PAWC's request for relief under 66 Pa. C.S. § 508 with respect to the bulk agreement of The York Water Company still stands.

On this same date, PAWC will file testimony and exhibits to authenticate and support entry of the attached documents into the record in this proceeding. The testimony explains the fundamental terms and conditions of the Municipalities Bulk Agreement and Springettsbury Bulk Agreement and why they are in the public interest.

Copies of this letter and the enclosed appendices have been served on all active parties as indicated on the enclosed Certificate of Service. Should you have any questions or concerns, please contact me.

Sincerely,



Cozen O'Connor
Counsel for *Pennsylvania-American Water
Company*

DPZ:kmg
Enclosures

cc: Administrative Law Judge Steven K. Haas
Per Certificate of Service

**BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION**

In re: Application of Pennsylvania-American Water Company :
under Section 1102(a) of the Pennsylvania Public Utility Code, 66 :
Pa C.S. § 1102(a), for approval of (1) the transfer, by sale, to :
Pennsylvania-American Water Company, of substantially all of the :
assets, properties and rights related to the wastewater collection and :
treatment system owned by the York City Sewer Authority and :
operated by the City of York, (2) the rights of Pennsylvania- :
American Water Company to begin to offer or furnish wastewater :
service to the public in the City of York, Pennsylvania, and to three :
bulk service interconnection points located in North York Borough, :
Manchester Township and York Township, York County, :
Pennsylvania, and (3) the rights of Pennsylvania-American Water :
Company to begin to offer and furnish Industrial Pretreatment :
Program to qualifying industrial customers in Manchester :
Township, Spring Garden Township and West Manchester :
Township, York County, Pennsylvania :
Docket No. A-2021-3024681, *et al.*

CERTIFICATE OF SERVICE

I hereby certify that I have this 12th day of January, 2022 served a true copy of the foregoing **Appendices Regarding Bulk Agreements (with Confidential Appendices)** upon the parties listed below, in accordance with the requirements of 52 Pa. Code § 1.54 (relating to service by a party).

VIA E-MAIL AND FIRST CLASS MAIL

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Manchester Township, York Water
Company, Spring Garden Township and
North York Borough (aka "Municipalities")



David P. Zambito, Esq.
Counsel for *Pennsylvania-American Water Company*

VERIFICATION

I Bernard J. Grundusky, Senior Director of Business Development, Pennsylvania-American Water Company, state that the facts set forth above are true and correct to the best of my knowledge. I understand that the statements herein are made subject to the penalties of 18 Pa C.S. §4904 (relating to unsworn falsification to authorities).



Bernard J. Grundusky
Senior Director of Business Development
Pennsylvania-American Water Company

Date: 01/12/22

Exhibit B - IPP Establishments

EXISTING INDUSTRIAL USERS

	Industry	Site Address	Site City	Site State	Site Zip Code	Municipality
1	AMZ Corp.	2206 Pennsylvania Av	York	PA	17404	City of York
2	Bickel's Snack Foods	1120 Zinns Quarry Rd	York	PA	17404	West Manchester Township
3	Cintas	1111 Smile Way	York	PA	17404	City of York
4	Columbia Gas of Pennsylvania, Inc.	201 Grant St	York	PA	17401	City of York
5	CP Industries	785 W Philadelphia St	York	PA	17404	City of York
6	Dentsply Sirona Preventive	1301 Smile Way	York	PA	17404	City of York
7	Frito-Lay, Inc.	3553 Gillespie Dr	York	PA	17404	West Manchester Township
8	Gamlet, Inc.	1750 Toronita St	York	PA	17402	Manchester Township
9	IWM International LLC	829 Loucks Mill Rd	York	PA	17402	Spring Garden Township
10	Johnson Controls Inc.- Grantley Campus	631 S Richland Av	York	PA	17403	Spring Garden Township
11	Kleen Tech, Inc.	3500 W Market St	York	PA	17404	West Manchester Township
12	North Metal & Chemical Company	609 E King St	York	PA	17403	City of York
13	Protech Powder Coatings Inc.	939 Monocacy Rd	York	PA	17404	City of York
14	Rutters Dairy	2100 N George St	York	PA	17404	Manchester Township
15	Surtech Industries Inc	915 Borom Rd	York	PA	17404	City of York
16	US Ecology (Envirite of Pennsylvania)	730 Vogelsong Rd	York	PA	17404	City of York
17	WC Manufacturing Co LLC	615 S Pine St	York	PA	17403	City of York
18	YGS Group, The	3650 W Market St	York	PA	17404	West Manchester Township
19	York County Resource Recovery Center	2651 Blackbridge Rd	York	PA	17406	Manchester Township
20	York County Ash Recycling and Processing Facility	2650 Blackbridge Rd	York	PA	17406	Manchester Township
21	York Wallcoverings	750 Linden Av	York	PA	17404	City of York
22	York Wallcoverings - Loucks Rd Facility	2075 Loucks Rd	York	PA	17408	West Manchester Township

Exhibit C - PAWC Rules and Regulations

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section A – DEFINITIONS

The following words and phrases, when used in this tariff, shall have the meanings assigned below unless the context clearly indicates otherwise:

1. **Applicant:** A person, association, partnership, corporation, municipality, authority, state or federal governmental agency or other entity who applies to become a customer of the Company in accordance with Section C, of this tariff.
2. **B.O.D. (Biochemical Oxygen Demand):** The quantity of oxygen, expressed in milligrams per liter, utilized in the biochemical oxidation of organic matter under the standard laboratory procedure for five (5) days at twenty (20) degrees Centigrade. The standard laboratory procedure shall be that found in the latest approved edition of "Standard Methods for the Examination of Water and Sewage" published by the American Public Health Association, the American Water Works Association, and/or the Water Pollution Control Federation.
3. **Capacity Reservation fee:** A fee charged by the Company for the allocation of capacity on a per EDU basis.
4. **Combined Sewer:** A sewage collection system which conveys both sanitary sewage and storm water flow.
5. **Commission:** The Pennsylvania Public Utility Commission.
6. **Company:** Pennsylvania-American Water Company and its duly authorized officers, agents and employees, each acting within the scope of his authority and employment.
7. **Company Service Line:** Company owned wastewater service line from the sewer main of the Company which connects to the Customer Service Line at the edge of the right-of-way or actual property line.
8. **Customer:** A person or entity who is an owner, occupant or who contracts with the Company for or who takes or receives wastewater collection, treatment and/or disposal service.
9. **Customer Service Line:** Customer owned wastewater service line extending from the end of the Company Service Line or connection to and within the customer's premise.
10. **Domestic Wastewater:** The liquid waste or liquid borne waste: (1) resulting from the non-commercial preparation, cooking and handling of food; (2) consisting of human excrement; or (3) consisting of wastewater, non-commercial laundering water, domestic housekeeping wastewater, and similar types of wastes from sanitary uses, whether generated in residences or sanitary facilities in commercial or industrial facilities, but does not include any storm water or ground water introduced from facilities such as roof leaders, sump pumps, floor drains or industrial wastewater.
11. **Dwelling Unit:** A structure or dwelling intended to be occupied as a whole by one family.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section A – DEFINITIONS (cont’d)

12. **Equivalent Dwelling Units (EDU):** Except for customers in Valley Township, the EDU is a measure (C)
 based upon the estimated average daily wastewater flow for the type of business, as calculated by the PaDEP
 Regulation at 25 Pa Code: 73.17 divided by the typical estimated average daily wastewater flow from a current
 single-family unit.

For customers in Valley Township, the number of equivalent dwelling units is determined as follows: (C)

Unit Schedule for Valley Township	
Category	Units
Single-family dwelling	1
Each family apartment or business suite in a multiple dwelling or office building	1
Each additional apartment or business suite	1
Each half of a double house	1
Each beauty parlor, food market, service station, garage, funeral parlor, doctor’s or dentist’s office	1
Each church or fire company or similar charitable organization	1
Each restaurant or tavern – 20 seats or less	2
Each additional 10 seats or portion thereof	1
Each hotel or motel – 3 rental units or less	1
Each additional 5 rooms or portion thereof	1
Each nursing home, group home, institution or hospital housing 4 beds or less	2
Each additional 2 beds or portion thereof	1
Each commercial and industrial establishment or professional office not otherwise classified which does not discharge an industrial waste, regularly occupied during business hours by less than 8 persons and for each 5 additional persons or portion thereof in regular occupancy during business hours	1
Each school regularly occupied during school hours by 10 persons or less and for each additional 10 persons or portions thereof For the purpose of computing school occupancy the number of pupils to be included for each year shall be the number enrolled in the school on October 1 of each year	1

13. **Garbage:** The solid wastes from domestic cooking and dispensing of food, and from the handling and storage of produce.

14. **Garbage Properly Shredded:** The term “Properly Shredded Garbage”, as used herein, shall mean the wastes from the preparation, cooking, and dispensing of food that have been shredded to such degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle greater than one-half inch in dimension.

15. **Grinder pump:** Any mechanical or powered device, owned by the Customer, used to grind, macerate or fluidize garbage so that it can be discharged into the Sanitary Sewer.

16. **Industrial/Commercial Wastes:** Any liquid, gaseous or water borne wastes from industrial processes or commercial establishments, as distinct from domestic wastewater.

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section A – DEFINITIONS (cont'd)

17. **Industrial/Commercial Waste Permit:** A wastewater permit issued as required by the Company to an Industrial/Commercial user which discharges Industrial/Commercial Waste.
18. **Industrial/Commercial Waste Pretreatment Program:** A program established by the Company that requires industrial and commercial dischargers to monitor, test, treat and control as necessary pollutants in their wastewater prior to discharge into the Sanitary or Combined Sewer.
19. **Line extension (for line extension purposes):** An addition to the Company's main line which is necessary to serve the premises of a Customer. Refer to Section H.
20. **Main:** The Company's pipe, excluding service connections, located in a public highway, street, alley or private right-of-way which pipe is used in transporting wastewater.
21. **Meter:** Any device supplied by the Company or other for the purpose of measuring water consumption or wastewater discharge.
22. **Nonresidential Service:** Wastewater service supplied to a commercial or industrial building, including a hotel or motel, or to a master-metered trailer park or multi-tenant apartment building, or to any customer who purchases wastewater service from the Company for the purpose of resale.
23. **Pretreatment:** The application of physical, chemical and/or biological processes to reduce the amount pollutants in, or alter the nature of the polluting properties of, an industrial/commercial process wastewater prior to discharging such wastewater into the Sanitary or Combined Sewer.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section A – DEFINITIONS (cont'd)

24. **Public Utility:** Persons or corporations owning or operating equipment or facilities in this Commonwealth for water, electric or wastewater collection, treatment, or disposal for the public for compensation.
25. **Residential Applicant:** A natural person at least 18 years of age not currently receiving service who applies for residential service provided by the Company or any adult occupant whose name appears on the mortgage, deed or lease of the property for which the residential utility service is requested. A Residential Applicant does not include a person who, within 30 days after service termination or discontinuance of service, seeks to have another service reconnected at the same location or transferred to another location within the Company's service territory.
26. **Residential Customer:** A natural person at least 18 years of age in whose name a residential service account is listed and who is primarily responsible for payment of bills rendered for the service or any adult occupant whose name appears on the mortgage, deed or lease of the property for which the residential utility service is requested. A Residential Customer includes a person who, within 30 days after service termination or discontinuance of service, seeks to have service reconnected at the same location or transferred to another location within the Company's service territory.
27. **Residential Service:** Wastewater service supplied to an individual single-family residential dwelling unit.
28. **Regulatory Agency:** Agencies, including but not limited to the Commission, the Pennsylvania Department of Environmental Protection (DEP), U.S. Environmental Protection Agency (EPA), which have authority over the operations of and/or discharges into and/or from the Company's treatment facilities
29. **Sanitary Sewer:** A sewer which primarily carries sanitary wastewater, together with such storm, surface and ground water as may be present.
30. **Storm Sewer:** A sewer which carries surface, ground water, or storm water from the buildings, ground, streets, or other areas.
31. **Storm Water Flow:** Any flow occurring during or following any form of natural precipitation, and resulting from such precipitation, including snowmelt.
32. **Suspended Solids:** Solids that either float on the surface of, or are in suspension in water, wastewater, or other liquids, and which are largely removable by filtration.
33. **Tariff:** All of the service rates, rules and regulations issued by the Company, together with any supplements or revisions thereto, officially approved by the Commission and contained in this document.
34. **Toxic Substances:** Any substances where gaseous, liquid or solid waste which, when discharged to a public sewer in sufficient quantities, will be detrimental to any biological wastewater treatment process, constitute a hazard to human beings or animals, inhibit aquatic life, or create a hazard to recreation in receiving waters of the effluent from a wastewater treatment plant, or as defined pursuant to PL 92500 (Federal Water Pollution Control Act Amendments of 1972) or its amendments.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section A – DEFINITIONS (cont'd)

35. **Unauthorized Use of Service:** Unreasonable interference or diversion of service, including meter tampering (any act which affects the proper registration of service through a meter), by-passing unmetered service that flows through a device connected between a main or service line and customer-owned facilities, unauthorized service restoration, unauthorized stormwater/groundwater connection to Sanitary or Combined Sewer, or the otherwise taking or receiving of wastewater service without the knowledge or approval of the Company.

36. **Wastes:** Any liquid, gaseous, or solid substances or combination thereof which are discarded, leached, or spilled substances or combination thereof including sanitary wastewater but excluding storm-water.

37. **Wastewater:** The liquid and water-carried wastes from dwellings, commercial facilities, industrial facilities and institutions, together with any groundwater, surface water, and storm water that may be present, whether treated or untreated, in the Company's sewer system.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section B – The Wastewater Tariff

1. Filing and Availability

A copy of this Tariff, which is the rates, rules and regulations under which wastewater service will be supplied by the Company to its Applicants and Customers in Pennsylvania, is on file with the Pennsylvania Public Utility Commission, and is available and open for inspection at the offices of the Company.

2. Revisions

This Tariff may be revised, amended, supplemented and otherwise changed from time to time in accordance with the Pennsylvania "Public Utility Code," and such changes, when effective, shall have the same force and effect as the present Tariff.

3. Applications of Tariff

The Tariff provisions apply to any party or parties applying for or receiving service from the Company, including Unauthorized Use of Service.

4. Amendment of Commission Regulations

(C)

Whenever Commission regulations in Title 52 of the Pennsylvania Code are duly amended in such a way as would produce a difference between Commission regulations and this tariff, the tariff is deemed to be amended to be consistent with the amendments to the regulations, except that if application of the amendment to Title 52 is discretionary, this tariff will remain unchanged.

(C) means Change

RULES AND REGULATIONS

Section C - Applications for Service

1. **Service Application Required:** Any Applicant who wishes to receive wastewater service from the Company under this Tariff must contact the Company and complete an application for service. Applications for service may be made by completing a written application, by telephoning the Company, or through application via the Company's website on the Internet. All applications for service must be signed by the owner or owners of the property to which wastewater collection service will be provided; except that where a lessee of property occupies or uses the property under a lease having a fixed term of more than six (6) months, the lessee may request service as an applicant. The Company may, at its sole discretion, require that a separate contract for service be signed by the applicant.

Prior to providing utility service, the Company may require the Applicant to provide: (1) information that positively identifies him/her self; (2) the name of any adult occupant whose name appears on the mortgage, deed or lease of the property for which the residential utility service is requested; (3) the names of each adult occupant residing at the location, and proof of their identity; or (4) a cash deposit, as may be required in accordance with Section G of this Tariff.

In the case of Residential Applicants, the Company may ask for the combined gross income of all adult occupants at the time the application for service is made; however, the Residential Applicant is not required to provide the information as a condition of receiving wastewater service, unless such applicant is seeking to enroll in the Company's *Help to Others Program*.

Non residential service customers which desire to discharge Industrial/Commercial Wastes into the Sanitary Sewer or existing industrial/commercial users which desire to commence operations of a new facility or a new or different process that will affect the characteristics of the wastewater discharging into the Sanitary Sewer, shall notify the Company prior to the commencement of the new or different operations at the facility and provide such other information regarding the proposed discharge as the Company may request, including an application for an Industrial Waste Discharge Permit when deemed necessary.

2. **Change in Ownership or Tenancy:** A new application must be made to the Company upon any change in ownership where the owner of the property is the Customer, or upon any change in the identity of a lessee where the lessee of the property is the Customer. The Company shall have the right to discontinue or otherwise interrupt wastewater collection service upon three (3) days notice if a new application has not been made and approved for the new customer.

RULES AND REGULATIONS

Section C - Applications for Service (cont'd)

3. **Acceptance of Application and Right to Reject:** An application for service shall be considered accepted by the Company only upon written approval by the Company. All regulatory requirements shall be met before Company can provide approval. The Company may limit the amount or character of service it will supply, or may reject applications for service for the following reasons: requested service is not available under a standard rate; requested service may affect service to other customers; for a non-Residential Applicant's or non-Residential Customer's failure to establish Creditworthiness; for failure to address prior Company debts; for the Applicant's failure to provide identifying documentation of the Applicant and each adult occupant residing at the location; when identifying documentation cannot be verified; for the reasons set forth in Section D, paragraph 5, or for other good and sufficient reasons.
4. **Temporary Service:** In the case of temporary service for less than a 12-month period, the Company may require the Customer to pay all costs of making the service connection and for its removal after the service has been discontinued, or to pay a fixed amount in advance to cover such expenses. If the actual costs differ from the estimate, the Applicant will pay to the Company any excess amount due or the Company will refund to the Applicant any excess amount paid.

RULES AND REGULATIONS

Section D - Construction and Maintenance of Facilities

1. **Customer Service Line:** The Customer service line shall be furnished, installed, maintained and/or replaced, when necessary, by and at the sole expense of the Customer. The Company reserves the right to determine the size, type, quality, depth, and connection location of the customer service lines. Prior to connection to the Company service line, the Customer, at their sole cost, shall have the Customer service line air pressure tested and checked for alignment by a Company approved qualified person under the supervision of a Company representative.
2. **Separate Trench:** The customer wastewater service line shall not be laid in the same trench with drain or water pipe, the facilities of any other public utility or of any municipality or municipal authority that provides a public utility service.
3. **Customer's Responsibilities:** All service lines, connections and fixtures furnished by the customer shall be maintained by the Customer in good working order. All valves, meters and appliances furnished by the Company and on property owned or leased by the Customer shall be protected properly by the customer. All leaks in the Customer service line or any pipe or fixtures in or upon the customer's premises must be repaired immediately by the Customer as determined solely by the Company. The failure of a Customer to properly install and maintain a service line, including replacement, shall constitute grounds for the Company to initiate action to terminate service to the customer and seek recovery for any damage to the Company's facilities caused by an improperly functioning service line. For Customers who also receive water service from the Company, where an undetected, non-surfacing, underground leak is found in a Customer's Water Service Pipe, the Company shall credit the Customer with a one-time bill adjustment for wastewater service equal to forty percent (40%) of that portion of one month's consumption that exceeds the average monthly usage, based on the prior twelve month period, upon proper verification that the Water Service Pipe leak has been repaired. The Company shall require documentation to establish, to the Company's satisfaction, the existence of such repaired leak at the Customer's premises. Such bill adjustment will be provided only to the extent the Customer has not received a bill adjustment for an undetected, non-surfacing, underground leak at the same premises in the past five (5) years.
4. **Customer Grinder Pump:** In areas of the collection system where the Company has installed a pressure sewage collection system or where required as determined by the Company, the Customer, in conjunction with the construction of their service line, shall install, own, operate, and maintain and replace a grinder pump and holding tank at the Customer's expense as specified by the Company prior to connection and shall maintain such facilities in good order and repair. The pump shall meet specifications as provided by the Company. The failure of a customer to properly install and maintain a grinder pump, including replacement, shall constitute grounds for the Company to initiate action to terminate service to the customer and seek recovery for any damage to the Company's facilities caused by an improperly functioning grinder pump.
5. **Right to Reject:** The Company may refuse to connect with any customer service line or furnish wastewater collection, treatment and/or disposal through a service already connected if such system or service is not properly installed or maintained.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section D – Construction and Maintenance of Facilities (cont'd)

6. **Water Use Standards for Certain Plumbing Fixtures:** This rule establishes maximum water use criteria for certain plumbing fixtures installed in all new construction or renovation. Such standards have been implemented to achieve maximum efficiency of water use which the Commission has determined is technologically feasible and economically justified.

(a) Maximum permitted water usage levels shall be as follows:

<u>Plumbing Fixture</u>	<u>Maximum Water Use</u>
water closets	1.6 gallons/flush
urinals	1.5 gallons/flush

(b) The Company may exempt particular customers, or classes of customers, when it is determined that the water use standards for plumbing fixtures listed above are unreasonable, cannot be accommodated by existing technology or are otherwise inappropriate.

7. **Individual Service Lines:** Except as otherwise expressly authorized by the Company, each individual customer shall be served only through a separate service line connected directly to the Company Service Line, and that Customer Service Line shall not cross over the property of or serve any other customer or premise. The maximum service line length shall be two hundred and fifty (250) feet from the point of connections with clean-outs every 50 feet. The Company shall have the right to waive this maximum length requirement at its sole discretion. No additional attachment may be made to any Customer Service Line for any purpose without the express written approval of the Company.

8. **Connection to Company Mains:** No connection shall be made to the Company's main, nor detachment from it, except under the direction and control of the Company. All such connections shall be property of the Company and shall be accessible to it and under its control. The Company will furnish, install and maintain all service lines from the main to the property line or right-of-way.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section E - Discontinuance, Termination and Restoration of Service

1. Discontinuance by Customer: Where a customer requests the Company to discontinue service, the following rules shall apply:

(a) A customer who wishes to have service discontinued shall give at least three (3) days notice to the Company, specifying the date on which service is to be discontinued. In the absence of proper notice, the Customer shall be responsible for all service rendered until the time that the Company shall have actual or constructive notice of the Customer's intent to discontinue service. The Customer shall not begin to use nor cease to use wastewater service without the prior consent of the Company.

2. Termination by Company: Wastewater and/or water service to the Customer may be terminated for good cause, including, but not limited to, the following:

- (a) making an application for wastewater service that contains material misrepresentations;
- (b) failure to repair leaks in sewer pipes or fixtures;
- (c) Unauthorized Use of Service, tampering with any Company Service Line, or installing or maintaining any unauthorized connection;
- (d) theft of sewer service, which shall include taking service without having made a proper application for service under Section C;
- (e) failure to pay, when due, any charges accruing under this tariff;
- (f) discharge of any prohibited substance listed in Section R into the wastewater system;
- (g) receipt by the Company of an order or notice from the Department of Environmental Protection, a health agency, local plumbing inspector or other similar authority, to terminate service to the property served on the grounds of violation of any law or ordinance, or upon notice to the Company from any such authority that has ordered an existing violation on the property to be corrected and that such order has not been complied with or
- (h) material violation of any provisions of the tariff;
- (i) failure to permit access to meters, service connection or other property of the Company for the purpose of replacements, maintenance, operation or repair of meter reading device after proper notice;
- (j) failure to properly install and maintain a grinder pump, including its replacement when improperly functioning as solely determined by the Company;

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section E - Discontinuance, Termination and Restoration of Service (cont'd)

2. Termination by Company (cont'd)

- (k) any unauthorized, un-inspected, or improper connection, as herein defined, found to exist will be required to be disconnected within ten (10) days. The Company may require a plumber's sworn statement or certificate as evidence that the connection has been discontinued;
- (l) Not abiding by the provisions of the Company's Industrial/ Commercial Waste Pretreatment Program;
- (m) Failure to remove direct connections to the Customer Service Line that allow surface, subsurface, storm water, or roof run off water into the Sanitary Sewer;
- (n) Not complying with any part of this tariff;
- (o) Supplying sewer service to other units, buildings or premises when Capacity Reservation Fees have not been paid for in accordance with tariff;
- (p) For termination of water service by Company in accordance with the Company's water tariff on file with the Commission;
- (q) For Customer's tendering payment for reconnection of service that is subsequently dishonored, revoked, canceled or otherwise not authorized and which has not been cured or otherwise made in full payment within three business days of the Company's notice; or
- (r) After receiving a written termination notice from the Company, for Customer's tendering payment which is subsequently dishonored under 13 Pa. C.S. § 3502, or, in the case of an electronic payment, that is subsequently dishonored, revoked, canceled or otherwise not authorized and which has not been cured or otherwise made in full payment within three business days of the Company's notice.

In order to terminate wastewater service, the Company can at its discretion install a shut off valve on the Company's Service Line to terminate service. The cost for the installation of the shut off valve and all the other charges accruing under this tariff shall be paid to the Company before service is restored.

3. Turn-on Charge: Whenever service is discontinued or terminated pursuant to Rule 1 or Rule 2 of this Section, service shall be permitted by the Company only upon the payment by the Customer of a turn-on fee and the curing of the problem that gave rise to the terminations if under Rule 2. Refer to Schedule of Miscellaneous Fees and Charges; section C for Service Reconnection and Discontinuance Fee.

4. Service Restoration Following Termination of Service: When wastewater service to any premise has been terminated by Company for any reason, it will be restored only after the conditions, circumstances, or practices which caused the wastewater service to be terminated are corrected and all applicable arrearages, deposits and fees paid.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section E - Discontinuance, Termination and Restoration of Service (cont'd)

5. Termination of Service for Nonpayment of Bills

Before termination of service, the Company will take the following steps:

- (a) Provide a written notice of termination to the Customer at least 10 days prior to the scheduled shut off and the notice shall be in the form required by the Commission;
- (b) Attempt to make personal contact with the Customer at least three days prior to the shut off date;
- (c) During winter months (December 1 through March 31), if the Company cannot reach the Customer at the time of termination, the Company will leave a 48-hour notice at the residence;
- (d) After complying with paragraphs (B) and (C), the Company will attempt to make personal contact with the Customer or responsible adult at the time service is terminated. Termination of service will not be delayed for failure to make personal contact;
- (e) Upon termination, the Company will make a good faith attempt to provide a post termination notice.

6. Landlord Ratepayer Termination of Service for Nonpayment of Bills

Before termination of service to a Landlord Ratepayer that has tenants, the Company will take the following steps:

- (a) Provide a written notice of termination to the Landlord Ratepayer at least 37 days prior to the scheduled shut off;
- (b) Provide written notice of termination to each dwelling unit reasonably likely to be occupied by affected tenant at least 30 days prior to the scheduled shut off;
- (c) Upon termination, the Company will post the termination notice at the dwelling, including common areas when possible.

7. Protection from Abuse Order

If you are a victim of domestic violence and have a Protection from Abuse Order or other court order that shows clear evidence of domestic violence, there are special protections available. The Company will not shut off your wastewater service during the winter months (December 1 through March 31), without PUC permission. Depending on your income, a special payment arrangement may be available. Your service may not be terminated on a Friday. You may not be held responsible for a bill in someone else's name. You may not be required to pay a security deposit. If you are required to pay a security deposit, you may be able to pay it over three payments. You will receive additional 48-hour notice prior to termination.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section F - Billing and Collection

1. **Billing Period:** The Company shall render a bill once every billing period to every Customer in accordance with approved rate schedules. The due date for payment of a bill for Residential and Non-Residential service shall be no less than twenty (20) days from the date of transmittal. If the last day for payment falls on a Saturday, Sunday or bank holiday, or on any day when the offices of the Company are not open to the general public, the due date shall be extended to the next business day. The Company may not impose a late-payment charge unless payment is received more than five (5) days after the stated due date.
2. **Late-Payment Charge:** All amounts not paid when due shall accrue a late-payment charge at the rate not to exceed one and fifty one-hundredths percent (1.50%) per billing period, not to exceed eighteen percent (18%) per year when not paid as prescribed in Rule 1 of this Section. (C)
3. **Change in Billing Address:** Where a customer fails to notify the Company of a change in billing address, the Customer shall remain responsible to remit payment by the billing due date.
4. **Application of Payment:** Utility bills rendered by the Company shall include only the amount due for utility service. Where a customer remittance to the Company includes payment for any non-utility services, proceeds will be applied first to pay all outstanding regulated utility charges.
5. **Return Check Fee:** The customer will be responsible for return check fee as provided in the Schedule of Miscellaneous Fees and Charges section of the tariff, per incident where a check or automatic transfer of funds, which has been presented to the Company or its agent for payment of any bill, is returned by the bank for any reason including, but not limited to, non-sufficient funds, account closed, payment stopped, two signatures required, postdated, stale date, no account, drawn against uncollected funds, and unauthorized signature. This fee is in addition to any and all charges assessed by the bank.
6. **Disputed Bills:** In the event of a dispute between the Customer and the Company with respect to any bill, the Company will promptly make such investigation as may be required by the particular case and report the result to the Customer. The Customer is not obligated to pay the disputed amount during the pendency of the Company's investigation. When the Company has made a report to the Customer sustaining the bill as rendered, the Customer shall have fifteen (15) days from the date of such report in which to pay the bill. If the Company determines that the bill originally rendered is incorrect, the Company will issue a corrected bill with a new due date for payment. Any amount received by the Company in excess of the amount determined to be due by the Company's investigation of the dispute shall be refunded to the Customer.
7. **Payment Arrangement:** A Customer must first contact the Company to request a payment arrangement. The Company will take into consideration the size of the unpaid balance, the ability of the Customer to pay, the payment history of the Customer and the length of time over which the bill accumulated. A Customer has the right to decline the Company's payment arrangement. If a Customer breaks a Company payment arrangement, the Commission may establish a payment arrangement. (C)

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section G – Credit/Deposits

1. Customer's Liability for Charges:

The Customer who has made application for wastewater service to any premise shall be held liable for all wastewater service furnished to such premise until such time as the Customer properly notifies the Company to discontinue the service for this account.

2. Prior Company Debts:

(a) Service will not be furnished to former Customers until any indebtedness to the Company for previous service of the same or similar classification has been satisfied or a payment arrangement has been made on the debt. This rule does not apply to the disputed portion of disputed bills under investigation. The Company will apply this rule to the disputed portion of disputed bills, if, and only if: (1) the Company has made diligent and reasonable efforts to investigate and resolve the dispute; (2) the result of the investigation is that the Company determines that the customer's claims are unwarranted or invalid; and (3) the Commission and/or the Bureau of Consumer Services has decided a formal or informal complaint in the Company's favor and no timely appeal is filed.

(b) The Company may utilize means in accordance with applicable law of determining an Applicant's or Customer's liability for any indebtedness to the Company for previous service, including, but not limited to, the following: (1) use of Company records that containing confidential information previously provided to the Company for service; (2) information contained on a valid mortgage, lease or deed; (3) other information contained in the Company's records that indicate that the Applicant was an adult occupant during the time the prior debt accrued; (4) use of commercially available skip tracing software that contains records of names and addresses; and (5) use of information contained in credit reporting data utilized by the Company.

3. Residential Customers' Deposits: The Company may charge deposits to Residential Applicants and Residential Customers as permitted by Commission statutes, rules regulations, and as permitted by Federal Bankruptcy Law.

- (a) . Deposits may be required from a Residential Applicant who is unable to establish Creditworthiness to the satisfaction of the Company through the use of a generally accepted credit scoring methodology which employs standards for using the methodology that falls within the range of general industry practice and specifically assess the risk of public utility bill payment.
- (b) Deposits may be required from a Residential Customer who fails to comply with the material terms or conditions of a settlement or payment arrangement or is delinquent in the payment of two consecutive bills, or three or more bills within the preceding twelve months.

RULES AND REGULATIONS

Section G – Credit/Deposits (cont'd)

3. Residential Customers' Deposits (cont'd):

- (c) Prior to reconnection of service, deposits may be required from a Residential Applicant or Residential Customer whose service was terminated for any of the following reasons: (a) nonpayment of an undisputed delinquent account; (b) failure to complete payment of a deposit, providing a guarantee or establish credit; (c) failure to permit access to meters, service connections or other property of Company for the purpose of replacement, maintenance, repair or meter reading; (d) Unauthorized Use of Service on or about the affected dwelling; (e) failure to comply with the material terms of a settlement or payment arrangement; (f) fraud or material misrepresentation of identity for the purposes of obtaining utility service; (g) tampering with meters, including, but not limited to, bypassing a meter or removal of an automatic meter reading device or other Company equipment; or (h) violating tariff provisions on file with the Commission so as to endanger the safety of a person or the integrity of the Company's water distribution system.
- (d) **Deposit Amount and Payment Period** - For Residential Applicants or Customers, the cash deposit required shall be in an amount equal to 1/6 of an Applicant's or Customer's estimated annual bill at the time the Company determines the deposit is required. Any Residential Applicant or Customer shall have up to 90 days to pay the deposit in full and may elect to pay the required deposit in three installments: 50% bill upon the determination that the deposit is required; 25% billed 30 days after the determination; and 25% billed 60 days after the determination. The Residential Applicant or Customer may elect to pay the deposit in full before the due date.
- (e) **Deposit Refunds and Interest**—A deposit will be refunded if service is discontinued and the final bill is paid or if the customer has paid the bills for the prior 12-month period without having been late on more than two (2) occasions and is not currently delinquent. Interest on deposits will be accrued until is returned to the Customer or upon termination or discontinuance of the service covered by the deposit. Deposits from residential customers shall bear simple interest at the rate determined by the Secretary of Revenue for interest on the underpayment of tax under section 806 of The Fiscal Code (72 P.S. § 806). The applicable interest rate for each year shall be determined as of January 1 of that year.

4. Nonresidential Customers' Deposits:

- (a) The Company may charge deposits to Non-Residential Applicants and Non-Residential Customers if they have bad credit, lack Creditworthiness, or for other reasonable grounds determined by the Company, and as permitted by Federal Bankruptcy Law.
- (b) The amount of the deposit will not be greater than an estimated average bill for one (1) billing period plus the estimated bill for one (1) additional month's service.
- (c) **Deposit Refunds and Interest**— A deposit will be refunded if the customer pays all bills on time over a 12-month period or if service is disconnected and the final bill has been paid. There will be no interest paid on deposits for nonresidential accounts.

5. Landlord Assumption of Responsibility

If an Applicant for service, who is a landlord, assumes responsibility for rates and charges related to water or wastewater service provided to tenants and is billed for such service, the landlord must assume responsibility and be billed for both water and wastewater service, if such service is provided or billed by the Company.

(C)

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section G – Credit/Deposits (cont'd)

6. Denial of Service

- (a) If the Company denies service, the Company will inform the Applicant in writing of the reasons for the denial within 3 business days of the denial. With the Applicant's consent, the Company may provide to the Applicant the information electronically. The written denial statement will include the reason for the denial and information on the Applicant's ability to challenge the denial. If the Company is requiring payment of an unpaid balance, the Company will specify in writing the amount of the unpaid balance, the dates during which the balance accrued and the location and customer name at which the balance accrued. The statement will inform the Applicant of the right to furnish a third-party guarantor in accordance with Commission regulations and the Applicant's right to contact the Commission.
- (b) The written denial statement will inform the Applicant that if he or she is, based upon household income, confirmed to be eligible for a customer assistance program a deposit is not required. The Company will inform the Applicant of the procedures and documentation necessary to qualify for an exemption from a security deposit requirement.
- (c) The written denial statement will include information informing victims of domestic violence with a protection from abuse order, or a court order issued by a court of competent jurisdiction in this Commonwealth which provides clear evidence of domestic violence, that there are special protections available. The Company will not shut off your wastewater service during the winter without PUC permission. Depending on your income, a special payment arrangement may be available. Your service may not be terminated on a Friday. You may not be held responsible for a bill in someone else's name. You may not be required to pay a security deposit. If you are required to pay a security deposit, you may be able to pay it over three payments. You will receive additional 48-hour notice prior to termination.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section H - Line Extensions for Applicants other than Bona Fide Service Applicants

1. When an extension to serve a Customer is required or requested, such extension will be made under the terms of a "Sewer Main Extension Agreement" or a "Sewer Main Extension Deposit Agreement".
2. Customer shall contribute all facilities required for the Company to directly connect the Customer to the Sanitary Sewer. This includes pumping stations, vaults, manholes, mains or any other apparatuses where applicable. The Company shall have the right to locate the facilities as required to meet the long term system needs of the Customers.
3. Customer shall also pay a capacity reservation fee to the Company for each proposed equivalent dwelling unit.
4. **Size of Main and Other Facilities:** The Company shall have the exclusive right to determine the type and size of mains and the other facilities required to render adequate service. However, where the Company decides to install a pipe larger than necessary to render extension of adequate service to the applicant, estimated or actual cost figures in the Sewer Main Extension Agreement or Sewer Main Extension Deposit Agreement shall include only the material and installation cost for a pipe the size of which is necessary to provide adequate service to the applicant. Any incremental costs of a larger pipe will be the responsibility of the Company. All estimated or actual cost figures referred to in the Sewer Main Extension Agreement or Sewer Main Extension Deposit Agreement shall include a reasonable allowance for overhead costs and taxes as appropriate.
6. **Length of Extension:** In determining the necessary length of an extension, the terminal point of such extension shall be at that point in the property line or right-of-way, which is equidistant from the side property lines of the last lot for which service was requested except where the Company, in its sole opinion, determines that it is necessary to extend beyond the last lot and connect to an existing main to provide adequate and reliable wastewater service. A street service connection will be provided only for customer service lines that extend at right angles from the curb line in a straight line to the premises to be served.
7. **Offsite Development Marketing Contracts:** Where it is prudent, reasonable and in the public interest, the Company may, at its option enter into offsite development marketing contracts which depart from the standard terms of the "Sewer Main Extension Agreement" or "Sewer Main Extension Deposit Agreement". These marketing agreements shall become effective 30 days after the Company has filed a copy thereof with the Pennsylvania Public Utility Commission, or in the event that the Commission institutes an investigation, at such time as the Commission grants its approval thereof.

RULES AND REGULATIONS

Section I- Service Continuity

1. **Regularity of Service:** The Company may, at any time, shut off service in case of accident or for the purpose of making connections, alterations, repairs or changes, or for other reasons. The Company will, pursuant to Commission regulations at 52 Pa. Code '67.1 and as circumstances permit, notify customers to be affected by service interruptions.

2. **Liability for Damages:**

(a) **Limitation of Damages for Service Interruptions:** The Company's liability to a customer for any loss or damage from any excess or deficiency in the wastewater collection service due to any cause other than willful misconduct or negligence by the Company, its employees or agents shall be limited to an amount no more than the Customer charge or minimum bill for the period in question. The Company will undertake to use reasonable care and diligence in order to prevent and avoid interruptions and fluctuations in service, but cannot and does not guarantee that such will not occur.

(b) **Responsibility for Customer Facilities:** The Company shall not be liable for any loss or damage caused by reason of any break, blockage, leak or other defect in a Customer's service line, fixtures or other installations, except where the damage is a result of the negligence or willful misconduct of the Company, its employees or agents. The Company shall in no event be responsible for maintenance of, or for damage done by sewage escaping from a blockage of the customer's service line or any other pipe or fixture, or from any other cause occurring to any premise or within any house or building.

(c) When the Company incurs costs and the blockage or defect is determined to be on the customer's service line, the Company may request reimbursement and the Customer is responsible to reimburse the Company for associated costs.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section J– Waivers

The Company may, at its sole discretion, waive any of the Rules contained herein that operate for the benefit of the Company; provided, that no such waiver will be valid unless in writing and signed by an authorized representative of the Company, and provided that no waiver will be allowed where the waiver would constitute a violation of the Public Utility Code, the regulations of the Commission or of any other applicable statute, law or regulation.

Section K– Amendment of Commission Regulations

Whenever Commission regulations in Title 52 of the Pennsylvania Code are duly amended in such a way as would produce a difference between Commission regulations and this tariff, this tariff is deemed to be amended so as to be consistent with the amendments to the regulations, except that if application of the amendment to Title 52 is discretionary, this tariff will remain unchanged.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section L. Privilege to Investigate/Right of Access

The Company's authorized representatives shall have the right of access at all reasonable times to all parts of any premises connected with the system, including meters, service connections and other property owned by it on the premises of the Customer, for the purpose of examining and inspecting connections and fixtures, including the water and/or wastewater metering arrangement, for disconnecting service for any proper cause, or for purposes of replacement, maintenance, operation or repair thereof.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section M – MAIN EXTENSIONS FOR BONA FIDE SERVICE APPLICANTS

General Provisions

(A)(1) The Company will extend existing sewer mains for a Bona Fide Service Applicant making application for sewer service, other than temporary or seasonal service, under, and pursuant to, these Rules and Regulations, to commence immediately upon installation of the Street Service Connection.

(2) When the costs of the main extension exceed the Company Contribution as defined in Subsection (D), then such extension will be made under and pursuant to the terms of an Extension Deposit Agreement for Bona Fide Service Applicant, as hereinafter set forth, and subject to the applicable provisions of these Rules and Regulations. The construction of facilities to serve such Bona Fide Service Applicant will not commence until an Extension Deposit Agreement for Bona Fide Service Applicant has been executed and all applicable terms and conditions therein have been satisfied by the Applicant.

(3) When an extension is requested or required to serve a Bona Fide Service Applicant requiring Special Utility Service, construction of the extension or of any facilities needed to provide such Special Utility Service will not commence until a Special Utility Service Agreement has been executed and all applicable terms and conditions therein have been satisfied by the Applicant including, but not limited to, paying the requisite sum of money for construction of the facilities needed to furnish Special Utility Service, in accordance with the Preliminary Memorandum to such Special Utility Service Agreement.

(B) The Company shall have exclusive right to determine the type and size mains to be installed and the other facilities required to render adequate service. If a Bona Fide Service Applicant desires any facilities other than those facilities determined by the Company to be required to render adequate service, those other facilities will be installed by, owned by, maintained by, and will become the sole responsibility of the Bona Fide Service Applicant.

(C) In determining the length of and necessity for any extension required pursuant hereto, the terminal point of such extension shall, in all cases, be at the point in the curb line which is equidistant from the side property lines of the last lot for which sewer service is requested, except as provided in Paragraph B above wherein it may be necessary to extend beyond the last lot and connect to an existing main to provide adequate and reliable sewer service. A street service connection will be provided only when Customer service lines from the curb to the premises to be served are laid in a straight line at right angles to the curb line.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section M –MAIN EXTENSIONS FOR BONA FIDE SERVICE APPLICANTS (cont'd)

(D) For the purposes of this rule:

(1) "Bona Fide Service Applicant" shall mean a person or entity applying for General Sewer Service to an existing structure for which a valid occupancy permit has been issued if such structure is within the Company's certificated service territory and is either: (1) a primary residence of the Applicant; or (2) a place of business. An Applicant shall not be deemed a Bona Fide Service Applicant if such Applicant is requesting sewer service to: (1) a building lot or subdivision; or (2) a primary residence if such primary residence was constructed, or the request for sewer service was made, as part of a plan for the development of a residential subdivision; or (3) sewer service for temporary or seasonal services. To become a Bona Fide Service Applicant, a person or entity must file a signed application for a new Street Service Connection to qualifying premises, extend the necessary customer service line to the curb line of premises, and request sewer service to begin immediately following installation of the Street Service Connection. If the Company shall be delayed or prevented from installing the Street Service Connection for a period of one (1) year or more from the date of application, the Bona Fide Service Applicant shall have the right to withdraw the Application for Service.

(2) "Company Contribution" shall mean that portion of the main extension costs which the Company will fund based upon the following formula:

Average Annual Revenue	\$ _____
Minus	
Operation and Maintenance Expenses	\$ _____
Subtotal	\$ _____
Divided by	
Depreciation Rate and Weighted Cost of Debt	_____ %
Company Investment	\$ _____

The Bona Fide Service Applicant will be required to pay one-third of the Customer Contribution prior to the commencement of any work by the Company. The Customer Contribution will be an amount equal to the difference between the Company Contribution and the cost of the main extension and applicable interest charges. After the initial payment any remainder will be amortized over thirty-six (36) equal monthly installments beginning with the Bona Fide Service Applicant's first bill for sewer service. The Company will also provide information to the applicant on financial institutions that may offer financing to the Bona Fide Service Applicant for the line extension.

(a) The Average Annual Revenue for residential customers with a 5/8" water meter shall be calculated based upon the average residential consumption for customers with a 5/8" water meter used to determine rates approved by the Pennsylvania Public Utility Commission in the Company's last approved general rate increase. Consumption for residential customers with larger water meters will be determined by selecting up to twenty (20) existing customers with similar water meter sizes, as available, which have received service for at least twelve (12) months prior to the date of application, and applying the Company's latest approved rates to the annual average consumption of those customers.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section M – MAIN EXTENSIONS FOR BONA FIDE SERVICE APPLICANTS (cont'd)

(b) The Average Annual Revenue for Commercial, Industrial and Municipal customers shall be calculated by selecting up to twenty (20) existing, similar commercial, industrial or municipal ratepayers, as available, which have received service for at least twelve (12) months prior to the date of application, to determine the average consumption to be used in calculating the Company Contribution.

(c) Operation and Maintenance Expenses shall be the Company's average annual operation and maintenance costs associated with serving an additional customer.

(d) The depreciation rate shall be the Company's depreciation rate for the facilities to be installed as determined in the Company's last approved general rate increase filing.

(e) The weighted cost of debt shall be the Company's long-term debt costs as determined in the Company's last approved general rate increase.

(3) "General Sewer Service" shall mean basic residential sewer service or sewer service for general commercial or municipal purposes but excluding, without limitation, sewer service for seasonal or temporary uses and sewer service solely for sprinkler systems or for any other fire protection use.

(4) "Special Utility Service" shall mean any residential or business service which exceeds that required for ordinary residential purposes. By way of illustration but not limitation, Special Utility Service shall include: the installation of facilities such as oversized mains, lift stations, additional plant capacity or pretreatment facilities required as necessary to adequately treat or convey flows, or service to large sewer producing commercial and industrial applicants. An otherwise Bona fide applicant requesting service which includes a special utility service component is entitled to a Bona fide applicant status, including the corresponding contribution toward the costs of the line extension which do not meet the special utility service criteria.

(5) "Street Service Connection" shall mean a pipe with appurtenances used to conduct sewer from a collection main of the Company to the curb line of the premises.

(E) (1) Street service supplying a premise shall not pass through or across any premises or property other than that to be supplied, except as provided in (E) (2). No sewer pipes or plumbing in any premises shall be extended therefrom to adjacent or other premises. Street service connections will not be permitted to cross intervening properties unless there is no other way in which service can be provided and appropriate easements are obtained. Only service applicant(s) owning property in fee which directly abuts a street wherein there is an existing main of the Company will be permitted to attach to the Company's service line for the purpose of receiving sewer service therefrom, unless appropriate easements are obtained pursuant to Subsection(2) below. It is understood that such property owned in fee by the said service applicant(s) shall be a complete standard building lot which complies with the existing zoning laws and regulations of the municipality in which such property is located. It is further understood that if such property owned in fee by a service applicant(s) is subsequently sold, the purchaser of such property will be entitled to receive sewer service upon compliance with all of the provisions of this tariff, but that the seller of such property shall only be entitled to continue to receive service if such seller complies with all of the provisions of this tariff.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section M – MAIN EXTENSIONS FOR BONA FIDE SERVICE APPLICANTS (cont'd)

(2) A residential service applicant(s) may obtain a recorded easement or right-of-way that runs with the land, of at least fifteen (15) feet in width connecting the property to be served to the street wherein the Company's main is located. Such easement or right-of-way shall not cross multiple properties. The residential service applicant(s) shall present the Company with a certified copy of a duly recorded instrument which (a) describes the easement or right-of-way by metes and bounds, (b) gives the easement in perpetuity to the heirs, successors and assigns of said residential service applicant(s), (c) grants access to the customer or company service line for purposes of repair and replacement, and (d) is recorded in the County Office of the Recorder of Deeds.

(F) Where substantial public need exists and the public health and safety may be compromised by the absence of a public sewer supply in a portion of the Company's authorized service territory, the Company, subject to the Commission's prior approval, may install main extensions and Special Utility Service facilities without the payment of the Customer Contribution that would otherwise be required under subparagraphs (A)(3) and (D)(2), respectively of Section M.

PENNSYLVANIA-AMERICAN WATER COMPANY

Calculation of Company Funded Portion of Main Extensions
(For Illustrative Purposes Only)

Average Annual Revenue	\$340
minus	
Operation and Maintenance Expenses	\$102
<u>Subtotal</u>	<u>\$238</u>
Divided by	
Depreciation Rate (Mains Only) and Weighted Debt Costs	6.08%
<u>Total</u>	<u>\$3,914</u>

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section N – EXTENSION DEPOSIT AGREEMENT FOR BONA FIDE SERVICE APPLICANT

THIS AGREEMENT entered into this _____ day of _____, 20____, by and between Pennsylvania-American Water Company hereinafter called the "COMPANY," and _____ hereinafter called the "BONA FIDE SERVICE APPLICANT."

WHEREAS, the BONA FIDE SERVICE APPLICANT desires extension of the sewer mains of the COMPANY, as hereinafter described;

NOW, THEREFORE, this agreement WITNESSETH:

FIRST: THE COMPANY contracts and agrees to lay the sewer main(s) (and other facilities, if any) as shown in red on the diagram hereto attached and made a part hereof described and located as follows:

(LEAVE SPACE FOR DESCRIPTION)

SECOND: It is expressly understood and agreed that if the COMPANY shall be delayed or prevented from installing the sewer main (s) (and other facilities, if any) hereinabove described because of its failure to secure pipe or other construction materials, or for any other causes beyond its control, such failure or delay in performance shall be excused; provided, however, if such failure or delay in performance shall extend for a period of more than one (1) year from the date thereof, the BONA FIDE SERVICE APPLICANT shall have the right to cancel and terminate this agreement on thirty (30) days' written notice to the COMPANY, and thereafter both parties shall be relieved of all duties and obligations arising hereunder. But this right to cancel and terminate by the BONA FIDE SERVICE APPLICANT shall not be invoked if the COMPANY has received the construction material, in which event the COMPANY shall have the obligation to prosecute the work diligently to its completion.

THIRD: The BONA FIDE SERVICE APPLICANT hereby agrees, upon notice from the COMPANY that it is prepared and able to go forward with the work provided in Paragraph FIRST hereof, to pay for the actual costs of extending the facilities as provided in Paragraph FIRST hereof, by depositing an amount in cash equal to (1) the Estimated Cost less (2) the Company Contribution. Items (1) and (2) are to be determined as follows:

(1) The Estimated Cost shall be the estimated cost of the extension, including the estimated cost of said main(s) and the estimated cost of any other facilities which the COMPANY shall have determined are required to render adequate service.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section N – EXTENSION DEPOSIT AGREEMENT FOR BONA FIDE SERVICE APPLICANT (cont'd)

(2) The Company Contribution shall be a credit as determined by the following formula:

Average Annual Revenue	\$ _____
Minus	
Operation and Maintenance Expenses	\$ _____
Subtotal	\$ _____
Divided by	
Depreciation Rate and Weighted Cost of Debt	_____ %
Total	\$ _____

multiplied by the number of bona fide service applicants who will be directly served by the extension.

The BONA FIDE SERVICE APPLICANT agrees to pay at least one-third of the deposit prior to the commencement of construction of the extension, and the remainder of the deposit plus applicable interest charges in thirty-six (36) equal monthly installments beginning with BONA FIDE SERVICE APPLICANT'S first bill for sewer service. Interest will be charged on the unpaid portion each month, equal to the monthly portion of the embedded cost of long-term debt recognized in the Company's last approved general rate increase.

Upon such written notice, a Preliminary Memorandum in the form attached shall be prepared and signed by both parties showing the deposit required in accordance with foregoing provisions. Upon completion of the installation of the extension, a Final Memorandum in the form attached shall be prepared and signed by both parties showing the deposit required based on the same calculations as set forth above but by using the actual cost of the extension, including the actual installation costs of the mains and other facilities, for the Estimated Cost and calculating the Applicable Credit. If the deposit shown to be due on the Final Memorandum differs from that shown on the Preliminary Memorandum, the APPLICANT will deposit any additional amount shown to be due or the COMPANY will refund to the APPLICANT any excess amount shown to have been deposited. Any additional amount of required deposit must be made by the APPLICANT to the COMPANY before the granting of refunds to the APPLICANT.

FOURTH: The COMPANY hereby agrees to refund to the BONA FIDE SERVICE APPLICANT during the period of ten (10) years from actual date of deposit as shown on the Preliminary Memorandum a Per-Customer Refund Amount for each additional BONA FIDE SERVICE APPLICANT for whom a street service connection shall be directly attached to such main extension, as distinguished from extensions or branches thereof; provided however, that the total amount refunded shall not exceed the amount of the original deposit by the BONA FIDE SERVICE APPLICANT to the COMPANY as of the date of the refund, and further provided that, if there is an unpaid balance owed then the Per-Customer Refund Amount shall first be deducted from the unpaid balance. All or any part of the deposit not refunded within said 10-year period shall become the property of the COMPANY. The Customer Refund Amount shall be the Company contribution divided by the number of customers connected to the initial main extension.

FIFTH: The BONA FIDE SERVICE APPLICANT may request refunds under Paragraph FOURTH, once in each Calendar quarter, furnishing the COMPANY, at such time, a listing of additional bona fide service applicants; however, failure on the part of the BONA FIDE SERVICE APPLICANT to make such request shall not constitute a waiver of any rights hereunder or relieve the COMPANY of the obligation to make refunds with reasonable promptness.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section N – EXTENSION DEPOSIT AGREEMENT FOR BONA FIDE SERVICE APPLICANT (cont'd)

SIXTH: The ownership of the sewer main(s) and other facilities installed hereunder shall at all times be with the COMPANY, its successors and assigns.

SEVENTH: This agreement shall be valid and binding on the COMPANY only when executed by its duly authorized representative.

EIGHTH: This agreement shall be binding upon the heirs, executors, administrators, successors and assigns of the respective parties.

NINTH: Any notice given hereunder shall be deemed sufficient if in writing and sent by registered mail to the COMPANY at

(Address of COMPANY)

and to the BONA FIDE SERVICE APPLICANT at

(Address of BONA FIDE SERVICE APPLICANT)

Issued:

Effective:

TENTH: This agreement is entered into pursuant to the legally established Rules and Regulations of the COMPANY, and the words, phrases, and terms hereof are to be understood and interpreted in conformity with said Rules and Regulations, which are hereby incorporated herein by reference.

Executed in triplicate by the parties hereto on the date first above written.

WITNESS:

WITNESS:

PENNSYLVANIA-AMERICAN WATER COMPANY

BY: _____

Title: _____

BONA FIDE SERVICE APPLICANT:

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section N – EXTENSION DEPOSIT AGREEMENT FOR BONA FIDE SERVICE APPLICANT (cont'd)

PRELIMINARY MEMORANDUM

This Preliminary Memorandum is executed by the parties hereto under and pursuant to the provisions of Paragraph THIRD of a certain agreement in writing between the parties entered into on the ___ day of _____, 20___, for the installation by the COMPANY of certain sewer main(s) and other facilities therein described. It is, therefore, agreed and stipulated:

- (a) Estimated Cost Main(s) \$ _____
- (b) Estimated Cost of Other Facilities \$ _____
- (c) Total \$ _____
- (d) Company Contribution \$ _____
- (e) Amount of Deposit \$ _____ (c) minus (d)

This Preliminary Memorandum shall be attached to the original agreement in accordance with the provisions of Paragraph THIRD thereof.

Dated: _____
Date

PENNSYLVANIA-AMERICAN WATER COMPANY

WITNESS:

BY: _____

Title: _____

WITNESS:

BONA FIDE SERVICE APPLICANT:

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section N- EXTENSION DEPOSIT AGREEMENT FOR BONA FIDE SERVICE APPLICANT (cont'd)

FINAL MEMORANDUM

This Final Memorandum is executed by the parties hereto under and pursuant to the provisions of Paragraph THIRD of a certain agreement in writing between the parties entered into on the ____ day of _____, 20____, for the installation by the COMPANY of certain sewer main(s) and other facilities therein described. It is, therefore, agreed and stipulated:

- (a) Actual Cost of Main(s) \$ _____
- (b) Actual Cost of Other Facilities \$ _____
- (c) Total _____
- (d) Company Contribution \$ _____
- (e) Amount of Deposit \$ _____ (c) minus (d)

This Final Memorandum shall be attached to the original agreement in accordance with the provisions of Paragraph THIRD thereof.

Dated: _____
 Date

PENNSYLVANIA-AMERICAN WATER COMPANY

WITNESS:

BY: _____

Title: _____

WITNESS:

BONA FIDE SERVICE APPLICANT:

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section O- SPECIAL UTILITY SERVICE

THIS AGREEMENT entered into this ____ day of _____, 20____, by and between Pennsylvania-American Water Company hereinafter called the "COMPANY," and _____ hereinafter called the "APPLICANT."

WHEREAS, the APPLICANT desires Special Utility Service, as defined in Section M(4) of the Company's tariff and as hereinafter described;

NOW, THEREFORE, this agreement WITNESSETH:

FIRST: THE COMPANY contracts and agrees to construct the facilities needed to furnish Special Utility Service shown in red on the diagram hereto attached and made a part hereof and described and located as follow:

(LEAVE SPACE FOR DESCRIPTION)

SECOND: It is expressly understood and agreed that if the COMPANY shall be delayed or prevented from installing facilities hereinabove described because of its failure to secure construction materials, or for any other causes beyond its control, such failure or delay in performance shall be excused; provided, however, if such failure or delay in performance shall extend for a period of more than one (1) year from the date thereof, the APPLICANT shall have the right to cancel and terminate this agreement on thirty (30) days' written notice to the COMPANY, and thereafter both parties shall be relieved of all duties and obligations arising hereunder. But this right to cancel and terminate by the APPLICANT shall not be invoked if the COMPANY has received the construction material and the APPLICANT has made the deposit as hereinafter required, in which event the COMPANY shall have the obligation to prosecute the work diligently to its Complete on.

THIRD: The APPLICANT hereby agrees to pay to the COMPANY, upon notice from the COMPANY that it is prepared and able to go forward with the work provided in Paragraph First hereof, an amount in cash equal to the Estimated Cost. The Estimated Cost shall be the estimated cost including material, labor and overheads of the facilities hereinabove described for providing Special Utility Service.

Upon such written notice, a Preliminary Memorandum in the form attached shall be prepared and signed by both parties showing the payment required in accordance with foregoing provisions. Upon completion of the Memorandum in the form attached shall be prepared and signed by both parties showing the payment required based on the same calculation as set forth above but by using the actual installation cost of the facilities, for the Estimated Cost. If the payment shown to be due on the Final Memorandum differs from that shown on the Preliminary Memorandum, the APPLICANT shall pay any additional amount shown to be due or the COMPANY will refund to the APPLICANT, without interest, any excess amount shown to have been paid, it being the intent of this agreement that the payment required shall be based on actual installation cost. If the actual installation cost exceeds the payment required as shown on the Preliminary Memorandum, the additional amount of required payment must be made by the APPLICANT to the COMPANY before installation of the facilities, a Final service to the APPLICANT commences.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section O- SPECIAL UTILITY SERVICE (cont'd)

FOURTH: The ownership of the facilities installed hereunder shall at all times be with the COMPANY, its successors and assigns.

FIFTH: This agreement shall be valid and binding on the COMPANY only when executed by its duly authorized representative.

SIXTH: This agreement shall be binding upon the heirs, executors, administrators, successors and assigns of the respective parties.

SEVENTH: Any notice given hereunder shall be deemed sufficient if in writing and sent by registered mail to the COMPANY at

(Address of Company)
and to the Applicant at _____
(Address of APPLICANT)

EIGHTH: This agreement is entered into pursuant to the legally established Rules and Regulations of the COMPANY, and the words, phrases, and terms thereof are to be understood and interpreted in conformity with said Rules and Regulations, which are hereby incorporated herein by reference.

Executed in triplicate by the parties hereto on the date first above written.

WITNESS:

WITNESS:

PENNSYLVANIA-AMERICAN WATER COMPANY

BY: _____

Title: _____

APPLICANT:

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section O- SPECIAL UTILITY SERVICE (cont'd)

PRELIMINARY MEMORANDUM

This Preliminary Memorandum is executed by the parties hereto under and pursuant to the provisions of Paragraph THIRD of a certain agreement in writing between the parties entered into on the ____ day of _____, 20____, for the installation by the COMPANY of certain facilities therein described. It is, therefore, agreed and stipulated:

(a) Estimated Cost of Facilities \$ _____
for Special Utility Service
(exclusive of the cost of the
main and appurtenances, street
service connection and meter)

This Preliminary Memorandum shall be attached to the original agreement in accordance with the provisions of Paragraph THIRD thereof.

Dated: _____
Date of Payment

PENNSYLVANIA-AMERICAN WATER COMPANY

WITNESS:

BY: _____

Title: _____

WITNESS:

APPLICANT:

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section O- SPECIAL UTILITY SERVICE (cont'd)

FINAL MEMORANDUM

This Final Memorandum is executed by the parties hereto under and pursuant to the provisions of Paragraph THIRD of a certain agreement in writing between the parties entered into on the ____ day of _____, 20____, for the installation by the COMPANY of certain facilities therein described. It is, therefore, agreed and stipulated:

- (a) Actual Cost of Facilities \$ _____
for Special Utility Service
exclusive of the cost of the
main and appurtenances, street
service connection and meter)

This Final Memorandum shall be attached to the original agreement in accordance with the provisions of Paragraph THIRD thereof.

Dated: _____
Date of Payment on
Preliminary Memorandum

WITNESS:	PENNSYLVANIA-AMERICAN WATER COMPANY
_____	BY: _____
	Title: _____
WITNESS:	APPLICANT:
_____	_____

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section P - Grinder Pumps for Paint-Elk Wastewater

This section applies to those customers from the former Paint-Elk Joint Sewer Authority (PEJSA) whose service addresses are listed on updated Schedule 1.1 of the acquisition closing documents. Original Schedule 1.1 from the Purchase Agreement was included in PAWC's Application filing on 12/6/2013, which was approved by the Public Utility Commission's Order entered on July 24, 2014, at Docket Number A-2013-2395998.

1. Those customers within the Former PEJSA whose addresses do not appear on Schedule 1.1 of the Purchase Agreement own their Customer service line in its entirety, including the grinder pump on their Customer service line should one exist.
2. For those customers within the Former PEJSA whose addresses appear on Schedule 1.1 of the Purchase Agreement, PAWC shall own and maintain the grinder pump units for a period of three years from the date of Closing.
3. PAWC shall be responsible to repair/replace any malfunctioning grinder pumps during this three year period. The decision to repair/replace shall be made in PAWC's sole discretion. Any customer may indicate to PAWC that it does not wish to have this service and such services shall cease upon notification from the customer and the ownership of the grinder pump unit shall revert to the customer.
4. The customer must agree to allow PAWC the necessary access to maintain the grinder pump unit or PAWC's obligation as to that particular customer shall cease without any further obligation from PAWC.
5. Three years from the date of Closing, PAWC's obligation to operate and maintain the grinder pump units shall cease. At that time, PAWC will provide written notification to the addresses listed on Schedule 1.1 that ownership of the grinder pump units has transferred to the customer and all responsibilities related to the grinder pump unit reside with the customer.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section Q – Liability of Company (General)

1. The liability of the Company for any loss or damages due to any negligent act of omission or commission, by the Company, shall be limited to and in no event exceed an amount equivalent to 1/4 the average charge of 4 billing periods to the Customer for the period of service during which such deficiency has occurred. Such average shall be determined by reference to the billed charges to the Customer for the four billing periods immediately prior to the billing period during which the loss or damage occurred.

(C)
2. In any legal action where a court does not recognize, or is being asked to interfere with or hamper, the jurisdiction of the Commission to authorize limitations of liability or to exclusively determine whether the service and facilities of the Company are in conformity with the regulation and Order of the Commission, the Company may certify to the Commission the question of the appropriateness of such court action by filing a petition for declaratory judgment with the Commission.
3. Notwithstanding any provision in this tariff to the contrary, the Company shall not be liable in any action where the loss or damage involves an act of God or does not involve a duty of the Company, including breaks or leaks on facilities that are not owned by the Company, such as breaks, leaks, defects or condition in the Customer's own service line, meter vault, pressure reducing valve, back flow prevention device, check valve, pressure relief valve, or any other control valve, internal plumbing or fixture, or due to the materials out of which those facilities are made. Further, the Company shall not be liable in any action where the loss or damage does not involve a breach of a duty of the Company, including where the Company does not receive actual notice, either written or oral, that a Company facility (located within the public right-of-way, in a sidewalk or on a Customer's property) is in need of repair, such as the condition or elevation of a curb box or valve box that is not proven to have been in that condition at the time of installation or that is caused by a plumber, developer, or other person or event.

(C) means Change

RULES AND REGULATIONS

Section R- Wastewater Control Regulations

1. **Applicability:** These provisions shall apply throughout the Company's service territory. For those systems where an Industrial Pretreatment Program (IPP) is required by the United States Environmental Protection Agency (EPA), Pennsylvania Department of Environmental Protection (DEP) or by the Company, all applicable customers shall comply with such IPP regulations. For a Commercial or Industrial Customer that is also subject to the provisions of an IPP of this tariff, to the extent a conflict exists between the provisions of this Section and the provisions of the applicable IPP, the terms of the IPP shall control. .
2. **General Prohibitions:**
 - (a) No storm water from pavements, area ways, runoff basins, roof runoff water, foundation drains, subsurface drains, water from springs, cooling water, basement sump pumps, unpolluted industrial or commercial process water or other sources shall be admitted to the Company Sanitary Sewer.
 - (b) The discharge of garbage to the Sanitary or Combined Sewer is expressly prohibited. Properly shredded biodegradable garbage may be discharged into the Sanitary or Combined Sewer with no particle greater than one-half inch in dimension.
3. **Prohibited Discharges:** The Company reserves the right to refuse connection to its Sanitary or Combined Sewer and/or to compel the discontinuance of the use of any system, or to require pre-treatment of Wastes by any Customer, in order to prevent the discharge of any Wastes to the Sanitary or Combined Sewer system which may be deemed harmful to the Sanitary or Combined Sewer system, or to have an adverse effect on the sewage treatment processes. Except from the written consent of the Company, there shall be excluded from the sewage system but not limited to, any wastes having suspended solids and Wastes having any or all of the following characteristics:
 - (a) Wastes containing any gasoline, naphtha, fuel, oil or other liquids, solids or gases which by reason of their nature or quality may cause fire or explosion or be in any other way injurious to persons, the structures of the wastewater system or its operation.
 - (b) Wastes having a temperature in excess of 120 degrees F. or less than 32 degrees F that enters the Sanitary or Combined Sewer or Wastes entering the plant that increase the temperature of the Wastewater at the headworks of the plant to exceed 104 degrees F.
 - (c) Wastes having a pH lower than 6.0 or higher than 9.0, or having any corrosive property capable of causing damage or hazards to structures, equipment or personnel of the wastewater system.
 - (d) Wastes containing any noxious or malodorous gas or substance that either singly or by interaction with sewage or other wastes is likely in the opinion of the Company to create a public nuisance or hazard to life or prevent entry to sewers for their maintenance and repair.

RULES AND REGULATIONS

Section R- Wastewater Control Regulations (cont'd)

- (e) Wastes containing ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, hair, chemical or paint residues, greases, paunch, manure, dairy products, cotton, wool, plastic or other fibers, lime, slurry or any other solid or viscous material of such character or in such quantity as in the opinion of the Company may cause an obstruction to the flow in sewers or otherwise interfere with the proper operation of the sewer system.
- (f) Wastes containing insoluble, non-flocculent substances having a specific gravity in excess of 2.65.
- (g) Wastes containing soluble substances in such concentrations as to cause the specific gravity to be greater than 1.1.
- (h) Wastes containing any substances which may affect the effluent and may cause violation of the National Pollutant Discharge Elimination System Permit.
 - (i) Wastes containing other matter detrimental to the operation of a sewage treatment plant or Sanitary or Combined Sewers causing erosion, corrosion or deterioration in sewers, equipment and structures of a sanitary or sewage treatment plant.
 - (j) Wastes containing fats, wax, tar, grease or oil of petroleum origin, whether emulsified or not, in excess of one hundred mg/L, or petroleum oil, non biodegradable cutting oil or petroleum products of mineral oil origin in amounts that will cause interference or pass through at the wastewater treatment facilities.
 - (k) Wastes containing an average concentration of oils and greases, of the Hydrocarbon variety or any Freon extractables which are not biodegradable in excess of 10 mg/L.
 - (l) Wastes containing more than 10 mg/L of any of the following gases: hydrogen sulfide; sulfur dioxide; nitrous oxide; or any of the halogens.
 - (m) Wastes containing a toxic or poisonous substance, in a sufficient quantity to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals or create any hazard in the sewer system operation or exceed the limitation set forth in a National Categorical Pretreatment Standard. Toxic pollutants or substances shall include but not limited to Wastewater containing cyanide, chromium, cadmium, mercury, copper, nickel, or materials listed as hazardous materials.
 - (n) Any waste containing toxic substances in quantities sufficient to interfere with the biochemical/biological processes of the sewage treatment works or that will pass through the sewage treatment works and exceed the state and/or federal requirements in respect thereof.
 - (o) Any waste containing radioactive isotopes or other radioactive materials.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section R- Wastewater Control Regulations (cont'd)

- (p) Sludges resulting from the treatment of concentrated solutions that are not acceptable for discharge to the Sanitary or Combined Sewer.
- q) Waste introduced into the Sanitary or Combined Sewer with any pollutants which cause pass through or interference; whether or not the customer is subject any other national, state, or local pretreatment standards or requirements.
- r) Waste containing any color which may not be removed in the wastewater treatment process.

Effluent limitations promulgated as categorical standards, 40 C.F.R. Chapter 1, Subchapter N and 40 C.F.R. 403.6 shall apply in any instance where they are more stringent than those in this section.

The local limits in this section may be supplemented with more stringent limitations if the Company determines that the limitations in subsection (a) through (p) above may not be sufficient to protect the operation of the sewerage system or to enable the water pollution control plant to comply with water quality standards or effluent limitations specified in the Company's NPDES permit.

- 4. **Disposal of Wastes From Septic Tanks and Cesspools:** No person shall dispose of wastes from septic tanks, cesspools, or other such sources of sanitary sewage to the Company's Sanitary or Combined Sewer, except as designated by the Company.
- 5. **Penalties:** The Company reserves the right to terminate water and/or wastewater service for violation of any provision of these regulations, subject to PUC rules and regulations.
- 6. **Damages:** In the event of any damage to the Company's wastewater system caused by a Customer, or a Customer's representative, such damage shall be immediately reported to the Company and said Customer shall reimburse the Company for the costs of such repairs, testing, consulting and all other costs associated with the damage. Any user violating any of the provisions of these Rules and Regulations shall become liable to the Company for all expenses, losses, or damages occasioned by the Company by reason of such violation, whether incidental or consequential.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section S – Stormwater Connections to Sanitary or Combined Sewer System:

(a) No person shall install any new connection to discharge stormwater or groundwater drainage to a Sanitary or Combined Sewer, or undertake any modification that increases the flow of stormwater or groundwater being discharged via an existing connection to the Sanitary or Combined Sewer, without applying for and obtaining a Connection Permit from the Company. Consideration and issuance of any Connection Permit is subject to the following:

(1) No new or increased discharge of stormwater or groundwater to the Sanitary or Combined Sewer will be permitted if separate stormwater system facilities or receiving streams exist in reasonable proximity to the proposed connection to the Sanitary or Combined Sewer. The person seeking a Connection Permit must demonstrate to the satisfaction of the Company that the discharge stormwater or groundwater flows to anywhere but to the Sanitary or Combined Sewer is not (i) technically or economically feasible, or (ii) permissible under applicable environmental regulations.

(2) No new or increased discharge of stormwater or groundwater will be allowed unless there is adequate capacity in the Sanitary or Combined Sewer system, and such flows can be managed in compliance with all laws and requirements applicable to the Sanitary or Combined Sewer system. When known or potential hydraulic capacity overloads may exist or may be created as the result of the proposed new or modified connection to the Sanitary or Combined Sewer, the Company reserves the right to require a detailed hydraulic study of the affected portion of the Sanitary or Combined Sewer system. The work and costs associated with such study shall be paid for by the party seeking the Connection Permit.

(3) Any new or modified connection involving the discharge of stormwater or groundwater to the Sanitary or Combined Sewer shall comply with all applicable state regulations and municipal ordinances.

(4) In the case of new or modified connections from a property that is presently contributing stormwater or groundwater drainage to a Sanitary or Combined Sewer, the peak rate of discharge must be controlled. The peak rate of discharge to the Sanitary or Combined Sewer after development or improvement shall be no greater than 75% of the peak rate of discharge to the Sanitary or Combined Sewer prior to development or improvement under storm conditions up to a 100-year rainfall event. Stormwater peak discharge and runoff shall be determined through the use of: (A) the USDA NRCS Soil Cover Complex Method as set forth in Urban Hydrology for Small Watersheds, Technical Release No. 55 (USDA, 1986), with specific attention given to antecedent moisture conditions, flood routing, time of concentration, and peak discharge specifications included therein and in Hydrology National Handbook, Section 4 (USDA, 1985); (B) the USDA NRCS Technical Release No. 20; or (C) other procedures as approved by the Company. Refer to Pennsylvania Stormwater Best Management Practices Manual (363-0300-002) dated December 30, 2006.

(5) Except where specifically approved by the Company, all new sanitary sewer laterals and mains shall be separate from stormwater laterals and mains.

(b) If a connection to the Sanitary or Combined Sewer is permitted as provided in 5(a), (1) any facilities using the connection to the Sanitary or Combined Sewer shall utilize inlet structures equipped with devices to prevent solids and floatable debris from entering the Sanitary or Combined Sewer of a design approved by the Company; and (2) the connection shall be made to an existing or new manhole or other Company approved structure that complies with design standards prescribed by the Company.

(c) No downspout gutter shall be connected to the Sanitary or Combined Sewer.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section T – Industrial Pretreatment Program (Coatesville District) (IPP-C)

This Section applies to Industrial and Commercial customers served under Rate Zone 1 and located in the Coatesville District area of the Company's service territory **and Rate Zone 11 - Valley**. All such customers shall comply with the "Coatesville District Industrial Pretreatment Program Regulations" ("IPP-C") and as may be amended by the Company or the Pennsylvania Department of Environmental Protection from time to time. The currently effective IPP-C will be made available on the Company's website. **(C)**

Such customers shall be responsible for the charges and fees scheduled below related to the implementation, administration, and enforcement of the IPP-C, and for the additional costs for treatment of wastewaters from such customers who have excess loadings and characteristics. Fees under this Section are separate from and in addition to all other rates chargeable by the Company under this tariff.

The fees as set forth in Schedule IPP-C-1 below will be in effect for customers subject to the IPP-C. Terms are as defined by IPP-C.

SCHEDULE IPP-C-1

1.1 General Fees.

1.1.1 Application for Service/Waste Survey - Each new commercial or industrial customer will be assessed a charge for the review of the Waste Survey Form attached to the Company's Application for Service Form.	\$50.00
1.1.2. Industrial Wastewater Discharge Permit Application or Permit Modification Application - Each customer determined to be a Significant Industrial User will be assessed a charge for the review of the Industrial Wastewater Discharge Permit application and for site inspection.	\$1,100.00
1.1.3. Industrial Wastewater Discharge Permit - Each customer required to submit an Industrial Wastewater Discharge Permit Application will be assessed a charge for the preparation of the Industrial Wastewater Discharge Permit that is specific to that customer, which may include, but is not limited to pretreatment, waste minimization and spill control requirements, local limits and other conditions required by the Company's IPP-C.	At Cost
1.1.4. Industrial Wastewater Discharge Permit Application for Renewal or Transfer - Each customer with a discharge permit will be assessed a charge for the review of the application for renewal or transfer of the permit. If changes are required to the permit, they will be done at cost as noted in Item #3 above.	\$250.00

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section T – Industrial Pretreatment Program (Coatesville District) (IPP-C) (cont'd)

1.1 General Fees (cont'd)

- 1.1.5. Facilities for Pretreatment, Accidental Discharge, Slug Control and or Monitoring** - Customers required to provide facilities for wastewater pretreatment and/or accidental/slug discharge or monitoring will be assessed a charge for the Company to review the plans and operating procedures required by the Company's IPP-C. At Cost
- 1.1.6. Monitoring Reports** - Customers will be assessed a charge for the Company to review each of the reports submitted as required by the Company's IPP-C. \$250.00
- 1.1.7. Facility Inspections** - Customers that require inspections by the Company for permitting, monitoring and compliance/noncompliance purposes will be assessed a charge for these services per each inspection. \$250.00
- 1.1.8. Sampling and Analysis** - Customers whose discharge requires the Company to perform or to arrange for compliance monitoring will be assessed a charge for each sampling event and laboratory analysis. This charge may include sampler rental and set-up, sample pick-up or delivery and lab report charges. At Cost
- 1.1.9. Noncompliance Repair or Maintenance** - Customers causing any violations that result in needed repairs or maintenance to the Company's Sewer System will be assessed a charge to reimburse the Company for its expenses. This charge may include but is not limited to, charges from haulers, cleaning crews, contractors, plumbers, excavations and vacuum sewer services. At Cost

1.2 Specific Fees.

1.21 In the event that the Company consents to accept into the Sanitary Sewer system Industrial/Commercial Wastes containing more than 300 milligrams per liter by weight (mg/L) of suspended solids and/or 300 mg/L of 5 day biochemical oxygen demand, otherwise prohibited under this Section, there is hereby imposed for such service in addition to the sanitary sewage quantity, a surcharge for the Suspended Solids and 5-day Biochemical Oxygen Demand (BOD5) contained in said wastes in excess of 300 mg/L, in accordance with the following schedule:

(i) \$0.10 per pound of BOD5 in excess of 300 mg/L. Calculated as: $BOD5 \text{ in mg/L} - 300 \text{ mg/l} \times \text{Wastewater volume in million gallons} \times 8.34 \times \$0.10/\text{pound}$.

(ii) \$0.06 per pound of Total Suspended Solids (TSS) in excess of 300 mg/L. Calculated as: $TSS \text{ in mg/L} - 300 \text{ mg/l} \times \text{Wastewater volume in million gallons} \times 8.34 \times \$0.06/\text{pound}$.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section T – Industrial Pretreatment Program (Coatesville District) (IPP-C) (cont'd)

1.2 Specific Fees (cont'd)

1.2.2 In the event the Company elects to accept Industrial/Commercial Wastes having a pH below 6.0 S.U. the total acid equivalent of such wastes, expressed as 100% sulfuric acid shall be considered as one pound of Suspended Solids. For purposes of calculating Surcharges, the total sum computed by adding the acid equivalent so determined to the actual Suspended Solids content shall be considered to be the Suspended Solids content of the acidic wastes. The charges for treatment of such acidic wastes shall be subject to the same Surcharges as above set forth for wastes containing excessive solids.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section U– Industrial Pretreatment Program: Scranton Area, All Service Areas under Rate Zones 1 (Except Coatesville), 2, 3, 7, 8 and 10 - Kane (IPP-S) (C)

This Section applies to Industrial and Commercial customers served throughout the Company's service territory under Rate Zone 1 of this tariff, except for the customers subject to Section T of this tariff pursuant to the provisions thereof, and Rate Zones 2, 3, 7, 8 and 10 - Kane of this tariff. (C)

All such customers shall comply with the "Industrial Pretreatment Program (Scranton-Area)" ("IPP-S") as required by and submitted to the Pennsylvania Department of Environmental Protection and as may be amended from time to time. The currently effective IPP-S will be made available on the Company's website.

Such customers shall be responsible for the charges and fees scheduled below related to the implementation, administration, and enforcement of the IPP-S, and for the additional costs for treatment of wastewaters from such customers who have loadings and characteristics that are in excess of Domestic Sewage as defined by the IPP-S. Pursuant to the IPP-S, IPP-S fees are set by this tariff. IPP-S fees are separate from and in addition to all other rates chargeable by the Company under this tariff.

The fees as set forth in Schedule IPP-S-1 below will be in effect for customers subject to the IPP-S. Terms are as defined by IPP-S.

SCHEDULE IPP-S-1

1.1. General Fees

1.1.1. IWDP Application Fee: \$1,000.00

1.1.2. IWDP Transfer/Modification/Renewal Fee: \$250.00

1.1.3. Facility Inspection Fee: \$250.00 per inspection

1.1.4. Monitoring Report Review Fee: \$250.00 per monitoring report

1.1.5. Sampling and Analysis Fee: Actual cost of sampling and laboratory analysis plus 25% to cover administrative costs.

1.1.6. Accidental Discharge, Slug Control, and/or Monitoring Fee: Actual cost of response to accidental discharges or discharges of slugs loads, including but not limited to the costs incurred for any additional treatment or other actions required to manage such discharges, monitoring and response to such discharges, correction of any resulting contamination or other impacts to the Treatment Works, including the Collection System and Treatment Plant.

1.1.7. Compliance and Enforcement Fee - Administrative and Legal: Actual cost incurred by the Company for investigation and actions to address a User's non-compliance with the terms of this IPP or any IWDP.

1.1.8. Damage Repair: Actual cost for cleaning, repair, replacement and/or correction of any damage to the Treatment Works, including the Collection System and the Treatment Plant, caused or contributed to by a User's discharge.

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section U – Industrial Pretreatment Program: Scranton Area, All Service Areas under Rate Zones 1 (Except Coatesville), 2, 3, 7, 8 and 10 - Kane (IPP-S) (cont'd) (C)

1.1. Specific Fees

1.1.1. **Industrial Loading Fee** - applicable on a quarterly basis to discharges with loadings above typical Domestic Sewage loadings up to but not exceeding any applicable Local Limit or IWDP limit, based on sampling and analysis by the Company and sampling required to be reported by the User under an IWDP:

Quarterly Fee (\$) = $Q \times \{((\text{BOD5 Actual} - \text{BOD5 Domestic}) \times \text{BOD5 Cost Factor}) + ((\text{NH3-N Actual} - \text{NH3-N Domestic}) \times \text{NH3-N Cost Factor}) + ((\text{TSS Actual} - \text{TSS Domestic}) \times \text{TSS Cost Factor})\}$

Where:

BOD5 Actual = actual concentration of BOD5 in mg/l as measured by the Company or the Industrial User

BOD5 Cost Factor = Treatment cost for BOD5 for the system = 0.0045

BOD5 Domestic = 330 mg/l, the typical concentration in Domestic Sewage

NH3-N Actual = actual concentration of NH3-N in mg/l as measured by the Company or the Industrial User

NH3-N Cost Factor = Treatment cost for NH3-N for the system = 0.0063

NH3-N Domestic = 23 mg/l, the typical concentration in Domestic Sewage

Q = Total flow for the quarter measured in thousand gallons

TSS Actual = actual concentration of TSS in mg/l as measured by the Company or the Industrial User

TSS Cost Factor = treatment cost for TSS for the system = 0.0028

TSS Domestic = 350 mg/l, the typical concentration in Domestic Sewage

1.1.2. **Excess Loading Fee** - applicable to discharges with loadings that exceed a Local Limit or IWDP limit:

If in any monthly period, the loading of BOD5, NH3-N, or TSS exceeds a Local Limit or IWDP limit, then for the applicable parameter, in calculating the Industrial Loading Fee under §1.2.1, the BOD5 Cost Factor, NH3-N Cost Factor and/or TSS Cost Factor, applicable to the total loading of that parameter will be 125% of the value set forth in §1.2.1 to compensate for the additional administrative, oversight and management costs associated with managing such excessive loadings.

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

**Section U – Industrial Pretreatment Program: Scranton Area, All Service Areas under Rate Zones 1
(Except Coatesville), 2, 3, 7, 8 and 10 - Kane (IPP-S) (cont'd) (C)**

1.2 Specific Fees (cont'd)

1.1.1. **Special Discharge Fee** - applicable to discharges with loadings or concentrations that exceed a Local Limit or IWDP limit and that impact sludge handling or disposal methods and costs, necessitate acquisition of nutrient credits, result in damages to the facility, or require extraordinary measures:

Fee = Actual cost incurred by the Company, including but not limited to: (1) additional costs of managing impacted sludge (including costs related to use of alternative disposal facilities, additional monitoring, etc.), (2) costs of acquiring nutrient credits to meet NPDES Permit cap limits; (3) costs of repairs to and restoration of the Treatment Works, including the Collection System and Treatment Plant; or (4) costs of implementing any other measures required to control, manage and address such excessive loadings or concentrations.

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section V – Industrial Pretreatment Program (McKeesport-Area) Compliance

(C)

This Section applies to Industrial and Commercial customers served under Rate Zone 6 of this tariff. All such customers shall comply with the “Industrial Pretreatment Program (McKeesport-Area)” (“IPP-M”) as required by and submitted to the Pennsylvania Department of Environmental Protection and as may be amended from time to time. The currently effective IPP-M will be made available on the Company’s website.

Such customers shall be responsible for the charges and fees scheduled below related to the implementation, administration, and enforcement of the IPP-M, and for the additional costs for treatment of wastewaters from such customers who have loadings and characteristics that are in excess of Domestic Sewage as defined by the IPP-M. Pursuant to the IPP-M, IPP-M fees are set by this tariff. IPP-M fees are separate from and in addition to all other rates chargeable by the Company under this tariff.

The fees as set forth in Schedule IPP-M-1 below will be in effect for customers subject to the IPP-M Terms are as defined by IPP-M.

SCHEDULE IPP-M-1

1.1 General Fees

- 1.1.1. IWDP Application Fee: \$1,000.00
- 1.1.2. IWDP Transfer/Modification/Renewal Fee: \$250.00
- 1.1.3. Facility Inspection Fee: \$250.00 per inspection
- 1.1.4. Monitoring Report Review Fee: \$250.00 per monitoring report
- 1.1.5. Sampling and Analysis Fee: Actual cost of sampling and laboratory analysis plus 25% to cover administrative costs.
- 1.1.6. Accidental Discharge, Slug Control, and/or Monitoring Fee: Actual cost of response to accidental discharges or discharges of slugs loads, including but not limited to the costs incurred for any additional treatment or other actions required to manage such discharges, monitoring and response to such discharges, correction of any resulting contamination or other impacts to the Treatment Works, including the Collection System and Treatment Plant.

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section V – Industrial Pretreatment Program (McKeesport-Area) Compliance (cont'd) (C)

- 1.1.7. Compliance and Enforcement Fee - Administrative and Legal: Actual cost incurred by the Company for investigation and actions to address a User's non-compliance with the terms of this IPP or any IWDP.
- 1.1.8. Damage Repair: Actual cost for cleaning, repair, replacement and/or correction of any damage to the Treatment Works, including the Collection System and the Treatment Plant, caused or contributed to by a User's discharge.

1.2 Specific Fees

- 1.2.1 Industrial Loading Fee - applicable on a quarterly basis to discharges with loadings above typical Domestic Sewage loadings up to but not exceeding any applicable Local Limit or IWDP limit, based on sampling and analysis by the Company and sampling required to be reported by the User under an IWDP:

Quarterly Fee (\$) = $Q \times \{((\text{BOD5 Actual} - \text{BOD5 Domestic}) \times \text{BOD5 Cost Factor}) + ((\text{NH3-N Actual} - \text{NH3-N Domestic}) \times \text{NH3-N Cost Factor}) + ((\text{TSS Actual} - \text{TSS Domestic}) \times \text{TSS Cost Factor})\}$

Where:

BOD5 Actual = actual concentration of BOD5 in mg/l as measured by the Company or the Industrial User

BOD5 Cost Factor = Treatment cost for BOD5 for the system = 0.0045

BOD5 Domestic = 330 mg/l, the typical concentration in Domestic Sewage

NH3-N Actual = actual concentration of NH3-N in mg/l as measured by the Company or the Industrial User

NH3-N Cost Factor = Treatment cost for NH3-N for the system = 0.0063

NH3-N Domestic = 23 mg/l, the typical concentration in Domestic Sewage

Q = Total flow for the quarter measured in thousand gallons

TSS Actual = actual concentration of TSS in mg/l as measured by the Company or the Industrial User

TSS Cost Factor = treatment cost for TSS for the system = 0.0028

TSS Domestic = 350 mg/l, the typical concentration in Domestic Sewage

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section V – Industrial Pretreatment Program (McKeesport-Area) Compliance (cont'd)

(C)

- 1.2.2. Excess Loading Fee - applicable to discharges with loadings that exceed a Local Limit or IWDP limit:

If in any monthly period, the loading of BOD5, NH3-N, or TSS exceeds a Local Limit or IWDP limit, then for the applicable parameter, in calculating the Industrial Loading Fee under §1.2.1, the BOD5 Cost Factor, , NH3-N Cost Factor and/or TSS Cost Factor, applicable to the total loading of that parameter will be 125% of the value set forth in §1.2.1 to compensate for the additional administrative, oversight and management costs associated with managing such excessive loadings.

- 1.2.3. Special Discharge Fee - applicable to discharges with loadings or concentrations that exceed a Local Limit or IWDP limit and that impact sludge handling or disposal methods and costs, necessitate acquisition of nutrient credits, result in damages to the facility, or require extraordinary measures:

Fee = Actual cost incurred by the Company, including but not limited to: (1) additional costs of managing impacted sludge (including costs related to use of alternative disposal facilities, additional monitoring, etc.), (2) costs of acquiring nutrient credits to meet NPDES Permit cap limits; (3) costs of repairs to and restoration of the Treatment Works, including the Collection System and Treatment Plant; or (4) costs of implementing any other measures required to control, manage and address such excessive loadings or concentrations.

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section W – Industrial Pretreatment Program (Exeter-Area) Compliance

(C)

This Section applies to Industrial and Commercial customers served under Rate Zone 9 of this tariff. All such customers shall comply with the “Industrial Pretreatment Program (Exeter)” (“IPP-E”) as required by and submitted to the Pennsylvania Department of Environmental Protection and as may be amended from time to time. The currently effective IPP-E will be made available on the Company’s website.

Such customers shall be responsible for the charges and fees scheduled below related to the implementation, administration, and enforcement of the IPP-E, and for the additional costs for treatment of wastewaters from such customers who have loadings and characteristics that are in excess of Domestic Sewage as defined by the IPP-M. Pursuant to the IPP-E, IPP-E fees are set by this tariff. IPP-M fees are separate from and in addition to all other rates chargeable by the Company under this tariff.

The fees as set forth in Schedule IPP-E-1 below will be in effect for customers subject to the IPP-E Terms as defined by IPP-E.

SCHEDULE IPP-E-1

1.1 General Fees

- 1.1.9. IWDP Application Fee: \$1,000.00
- 1.1.10. IWDP Transfer/Modification/Renewal Fee: \$250.00
- 1.1.11. Facility Inspection Fee: \$250.00 per inspection
- 1.1.12. Monitoring Report Review Fee: \$250.00 per monitoring report
- 1.1.13. Sampling and Analysis Fee: Actual cost of sampling and laboratory analysis plus 25% to cover administrative costs.
- 1.1.14. Accidental Discharge, Slug Control, and/or Monitoring Fee: Actual cost of response to accidental discharges or discharges of slugs loads, including but not limited to the costs incurred for any additional treatment or other actions required to manage such discharges, monitoring and response to such discharges, correction of any resulting contamination or other impacts to the Treatment Works, including the Collection System and Treatment Plant.

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section V – Industrial Pretreatment Program (Exeter-Area) Compliance (cont'd) (C)

- 1.1.15. Compliance and Enforcement Fee - Administrative and Legal: Actual cost incurred by the Company for investigation and actions to address a User’s non-compliance with the terms of this IPP or any IWDP.
- 1.1.16. Damage Repair: Actual cost for cleaning, repair, replacement and/or correction of any damage to the Treatment Works, including the Collection System and the Treatment Plant, caused or contributed to by a User’s discharge.

1.3 Specific Fees

- 1.2.1 Industrial Loading Fee - applicable on a quarterly basis to discharges with loadings above typical Domestic Sewage loadings up to but not exceeding any applicable Local Limit or IWDP limit, based on sampling and analysis by the Company and sampling required to be reported by the User under an IWDP:

Quarterly Fee (\$) = $Q \times \{((BOD5 \text{ Actual} - BOD5 \text{ Domestic}) \times BOD5 \text{ Cost Factor}) + ((TSS \text{ Actual} - TSS \text{ Domestic}) \times TSS \text{ Cost Factor})\}$

Where:

BOD5 Actual = actual concentration of BOD5 in mg/l as measured by the Company or the Industrial User

BOD5 Cost Factor = Treatment cost for BOD5 for the system = 0.0095

BOD5 Domestic = 250 mg/l, the typical concentration in Domestic Sewage

Q = Total flow for the quarter measured in thousand gallons

TSS Actual = actual concentration of TSS in mg/l as measured by the Company or the Industrial User

TSS Cost Factor = treatment cost for TSS for the system = 0.00648

TSS Domestic = 250 mg/l, the typical concentration in Domestic Sewage

(C) means Change

RULES AND REGULATIONS

Section V – Industrial Pretreatment Program (Exeter-Area) Compliance (cont'd)

(C)

- 1.2.2. Excess Loading Fee - applicable to discharges with loadings that exceed a Local Limit or IWDP limit:

If in any monthly period, the loading of BOD5, or TSS exceeds a Local Limit or IWDP limit, then for the applicable parameter, in calculating the Industrial Loading Fee under §1.2.1, the BOD5 Cost Factor and TSS Cost Factor, applicable to the total loading of that parameter will be 125% of the value set forth in §1.2.1 to compensate for the additional administrative, oversight and management costs associated with managing such excessive loadings.

- 1.2.3. Special Discharge Fee - applicable to discharges with loadings or concentrations that exceed a Local Limit or IWDP limit and that impact sludge handling or disposal methods and costs, necessitate acquisition of nutrient credits, result in damages to the facility, or require extraordinary measures:

Fee = Actual cost incurred by the Company, including but not limited to: (1) additional costs of managing impacted sludge (including costs related to use of alternative disposal facilities, additional monitoring, etc.), (2) costs of acquiring nutrient credits to meet NPDES Permit cap limits; (3) costs of repairs to and restoration of the Treatment Works, including the Collection System and Treatment Plant; or (4) costs of implementing any other measures required to control, manage and address such excessive loadings or concentrations.

(C) means Change

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

**Section X – TAXES ON DEPOSITS FOR CONSTRUCTION, CUSTOMER ADVANCES
AND CONTRIBUTIONS IN AID OF CONSTRUCTION**

The Company will pay income taxes on any deposit, advance, contribution or other like amounts received from an applicant which shall constitute taxable income to the Company as defined by the Internal Revenue Service. Such income taxes shall be segregated in a deferred account for inclusion in rate base in a future rate case proceeding. Such income tax associated with a deposit, advance or contribution will not be charged to the specific depositor / contributor of the capital.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section X– Industrial Pretreatment Program (Royersford Area) (IPP-R)

This Section applies to Industrial and Commercial customers served throughout the Company's service territory under Rate Zone 10 of this tariff. All such customers shall comply with the "Industrial Pretreatment Program (Royersford-Area)" ("IPP-R") as required by and submitted to the Pennsylvania Department of Environmental Protection and as may be amended from time to time. The currently effective IPP-R will be made available on the Company's website.

Such customers shall be responsible for the charges and fees scheduled below related to the implementation, administration, and enforcement of the IPP-R, and for the additional costs for treatment of wastewaters from such customers who have loadings and characteristics that are in excess of Domestic Sewage as defined by the IPP-R. Pursuant to the IPP-R, IPP-R fees are set by this tariff. IPP-R fees are separate from and in addition to all other rates chargeable by the Company under this tariff.

The fees as set forth in Schedule IPP-R-1 below will be in effect for customers subject to the IPP-R. Terms are as defined by IPP-R.

SCHEDULE IPP-R-1

1.1. General Fees

1.1.1. IWDP Application Fee: \$1,000.00

1.1.2. IWDP Transfer/Modification/Renewal Fee: \$250.00

1.1.3. Facility Inspection Fee: \$250.00 per inspection

1.1.4. Monitoring Report Review Fee: \$250.00 per monitoring report

1.1.5. Sampling and Analysis Fee: Actual cost of sampling and laboratory analysis plus 25% to cover administrative costs.

1.1.6. Accidental Discharge, Slug Control, and/or Monitoring Fee: Actual cost of response to accidental discharges or discharges of slugs loads, including but not limited to the costs incurred for any additional treatment or other actions required to manage such discharges, monitoring and response to such discharges, correction of any resulting contamination or other impacts to the Treatment Works, including the Collection System and Treatment Plant.

1.1.7. Compliance and Enforcement Fee - Administrative and Legal: Actual cost incurred by the Company for investigation and actions to address a User's non-compliance with the terms of this IPP or any IWDP.

1.1.8. Damage Repair: Actual cost for cleaning, repair, replacement and/or correction of any damage to the Treatment Works, including the Collection System and the Treatment Plant, caused or contributed to by a User's discharge.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section U – Industrial Pretreatment Program (Royersford -Area)

1.2. Specific Fees

1.2.1. **Industrial Loading Fee** - applicable on a quarterly basis to discharges with loadings above typical Domestic Sewage loadings up to but not exceeding any applicable Local Limit or IWDP limit, based on sampling and analysis by the Company and sampling required to be reported by the User under an IWDP:

$$\text{Quarterly Fee (\$)} = 0.00834 \times Q \times \{((\text{BOD5 Actual} - \text{BOD5 Domestic}) \times \text{BOD5 Cost Factor}) + ((\text{TSS Actual} - \text{TSS Domestic}) \times \text{TSS Cost Factor}) + ((\text{DS Actual} - \text{DS Domestic}) \times \text{DS Cost Factor})\}$$

Where:

BOD5 Actual = actual concentration of BOD5 in mg/l as measured by the Company or the Industrial User

BOD5 Cost Factor = Treatment cost for BOD5 for the system = \$71.60

BOD5 Domestic = 300 mg/l, the typical concentration in Domestic Sewage

TSS Actual = actual concentration of TSS in mg/l as measured by the Company or the Industrial User

TSS Cost Factor = treatment cost for TSS for the system = \$106.41

TSS Domestic = 250 mg/l, the typical concentration in Domestic Sewage

DS Actual = actual concentration of Dissolved Solids in mg/l as measured by the Company or the Industrial User

DS Cost Factor = Treatment cost for Dissolved Solids for the system = \$12.07

DS Domestic = 500 mg/l, the typical concentration in Domestic Sewage

Q = Total flow for the quarter measured in million gallons

1.2.2. **Excess Loading Fee** - applicable to discharges with loadings that exceed a Local Limit or IWDP limit:

If in any monthly period, the loading of BOD5, DS, or TSS exceeds a Local Limit or IWDP limit, then for the applicable parameter, in calculating the Industrial Loading Fee under §1.2.1, the BOD5 Cost Factor, DS Cost Factor and/or TSS Cost Factor, applicable to the total loading of that parameter will be 125% of the value set forth in §1.2.1 to compensate for the additional administrative, oversight and management costs associated with managing such excessive loadings.

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section U – Industrial Pretreatment Program (Royersford -Area)

1.2 Specific Fees (cont'd)

- 1.2.3. **Special Discharge Fee** - applicable to discharges with loadings or concentrations that exceed a Local Limit or IWDP limit and that impact sludge handling or disposal methods and costs, necessitate acquisition of nutrient credits, result in damages to the facility, or require extraordinary measures:

Fee = Actual cost incurred by the Company, including but not limited to: (1) additional costs of managing impacted sludge (including costs related to use of alternative disposal facilities, additional monitoring, etc.), (2) costs of acquiring nutrient credits to meet NPDES Permit cap limits; (3) costs of repairs to and restoration of the Treatment Works, including the Collection System and Treatment Plant; or (4) costs of implementing any other measures required to control, manage and address such excessive loadings or concentrations.

Exhibit D - Capacity Allocation and Limitations

Exhibit D – Capacity Allocation and Limitations

<u>Description</u>	<u>Manchester Township</u>	<u>North York Borough</u>	<u>Spring Garden Township</u>	<u>Springetts-bury Township</u>	<u>West Manchester Township</u>	<u>West York Borough/ York Water Company</u>	<u>York Township</u>
<u>Max gallons over 24 hrs</u>	<u>3,092,100</u>	<u>674,600</u>	<u>3,821,400</u>	<u>6,500,000*</u>	<u>4,291,000</u>	<u>1,524,600</u>	<u>4,268,742</u>
<u>Max avg gallons per 24 hrs /7 consecutive days</u>	<u>2,434,900</u>	<u>531,200</u>	<u>3,011,500</u>	<u>4,800,000*</u>	<u>3,378,800</u>	<u>1,200,500</u>	<u>3,363,000</u>
<u>Max flow GPM</u>	<u>4,226</u>	<u>940</u>	<u>5,222</u>	--	<u>5,960</u>	<u>2,084</u>	<u>5,834</u>
<u>Max BOD - over 24 hrs (lbs)</u>	<u>7,479</u>	<u>1,630</u>	<u>9,250</u>	<u>11,609</u>	<u>10,380</u>	<u>2,795</u>	<u>10,328</u>
<u>Max avg BOD per 24hrs/ 7 consecutive days</u>	<u>5,889</u>	<u>1,285</u>	<u>7,284</u>	--	<u>8,170</u>	<u>2,204</u>	<u>8,133</u>
<u>Max TSS - over 24 hrs (lbs)</u>	<u>5,287</u>	<u>1,150</u>	<u>6,539</u>	<u>8,207</u>	<u>7,340</u>	<u>2,476</u>	<u>7,301</u>
<u>Max avg TSS per 24hrs/ 7 consecutive days</u>	<u>4,163</u>	<u>910</u>	<u>5,149</u>	--	<u>5,780</u>	<u>1,954</u>	<u>5,750</u>

“GPM” means “Gallons Per Minute.”

“TSS” means “Total Suspended Solids.”

“BOD” means “Biological Oxygen Demand.”

*Springettsbury Township allocations include 800,000 gallons from the York Township allocations.

Exhibit E - Laterals

PENNSYLVANIA-AMERICAN WATER COMPANY

RULES AND REGULATIONS

Section D - Construction and Maintenance of Facilities

1. **Customer Service Line:** The Customer service line shall be furnished, installed, maintained and/or replaced, when necessary, by and at the sole expense of the Customer. The Company reserves the right to determine the size, type, quality, depth, and connection location of the customer service lines. Prior to connection to the Company service line, the Customer, at their sole cost, shall have the Customer service line air pressure tested and checked for alignment by a Company approved qualified person under the supervision of a Company representative.
2. **Separate Trench:** The customer wastewater service line shall not be laid in the same trench with drain or water pipe, the facilities of any other public utility or of any municipality or municipal authority that provides a public utility service.
3. **Customer's Responsibilities:** All service lines, connections and fixtures furnished by the customer shall be maintained by the Customer in good working order. All valves, meters and appliances furnished by the Company and on property owned or leased by the Customer shall be protected properly by the customer. All leaks in the Customer service line or any pipe or fixtures in or upon the customer's premises must be repaired immediately by the Customer as determined solely by the Company. The failure of a Customer to properly install and maintain a service line, including replacement, shall constitute grounds for the Company to initiate action to terminate service to the customer and seek recovery for any damage to the Company's facilities caused by an improperly functioning service line. For Customers who also receive water service from the Company, where an undetected, non-surfacing, underground leak is found in a Customer's Water Service Pipe, the Company shall credit the Customer with a one-time bill adjustment for wastewater service equal to forty percent (40%) of that portion of one month's consumption that exceeds the average monthly usage, based on the prior twelve month period, upon proper verification that the Water Service Pipe leak has been repaired. The Company shall require documentation to establish, to the Company's satisfaction, the existence of such repaired leak at the Customer's premises. Such bill adjustment will be provided only to the extent the Customer has not received a bill adjustment for an undetected, non-surfacing, underground leak at the same premises in the past five (5) years.
4. **Customer Grinder Pump:** In areas of the collection system where the Company has installed a pressure sewage collection system or where required as determined by the Company, the Customer, in conjunction with the construction of their service line, shall install, own, operate, and maintain and replace a grinder pump and holding tank at the Customer's expense as specified by the Company prior to connection and shall maintain such facilities in good order and repair. The pump shall meet specifications as provided by the Company. The failure of a customer to properly install and maintain a grinder pump, including replacement, shall constitute grounds for the Company to initiate action to terminate service to the customer and seek recovery for any damage to the Company's facilities caused by an improperly functioning grinder pump.
5. **Right to Reject:** The Company may refuse to connect with any customer service line or furnish wastewater collection, treatment and/or disposal through a service already connected if such system or service is not properly installed or maintained.

SECTION 33 31 16

PVC SERVICE LATERALS AND CLEANOUTS

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Whenever directed by the Engineer, the Contractor shall install PVC service laterals from the main line sewer to the property line as detailed on the Contract Drawings including cleanout riser pipe, pipe and fittings, dewatering, excavation, backfill and stone bedding or as may be specifically ordered by the Engineer and at locations ordered by the Engineer.
- B. An approved wye or tee-wye connection fitting shall be installed in the collection main in accordance with the instructions of the pipe manufacturer. The entire connection shall be supported by stone as detailed on the Contract Documents.

1.02 RELATED SECTIONS AND STANDARD DETAILS

- A. SD-26 to SD-31 Standard Lateral Details
- B. SD-33 Cap Protection Casting Detail
- C. SD-35 to SD-36 Standard Cleanout Details

PART 2: PRODUCTS

2.01 MATERIALS

- A. PVC pipe shall be in accordance with ASTM D3034-85b (latest edition) and shall be Class SDR-35 or ASTM F679-86 as applicable. All fittings shall be PVC sewer pipe fittings with a rubber ring in each bell and ring groove so designed as to prevent ring displacement.
- B. A Fernco adapter shall be used for connection to existing piping.
- C. Cast iron cleanout boxes shall be provided where ordered by the Engineer and are primarily to be used where a cleanout may be located in driveways or parking area. Cleanout boxes shall be the top portion of a standard 5 $\frac{1}{4}$ " valve box as manufactured by Mueller Co. or equal.

PART 3: EXECUTION

3.01 WORKMANSHIP

- A. Service connections in any given street shall be laid coincidentally with or shortly after main sewer is installed so that street repairs and cleanup are rapidly completed.

Exhibit F - Insurance certificate - PAWC



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
01/04/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Marsh USA Inc. 1166 Avenue of the Americas New York, NY 10036 Attn: NewYork.Certs@marsh.com Fax: 212-948-0500 GAEW	CONTACT NAME: PHONE (A/C, No. Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A : Travelers Property Casualty Company Of America		25674
INSURER B : AEGIS Insurance Services, Inc.		
INSURER C : Travelers Indemnity Company of Connecticut		25682
INSURER D :		
INSURER E :		
INSURER F :		

COVERAGES	CERTIFICATE NUMBER: NYC-008955503-55	REVISION NUMBER: 6
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THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
C	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:			HC2J-GLSA-2G401576-22	01/01/2022	01/01/2023	EACH OCCURRENCE \$ 2,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 2,000,000 MED EXP (Any one person) \$ 5,000 PERSONAL & ADV INJURY \$ 2,000,000 GENERAL AGGREGATE \$ 10,000,000 PRODUCTS - COMP/OP AGG \$ Included Above
C	<input checked="" type="checkbox"/> AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/> NON-OWNED AUTOS ONLY			HC2J-CAP-2G401564-22	01/01/2022	01/01/2023	COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
B	<input type="checkbox"/> UMBRELLA LIAB <input type="checkbox"/> OCCUR <input checked="" type="checkbox"/> EXCESS LIAB <input checked="" type="checkbox"/> CLAIMS-MADE DED <input checked="" type="checkbox"/> RETENTION \$ 10,000			XL5761204P	01/01/2022	01/01/2023	EACH OCCURRENCE \$ 5,000,000 AGGREGATE \$ 5,000,000
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	Y/N N	N/A	UB-0T494807-22-NC-T	01/01/2022	01/01/2023	<input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$ 1,000,000 E.L. DISEASE - EA EMPLOYEE \$ 1,000,000 E.L. DISEASE - POLICY LIMIT \$ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
EVIDENCE OF COVERAGE ONLY

CERTIFICATE HOLDER Pennsylvania American Water Company 852 Wesley Drive Mechanicsburg, PA 17078	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE <i>Marsh USA Inc.</i>
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Exhibit G - Sample Sewer Usage Charges

Exhibit G– Sample Sewer Usage Charges

Sample for calculation purposes only, actual invoice may appear differently. Yellow highlighted information is input based on data provided by meter reading reports or from bulk customer

Flow Meter

Flow meter rate formula:

$$(\text{Net Flow Meter Usage}/100) \times \text{Current Bulk Rate (rate/100 gal)}$$

Sample Calculation

$$9000.00 \times \$0.375 \dots\dots\dots \$3,375.00$$

Sample Flow Meter Inputs:

- FM01 - 750,000 gallons
- FM02 - 250,000 gallons
- FMD01 – (100,000) gallons – deduction

Sum of Flow Meter Usage – 900,000 gallons

Water Usage Data – (Water usage provided by Bulk Customer):

Water usage rate formula:

$$((\text{Net water usage for billing period}/100) \times \text{Inl Factor (1.3)}) \times \text{Current Bulk Rate (rate/100 gal)}$$

Sample Calculation - Water Usage:

$$(5000.00 \times 1.3) \times \$0.375 \dots\dots\dots \$2,437.50$$

Sample Usage Data Inputs:

Sum of Water Usage of all Water Usage Customers – 500,000 gallons

EDU Usage – (EDUs provided by Bulk Customer)

EDU usage rate formula:

$$((\text{EDU's} \times (350\text{gal}/\text{day}/\text{EDU} / 100) \times \# \text{ days in billing period}) \times \text{Current Bulk Rate (rate/100gal)})$$

Sample Calculation – EDU's

$$((50 \times 3.5) \times 90 \text{ days}) \times \$0.375 \dots\dots \$5,906.25$$

Sample EDU Data Input

- Sum of all EDUs – 50
- Days in billing period – 90 (fluctuates per billing period)

Total Invoice

Flow Meter -	\$3,375.00
Usage Data -	\$2,437.50
EDU Usage -	\$5,906.50
Total Bill -	\$11,718.75

Exhibit H - InI Specifications

SECTION 03 40 00

PRECAST CONCRETE

PART 1: GENERAL

1.01 STANDARD REQUIREMENTS

- A. This Section of the Specifications covers the furnishing and placement of all precast concrete elements indicated on the Contract Drawings. The Contractor is to be responsible for confirming all measurements to ensure that the finished units will fit into the complete construction.
- B. It is the responsibility of the Manufacturer to produce precast concrete units of the quality specified, and from the concrete mix formula designed to suit the particular manufacturing and project requirements.
- C. The use of admixtures to prevent weathering or increase workability is acceptable provided such admixtures do not cause any deleterious effect to the finished surfaces or the concrete strength.

1.02 SUBMITTALS

- A. All shop drawings, samples, tests or other data are to be submitted by the Contractor for the review and approval of the Engineer prior to constructing the units.
- B. The design of the precast units shall be signed and sealed by a Licensed Professional Engineer licensed in the Commonwealth of Pennsylvania. The signed and sealed design will be submitted to the Engineer to review and ensure the units conform with Contract Documents.
- C. Prior to the production of any precast units, the Manufacturer, through the Contractor, is to submit to the Engineer the mix design for the units for review. The Engineer must be notified in advance of any changes to be made in the design mixes during production.

1.03 RELATED SECTIONS AND DETAILS

- A. Section 33 05 61 – Concrete Manholes

PART 2: PRODUCTS

2.01 MATERIALS

- A. Each material used in the precast concrete units is to be from one source and to match consistently throughout. The workmanship, color and texture of the precast

units are to match the approved samples.

B. Precast concrete is to meet the following design criteria:

1. Cement is to be Portland cement Type II or Type I/II and conform to ASTM C150.
2. All cementitious material used in precast concrete elements shall be Portland cement Type II or Type I/II.
3. Fine aggregates are to be natural or manufactured sand, conforming to ASTM C33.
4. Coarse aggregate is to be gravel or crushed stone conforming to ASTM C33.
5. Reinforcement is to be steel welded wire reinforcement conforming to ASTM A497, 70,000 psi yield, or ASTM A615 grade 60, 60,000 psi yield strength.
6. Mixing water is to be clean and free of any acid, alkali, oil or organic material that may interfere with the setting of cement.
7. Air entraining admixtures are to conform to ASTM C260 and produce from 3-5% \pm 1% air content by volume when tested in accordance with ASTM C138.
8. All bearing shims for precast units are to be high impact fire resistant plastic.
9. Except where other materials are indicated or specified; all metal anchors, dowels, clamps, inserts, clip angles, anchor plates, bolts, edge channels, and other fastening devices and accessories are to be hot dipped galvanized, cadmium plated or painted.
10. Wedge inserts are to be Catalog No. 425.6 as manufactured by Heckmann Building Products, or equal. Wedge inserts are to be of the heavy-duty malleable iron type, have wedge-shaped holding faces, and be sized for minimum $\frac{3}{4}$ " diameter askew head bolts. All wedge inserts are to be provided with holes for nailing to forms. Wedge inserts are to be installed in precast concrete elements on maximum 2'-8" centers, unless a lesser spacing is necessary to meet to the manufacturer's published allowable working load requirements.

2.02 COATING AND LINING

- A. Exterior below grade portions of the submersible pump station wet wells and valve chambers shall be provided with two (2) coats of bitumastic, minimum 16 mils total dry film thickness. Bituminous coating shall be Carboline Bitumastic 300M coal tar epoxy or approved equal.
- B. Interior surfaces of wet wells of submersible pump stations shall be lined with two (2) coats of corrosion resistant epoxy polymer, Sauereisen Sewerguard No. 210T, 210RS or 210S or equal. Total dry film thickness shall be 60 to 125 mils.

PART 3: EXECUTION

3.01 GENERAL REQUIREMENTS

- A. The first unit of each type cast is to be subject to the Engineer's inspection at the Manufacturer's plant. Approved units are to serve as models for the remainder of the work and be incorporated in the Structure when no longer needed as models.
- B. All precast products are to have form marks removed using a carborundum stone. The finish surface is to be bagged using burlap to present a smooth textured and uniform appearance.

3.02 CONCRETE

- A. The specified compressive strength of concrete at 28 days is to be 5,000 psi when tested in accordance with ASTM C39.
- B. The water-cement ratio is to be kept to a minimum and the concrete slump is not to exceed 3" when tested according to ASTM C143.
- C. Water absorption is not to exceed 5% when tested in accordance with ASTM C97.
- D. All concrete is to be mixed in a mixer that will distribute the coarse and fine aggregate evenly throughout the mix. Each batch is to be mixed in proportion by weight.
- E. Concrete is to be handled, conveyed, and placed in the forms by methods that will prevent segregation of the aggregates. Concrete is to be placed in the form so as not to distort the reinforcing.
- F. The concrete is to be consolidated in the form by a method of high frequency impact type vibration. Finished products must be free of any honeycombing or voids.

3.03 CONCRETE TESTING

- A. The Contractor is to pay for all work associated with testing of materials and casting and testing of cylinders under this Section. All test specimens are to be taken from the actual mixes used in fabrication of the units and are to be tested in accordance with the latest applicable ASTM Standards in an approved testing laboratory. Reports of all tests are to be submitted to the Engineer for their review and acceptance. The Owner is to select the Testing Laboratory.
- B. A set of five (5) standard test cylinders is to be made for the first precast concrete unit of each type. Thereafter, a set is to be made for each 25 cubic yards of concrete or less placed in one day. Three test cylinders of each set are to be tested at 7 days and the other cylinders at 28 days. Slump tests are to be made for each batch of concrete.
- C. The sampling, storing and testing of concrete cylinders is to be in accordance with ASTM C172, ASTM C138, ASTM C31 and ASTM C39. Test cylinders below the required strength will be cause for rejection of the corresponding precast units.

3.04 FABRICATION

- A. Precast concrete units are to be cast in forms of rigid construction maintaining dimensions within a tolerance as specified in Section 3.05 – Tolerances. The forms are to be accurate in all details with sharp arises and corners throughout to provide perfect surfaces in the finished elements.
- B. Forms are to be braced and reinforced adequately to withstand, without distortion, all stresses occasioned by casting. Form surfaces constructed of absorptive material are to be coated or lined to produce a non-absorptive surface.
- C. Non-circular precast units are to be of the sizes and shapes indicated on the reviewed shop drawings and designed to withstand a wind pressure of 25 pounds per square foot, and a suction of 20 pounds per square foot, but not acting at the same time, including pressures on any elements held by the units. Below grade units shall be designed to withstand a lateral soil load of 90 psf plus surcharge and groundwater at grade. Slabs less than 1'-0" above grade are to be designed for a H-20 live load. Slabs 1'-0" or more above finished grade shall be designed for a minimum live load of 300 psf. All units shall be designed to resist hydrostatic uplift pressures plus 10% assuming groundwater at grade. All calculations shall be signed and sealed by a Professional Engineer currently licensed in the Commonwealth of Pennsylvania. The portions of the precast units that are exposed to view are to match the color and texture of the approved models. All surfaces to remain concealed may be finished in accordance with Manufacturer's standard approved practice. In the completed work, no unfinished edges or surfaces are to be exposed to view. The finished units are to be straight and true with all edges sharp, straight, and square, and all flat surfaces in a true plane.

- D. Below grade circular precast units shall be designed as per ASTM C478. Base slab and top slab design calculations, signed and sealed by a Professional Engineer, licensed in the Commonwealth of Pennsylvania shall be submitted for all precast manholes.
- E. It is to be the responsibility of the Manufacturer to carefully engineer the entire reinforcement assembly. This includes calculations of all stresses and strains due to temperature changes, erection loads, wind pressure, panel weights, handling and lifting.
- F. Reinforcing assemblies in all units are to be prefabricated and welded or tied into single units of proper size and shape. All steel reinforcement is to be kept a minimum of 3/4" from the edges and surfaces of precast units. Reinforcing supports are not to be used on exposed architectural concrete surfaces.
- G. All anchors, clips, inserts, lifting devices, bolts and devices required for handling and installing precast units and for the attachment of subsequent items are to be placed and secured in the forms as indicated or required. Sleeves or special items required in precast units for use by other trades are to be supplied and located by those trades prior to fabrication of the unit.
- H. Each precast concrete unit is to be properly marked on a concealed surface with a designation corresponding to the designation on the shop drawings.
- I. Handling and conveying precast units while curing is to be kept to a minimum and be done by means of equipment that will avoid bending and shock which might produce incipient cracks or other defects.
- J. Precast units are to be form-cured for a minimum of 12-15 hours. Temperatures during the curing period are to be maintained at a minimum of 70°±5°F. Following this period, the units are to be allowed to cure for at least 7 days before shipping.
- K. Failure of the precast concrete Manufacturer to meet any of the above requirements is to be cause for rejection of the product by the Engineer.

3.05 TOLERANCES

- A. The casting, bowing, warping and dimensional tolerances for Architectural precast units are to be maintained in accordance with the following:
 - 1. Overall dimension for height and width of units for above grade elements: plus 0" or minus 3/32" per ten feet of dimension.
 - 2. Thickness of unit for above grade elements: Plus 0" or minus 3/32" total.
 - 3. Overall dimension of length, width, height, or diameter measurements of below grade elements shall be as follows:

<u>Dimension</u>	<u>Tolerance</u>
0' – 5'	± ¼"
5' – 10'	± 3/8"
10' – 20'	± ½"
20' +	As agreed by supplier & purchaser

4. Bowing or warpage: Not to exceed 3/32" in any direction.
5. Insert locations: Plus or minus ¼" in any direction.

B. Non-architectural precast concrete units are to be cast in forms of rigid construction maintaining dimensions within a tolerance of ± ¼". The forms are to be accurate in all details with sharp arises and corners throughout.

3.06 HANDLING AND STORAGE

- A. The Manufacturer is to protect each precast unit from time of fabrication until it is erected in its proper place. After erection, the protection of the precast units becomes the responsibility of the Contractor.
- B. Precast units are to be handled, transported and stored in a manner to avoid undue strains, cracking, staining, or other damage. Damaged or defective units are to be repaired or replaced as directed by the Engineer. Units are to be delivered from the plant to the project site in accordance with the project schedule and proper setting sequence.

3.07 INSTALLATION AND SETTING OF PRECAST CONCRETE

- A. An experienced representative of the precast Manufacturer is to supervise the entire installation of this work, when such supervision is deemed necessary by the Engineer.
- B. All precast work is to be accurately set in its assigned position, carefully plumbed and aligned and securely anchored to the structure in accordance with the approved details. Erection is to be by the Manufacturer's personnel skilled in this type of work.
- C. The Manufacturer is to furnish and install all loose shims, wedges, leveling plates, etc., for the support and bearing of precast units where needed.
- D. All precast units are to be delivered to the project site in the cleanest condition possible. During installation, the utmost care is to be directed to prevent staining or marring of the precast units. Upon completion of erection, the precast work is to be left clean. Final cleaning at a later date, if required, is to be the responsibility of the Contractor. Finished surfaces of precast concrete are to be protected at all times

from defacement from welding or other operations by use of shields properly placed around these operations.

END OF SECTION 03 40 00

SECTION 33 05 61

CONCRETE MANHOLES

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Under this Section, the Contractor shall furnish and install precast concrete manholes, with cast iron manhole frames and covers, and polypropylene manhole steps.
- B. All labor, materials and equipment shall be included as well as the stubs for entering sewers, exterior joint plastering and wall coating, parging of all joints and the frame excavation, backfill and ¾-inch crushed stone bedding. Coated concrete benching, PVC lining systems and channeling required for direction of flow and concrete foundation mats, when directed by the Engineer and as shown on the Contract Drawings and details, shall be included under this Section.

1.02 RELATED SECTIONS AND STANDARD DETAILS

- A. Section 03 40 00 – Precast Concrete
- B. SD-11 to SD-25 - Standard Manhole Details

PART 2: PRODUCTS

2.01 PRECAST CONCRETE MANHOLES

- A. Precast concrete manholes shall consist of a precast reinforced concrete base section, riser sections, and a conical or flat slab top section, conforming with the typical details attached or as shown in the Contract Drawings. Flat top slabs shall be used for manholes 5-feet or less in depth.
- B. The actual configuration of the manholes will vary with the size of the incoming sewers and the depth of the sewer.
- C. Precast manhole and chamber sections shall be manufactured in accordance with ASTM Designation C-478. The minimum compressive strength of the concrete for all sections shall be 4,000 psi. The maximum allowable absorption of the concrete shall not exceed 8% of the dry weight. Tests, if required, shall be similar to those described in ASTM C-478. The circumferential steel reinforcement for riser pipe, cone sections and base walls shall be a minimum of that called for under ASTM C-478. Reinforcing in the layer of steel in the bottoms of bases shall be a minimum of 0.12 square inches per lineal foot in both directions. Flat slab top sections shall be designed to carry an H-20 wheel load.

2.02 MATERIALS

- A. Concrete Foundation Mat: Concrete foundation mats shall be 3,000 psi concrete.
- B. Frames and Covers: The Contractor shall furnish, set level and to the proper grade and parge cast iron frames and covers of the form and dimensions shown on the Contract Drawings.
1. All castings for frames and covers shall be of tough grey iron, free from cracks, holes and cold shuts. The quality shall be such that a blow from a hammer will produce an indentation on a rectangular edge of the casting without flaking the metal.
 2. All castings shall be made accurately to dimensions and shall be machined to provide even bearing surfaces. Covers must fit the frames in any position, and if found to rattle under traffic, shall be replaced. Filing to obtain tight covers will not be permitted. No plugging, burning or in filling will be allowed. The frame shall be thoroughly bedded in mortar.
 3. All castings shall be carefully coated inside and out with coal-tar pitch varnish of approved quality.
 4. Manhole frames and covers shall be furnished under this item as follows:
 - i. Standard: Neenah Foundry Company R-1642,
 - ii. Watertight: Neenah Foundry Company R-1916-F,
 - iii. Or Equal.
 5. All covers furnished shall bear the letters "SANITARY SEWER" in 2-inch letters.
 6. All covers shall be watertight, have non-penetrating pickholes and shall be solid with no vent holes.
 7. All frames shall be provided with four (4) equally spaced, 1-inch diameter cored holes to permit installation of the manhole frame anchor bolts as indicated within the Contract details.
 8. Inflow Protection Covers manufactured by Parson Environmental Products shall be furnished on all manholes.
- C. Steps: During the construction of each manhole, steps of copolymer polypropylene plastic reinforced with a ½-inch steel grade 60 rod shall be set in place on the inside of the manhole beginning two feet above the bottom, and spaced twelve (12) inches center-to-center, as shown on the Contract Drawings. Steps shall be properly

embedded in the wall. Details of the steps and proposed embedment shall be indicated within the submitted shop drawings. The polypropylene steps shall be manufactured by M.A. Industries, Inc. Model PS4-B or equal.

- D. Heat Shrinkable Manhole Encapsulation System: All external manhole joints shall be sealed with a heat shrinkable manhole encapsulation system in accordance with the requirements of Specification Section 33 01 30.83.
- E. Flexible Manhole Connector: A flexible manhole connector shall be used whenever a pipe penetrates into a precast concrete manhole. The connector shall be A-Lok Premium Connector manufactured by A-Lok Products, Inc., or equal. The connector shall be made of materials that conform to ASTM C-923. The connector shall be sized specifically for the type of pipe being used and shall be integrally cast with the manhole unit.
- F. Coating: The entire exterior of manholes shall be painted with two (2) coats of an approved bituminous sealer, minimum 16 mils total dry film thickness. Bituminous coating shall be Carboline Bitumastic 300M coal tar epoxy or approved equal.
- G. Lining: All interior surfaces shall be coated with a minimum 12-mils of epoxy paint (or PVC lining system where indicated). Paint system shall be Thoroc Sewer Guard TG Epoxy paint, Carboline, Sherwin Williams, or equal.
- H. PVC Liner: Where indicated, manholes to be PVC lined shall be supplied with liner manufactured from polyvinyl chloride resin, white in color. The liner shall be installed during the precasting process in accordance with the instructions of the manufacturer. Liner shall be Dura Plate 100 as manufactured by A-Lok Products, Inc., T-lock as manufactured by Ameron or equal.

PART 3: EXECUTION

3.01 INSTALLATION

- A. Precast base sections shall be installed on a broken stone foundation mat as indicated on the Contract Drawings. Concrete foundation mats shall be furnished if required by the Engineer due to adverse field conditions. The bell of the manhole base shall be wiped clean, be free of all dirt and grit and liberally soaped in preparation for receiving the riser, cone or slab top section. Prior to snapping the gasket onto the spigot groove of the riser or cone section, the gasket should be wiped clean and well soaped. Soaping the gasket groove will also make joining of the pipe sections easier. A screwdriver or hammer handle inserted beneath the gasket and run around the pipe will insure even seating. The riser or cone section with gasket in place should then be lowered into the bell of the manhole base, taking care that no dirt gets into the joint or on the gasket. Additional riser or cone sections should be jointed in a similar manner.
- B. All pipes or castings to be embedded in masonry work shall be accurately set. Spurs

or stubs for branch sewers shall be built in the manholes where shown on the Plans or otherwise required by the Engineer. Integrally cast, flexible manhole sleeves shall be furnished for the diameter sewers shown on the Contract Drawings.

C. Prior to backfilling, all exterior joints shall be cleaned and a heat shrinkable manhole encapsulation system shall be applied. Prior to installation of the encapsulation system, the entire exterior of the manhole or chamber shall be painted with two (2) coats of an approved bituminous sealer, minimum 16 mils total dry film thickness. Coating shall be applied by the structure Manufacturer. Bituminous coating shall be Carboline Bitumastic 300M coal tar epoxy or approved equal. Manhole sections may be coated prior to installation, however, those portions which will be mortared after installation shall not be coated until mortar is applied. A bituminous or plastic type exterior joint filler may be used if recommended by the manhole Manufacturer.

D. All manholes shall be cleaned of debris, the same as the adjacent sewer reaches, prior to inspection for acceptance.

E. Manhole Grade Rings

1. Concrete Grade Rings:

Concrete Grade Rings for leveling units shall be full circle and shall be manufactured as per ASTM C-478 and shall be a minimum thickness of 2 inches or thicker as necessary to provide the required grade adjustment. Each grade ring shall have two holes cast therein at the manufacturer's plant for the manhole frame hold down bolts. Joint material between grade rings shall be as specified in Manhole Joint Sealing Material. Design of the grade rings must provide for full bearing of the manhole frame.

2. Rubber Grade Rings:

Rubber grade rings shall only be used in paved areas. Tapered rubber grade rings shall be used to accommodate sloped paved surfaces. Rubber grade rings (rubber adjustment riser) for leveling units shall comply with the following:

a. Density:

As specified in ASTM C 642-90.

b. Durometer Hardness:

As specified in ASTM D 2240.

c. Compression:

As specified in ASTM D 575.

d. Compression Set:

As specified in ASTM D 395.

e. Freeze and Thaw:

As specified in ASTM C 672-91.

f. Coefficient of Thermal Expansion:

As specified in ASTM C 5314-85.

- g. Weathering (70 hours at 70°C):
As specified in ASTM D 573-88.

3. HDPE Grade Rings

- a. All adjusting rings shall be injection molded-recycled HDPE - as manufactured by LADTECH, Inc. or approved equal and installed as per manufacturer's recommendations.
- b. The adjustment rings shall be manufactured from polyethylene plastic as identified in ASTM Designation D-1248 Standard Specification for Polyethylene Plastic Molding and Extrusion Materials.
- c. Material properties shall be tested and qualified for usage per the ASTM Test Methods referenced above.
- d. The adjustments rings shall be molded from 100% recycled material.
- e. The plastic rings shall be manufactured utilizing the injection molding process as defined by the Society of Plastic Engineers.
- f. The adjustment rings shall be tested to assure compliance with impact and loading requirements per the ASSHTO Standard Specification for Highway Bridges.
- g. Installation shall be per manufacture's recommendation only.
- h. The annular space between the grade rings and the precast manhole top/cone and the rings and manhole frame shall sealed using the approved butyl sealant (See Manhole Joint Sealing Material-this Section).
- i. All adjustment for matching road grade shall be made utilizing a molded and indexed slope ring.

4. Chemical Grout:

- a. Cement grout shall be non-shrink non-metallic.
- b. Use Type I cement where grout is not in contact with sewage.
- c. Use Type II (Sulfate Resistant) cement where grout is in contact with sewage.

5. Waterproofing mortar:

- a. Material composition meeting the requirements of ASTM C270, Type M with waterproofing admixture included.
- b. Apply in accordance with manufacturer's instructions.

6. Epoxy Bonding Compound

- a. Provide a high-modulus, low viscosity, moisture insensitive epoxy adhesive having the following characteristics.
 - i. Mix Ratio: 100 percent solids, two components; mixed one part by volume component B to two parts by volume component B.
 - ii. Ultimate Compressive Strength: 13,000 psi after cure at 73° F and 50 percent relative humidity determined in accordance with ASTM D695.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Taper sections and cone sections shall be used wherever possible to reduce the manhole diameter to that required for the manhole castings. Where required to meet field conditions, the Contractor shall furnish manholes with flat slab top sections.
- B. Joints of the manhole sections shall be formed entirely of concrete employing a round rubber gasket and when assembled, shall be self-centering and make a uniform watertight joint. Except for those surfaces within a gasket groove, all inside surfaces of the bell or outside surfaces of the spigot, or both, on which the rubber gasket may bear during the closure of the joint and at any degree of partial closure shall be parallel within one (1) degree and have an angle of not more than two (2) degrees with the longitudinal axis of the pipe. In joints formed entirely of concrete, the distance from either side of the gasket to the end of the bell or spigot shall not be less than $\frac{3}{4}$ inches. The gasket spaces between the bell and spigot shall be so shaped as to provide grooves that will prevent the gasket from disengaging from its compression surface or being blown out by the hydrostatic pressures. Joints shall be mortared on exterior and interior surfaces.
- C. Flexible manhole sleeves integrally cast with the manhole sections shall be provided. The Contractor must submit shop prints for flexible manhole sleeves. Each manhole sleeve shall be set to the correct alignment and elevation.
- D. The Contractor shall provide benching of 3,000 psi concrete. Benching may be precast or formed in the field. Any precast invert which is delivered to the site with incorrect invert locations, pipe sizes or channeling shall be removed from the site. Inverts shall have a cross section of the exact shape of the sewers which are connected, and changes in size shall be made gradually and evenly, unless otherwise specifically directed. All benching shall be included within the unit price bid for manhole bases, and coated with 12 mils of epoxy paint.

3.03 WATERTIGHT WORK REQUIRED

- A. The entire work of constructing manholes must be carried on in a manner to ensure watertight work, and any leaks in manholes shall be caulked, repaired or the entire work shall be removed and rebuilt.
- B. All installed manholes shall be inspected for watertightness prior to placing the manhole into service. The inspection of each manhole shall be performed by the Contractor and witnessed by the Engineer. The Contractor shall maintain a log of the inspections and submit the log prior to contract closeout.

3.04 MANHOLE TESTING

- A. A "Vacuum Test" for leakage shall be performed on each manhole. This test shall be performed following the completion of the manhole installation, including but not

limited to all inlet and outlet piping, benches, complete manhole with castings mortared in place and final surface restoration. No additional payment shall be made for this testing. The test shall be performed by the Contractor and witnessed by the Engineer. At the completion of testing, the Contractor shall submit to the Engineer a test report for each manhole including, date, time, manhole number, testing readings and whether the test passed or failed.

1. The Contractor shall provide a circular-shaped vacuum manhole tester as manufactured by Cherne Industries, Inc., or approved equal.
2. Prior to the start of testing, the Contractor shall repair to the satisfaction of the Engineer, all areas where there is visible infiltration into the manhole. The manhole shall then be thoroughly cleaned, drained and all openings sealed with plugs properly designed to provide a watertight seal for testing. All plugs and pipe shall be braced and the vacuum apparatus installed in accordance with the manufacturer(s)' instructions.
3. The vacuum pump shall be used to draw a vacuum of ten inches (10") of Mercury. The valves shall be closed and the pressure shall be monitored with the time recorded for the pressure to drop from ten inches (10") of Mercury to nine inches (9") of Mercury. The minimum time allowed shall be sixty (60) seconds for manholes of all depths. If the one inch (1") pressure drop from 10" to 9" is less than sixty (60) seconds, the test will not be considered a "passing" result. The manhole shall be repaired and the test repeated until all manholes pass the test. There shall be no additional payment made to the Contractor for this work.

END OF SECTION 33 05 61

SECTION 33 31 16

PVC SERVICE LATERALS AND CLEANOUTS

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Whenever directed by the Engineer, the Contractor shall install PVC service laterals from the main line sewer to the property line as detailed on the Contract Drawings including cleanout riser pipe, pipe and fittings, dewatering, excavation, backfill and stone bedding or as may be specifically ordered by the Engineer and at locations ordered by the Engineer.
- B. An approved wye or tee-wye connection fitting shall be installed in the collection main in accordance with the instructions of the pipe manufacturer. The entire connection shall be supported by stone as detailed on the Contract Documents.

1.02 RELATED SECTIONS AND STANDARD DETAILS

- A. SD-26 to SD-31 Standard Lateral Details
- B. SD-33 Cap Protection Casting Detail
- C. SD-35 to SD-36 Standard Cleanout Details

PART 2: PRODUCTS

2.01 MATERIALS

- A. PVC pipe shall be in accordance with ASTM D3034-85b (latest edition) and shall be Class SDR-35 or ASTM F679-86 as applicable. All fittings shall be PVC sewer pipe fittings with a rubber ring in each bell and ring groove so designed as to prevent ring displacement.
- B. A Fernco adapter shall be used for connection to existing piping.
- C. Cast iron cleanout boxes shall be provided where ordered by the Engineer and are primarily to be used where a cleanout may be located in driveways or parking area. Cleanout boxes shall be the top portion of a standard 5¼" valve box as manufactured by Mueller Co. or equal.

PART 3: EXECUTION

3.01 WORKMANSHIP

- A. Service connections in any given street shall be laid coincidentally with or shortly after main sewer is installed so that street repairs and cleanup are rapidly completed.

All connections shall be supported to firm undisturbed ground with ¾” clean broken stone as directed by the Engineer. Stone is to be furnished and installed as specified in Section 02210.

- B. The pipe shall be laid on a continuous upgrade of not less than 1/4” per foot for 4” diameter pipe and located where ordered by the Engineer.
- C. Prior to completion of the connection of the new lateral to an existing lateral, the condition of the existing lateral shall be noted and recorded. The condition of the existing lateral shall be determined from a visual inspection of the interior of the lateral from the point of connection.

END OF SECTION 33 31 16

SECTION 33 31 21

SANITARY SEWAGE GRAVITY AND FORCE MAIN PIPING

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Section includes requirements to construct and test sanitary sewage system complete in place.

1.02 REQUIREMENTS FOR MANUFACTURERS AND SUPPLIERS AND CONTRACTORS BEFORE DELIVERY

- A. Manufacturer or supplier of reinforced concrete pipe (RCP) and structures: Store completed sections off ground using wood blocks, pallets, or other appropriate means.
 - 1. Place with ample space between rows and individual pieces, and enough clearance above and below stored sections to allow full view of walls and joint ends for inspection purposes.
 - 2. Batching plant, casting equipment, and curing facilities: Complete, operating properly and of proper size and range.
 - 3. Show records of continual maintenance and quality control over casting forms and joint forming rings.
- B. Readiness for Inspection of RCP.
 - 1. Pipe will be ready to inspect when it meets requirements of specified tests.
 - 2. Pipe manufacturer or supplier: Before inspection of pipe for Contractor's order is scheduled, furnish:
 - a. The contract number and Contractor's name.
 - b. Pipe diameters, design, and classes.
 - c. Footage of pipe included in order.
 - d. Adequate quantities of pipe of required diameters, design, and classes.
- C. Owner supplied material: Inspected by the Contractor
 - 1. Damage of exterior coated pipe and fittings; Contractor shall repair following Pipe Manufacturer's recommendations.
- D. Contractor shall provide, the following for 30-inch and larger pipe and fittings:
 - 1. Project Schedule showing the pipe laying by stations and locations.
 - 2. Identify delivery sequence with specific locations, pipe sizes and quantities required per the lay schedule.

- E. Quality assurance for precast concrete utility structures is specified in Section 03 40 00.
- F. Tapping Contractor: Performed successful pressure taps on cast iron, ductile iron pipe (DIP), or polyvinyl chloride (PVC) water mains.
- G. PVC pipe manufactured more than 12 months prior to installation will not be accepted.
- H. Qualifications for linestop tapping equipment installer:
 - 1. Experience: Actively engaged in linestop installation for minimum of 3 years, with at least 5 projects in the last 3 years of similar size and type.
 - 2. Field supervisory personnel: Experienced in performance of work and tasks stated herein for minimum of 3 years.
- I. Qualifications for insertion valve equipment installer:
 - 1. Experience: Actively engaged in insertion valve installation for minimum of 3 years, with at least 5 projects in the last 3 years of similar size and type.
 - 2. Field supervisory personnel: Experienced in performance of work and tasks stated herein for minimum of 3 years.

1.03 SUBMITTALS

- A. Submit following per Section 01 33 00.
 - 1. Shop Drawings, showing strength, details of special fittings, and reinforcing (RCP) with joint and gasket dimensions.
 - 2. Piping lay schedules.
 - 3. Results of source quality control tests performed on pipe at point of manufacture.
 - 4. Method for maintaining sewage flows, per Section 01 57 29.
 - 5. Shop drawings, manufacturer's installation recommendations, and operation and maintenance manuals for valves, slide gates and operators.
 - 6. Coating manufacturer's catalog data for coating material used to line inside of ductile iron pipe (DIP), including surface preparation, application procedures, curing, and handling of lined pipe.
- B. Submit following before delivery of materials.
 - 1. RCP.
 - a. Certificates of Compliance:
 - 1) Include Contract Number, job location, and Contractor's name, types, classes, and strengths of pipe, and pipe manufacturer's name.
 - 2) Concrete and masonry materials: See Sections 03300, 03400 and

04200.

- b. Certified Test Reports:
 - 1) Aggregates.
 - 2) Cement.
 - 3) Admixtures.
 - 4) Steel reinforcement materials: Follow national standards specifying pipe and fittings.
 - 5) Submit reports before start of production and every 30 days after production is ongoing.
- 2. Heat Shrinkable Sleeve
 - a. Documentation that Installer has attended at least one day of training at the manufacturer's facility or, on-site with a manufacturer's representative.
- C. Packing list, invoice, or delivery ticket with every shipment, to contain the contract number, type and class of pipe, length, and other pertinent information.
- D. Installation and Repair Recommendations.
 - 1. Submit manufacturer's recommended installation and repair methods and procedures for pipe and structures for approval before material fabrication.
 - 2. Submit manufacturer's recommended installation procedures for PVC lined or HDPE lined precast concrete manholes.
 - 3. Submit recommended repair methods and procedures for defects and damage to RCP, structures and lined manholes from manufacturer furnishing product.
 - a. Repairs: Performed by manufacturer using specifically trained personnel, only in presence of, and after approval of Engineer.
 - b. Lined manhole repair: Repair personnel certified by lining manufacturer.
 - 4. Submit coating repair methods and procedures to be used at Contract site for lined pipe.
 - a. Inspection and repairs: Follow coating manufacturer's recommendations.
- E. Concrete Design Mixes: See Sections 03 30 00 and 03 40 00.
- F. Sewer Service Connection Testing: Closed Circuit Television (CCTV) color video and inspection report as specified under Field Testing.
- G. Tapping Sleeve and Valve or Tapping Assembly and Valve: Submit before main is tapped.
 - 1. Installation and testing instructions.
 - 2. Recommended maximum test pressure and length of time for testing assembly using water as test medium.

- H. Submit manufacturer's installation instruction for PVC pipe and fittings, joint restraint devices, and manufacturer's instructions for tapping pipe.
- I. Submit for information only:
 - 1. Contractors Experience and Supervisory Field Personnel for Linestop Tapping Equipment/Installer.
 - a. Presentation of similar experience in the last 3 years.
 - 1) Include, but not limited to, owner name, address, telephone number, contact person, date and duration of work, location, pipe information, and contents handled by the pipeline.
 - b. Supervisory field personnel and historical information of linestop experience.
 - c. At least one of the field supervisors listed must be at site when linestop operations are in progress.

1.04 STORAGE AND HANDLING

- A. Engineer will inspect materials on site before installation.
- B. Loading, unloading, handling, inspection, and storage of pipe, fittings, valves, joint accessories, and appurtenances: Follow AWWA C600 and AWWA C605 as well as AWWA C900, and as specified herein.
- C. Storage: Store pipe, fittings, valves, and appurtenances off ground using sound wood blocks placed on stable foundation or using other appropriate means. Allow space between rows, individual pieces and bundles with clearance below and above to allow full view for inspection purposes.
 - 1. Store in well-drained area away from brush and accessible for inspection.
 - 2. Do not stack pipe higher than 54 inches high.
 - 3. Keep spigot ends of pipe clean and clear for dimensioning purposes.
 - 4. Do not place excavated or other material over or against stored material.
 - 5. PVC pipe:
 - a. Store so it does not deform or bend.
 - b. Pipe stored outdoors or otherwise exposed to direct sunlight: Cover with canvas or other opaque material with provision for adequate air circulation.
- D. Handling: Unload and handle materials with crane, backhoe, or equipment of adequate capacity, equipped with appropriate slings or padding to protect materials from damage. Use of chains for handling pipe is not permitted.
- E. Repair or Replacement:
 - 1. Repair damages or defects following approved manufacturer's recommendations.

2. Remove and replace at no cost to the Owner materials deemed not repairable.

1.05 RELATED SECTIONS AND STANDARD DETAILS

- A. Section 03 30 33 – Cast In Place Concrete
- B. Section 31 23 33 – Trenching, Backfilling and Compacting
- C. Section 33 05 97 – Underground Identification Markings
- D. Section 33 31 31 – Leakage and Testing of Sewer Mains
- E. SD-1 – Sewer Line Bedding and Backfill Detail
- F. SD-2 – Lateral Line Bedding and Backfill Detail
- G. SD-8 – Thrust Blocking Details
- H. SD-9 – Concrete Anchor Detail
- I. SD-17 – Typical Tie-In to Existing Manhole Detail
- J. SD-37 – Low Pressure Drop Connection Detail
- K. SD-38 – Force Main Lateral Detail
- L. SD-39 – Typical Grinder Pump Installation Detail
- M. SD-43 – Force Main Metering Manhole Detail

PART 2: PRODUCTS

2.01 MATERIALS

A. Pipe and Fittings.

1. General:

The Contractor shall furnish all material unless otherwise specified in the Specifications Special Conditions section. Pipe between structures or between structure and terminus: Same size and material and by same manufacturer.

Each pipe and fitting: Mark with manufacturer's name or trademark, specification designation, pipe class and strength, production shift code, and manufacture date and location.

2. Gravity Sewer:

a. PVC Pipe and Fittings

1) Standards.

- a) PVC pipe and fittings 4-inch through 15-inch diameter: ASTM D3034, wall thickness classification SDR 26 (PS115).
- b) PVC pipe and fittings 18-inch through 36-inch diameter: ASTM F679, PS115, wall thickness T-1.
- c) Closed profile PVC pipe 21-inch through 54-inch diameter: ASTM F1803.

- (1) Manufacturer: Designate and mark pipe manufactured to connect to manholes as "Manhole Pipe".
 - (2) Exterior seam: Factory smoothed.
 - d) Open profile PVC pipe 18-inch through 30-inch diameter: ASTM F794.
 - (1) Manufacturer: Furnish suitable smooth manhole adapters, ASTM F679, minimum wall thickness T-1, SDR 26.
 - 2) Length: Not less than 12 feet.
 - 3) Joints and fittings: Integral bell gasketed joint is designed so when assembled elastomeric gasket inside bell is compressed radially on pipe spigot it forms watertight joint.
 - a) Gasket: ASTM F477.
 - 4) Legible markings: ASTM D3034, ASTM F679, ASTM F794, or ASTM F1803 and with date and location of manufacture.
 - a) Pipe and fittings not marked as specified herein will be rejected.
 - b) Pipe and fittings manufactured more than 1 year before date of work site inspection will not be accepted.
 - 5) Approved pipe manufacturers:
 - a) CONTECH Engineered Solutions LLC, open profile, 18 inch through 36 inch.
 - b) Diamond Plastics Corporation, 4 inch through 27 inch; closed profile 30 inch through 48 inch; open profile 18 inch through 48 inch.
 - c) IPEX, Inc., 4 inch through 27 inch, Ultra Rib open pipe, 18 inch through 24 inch.
 - d) Prime Conduit Inc., Vylon Pipe, closed profile, 21 inch through 54 inch.
 - e) National Pipe and Plastics, Inc.
 - f) JMTM Eagle.
 - 6) Approved fittings manufacturers:
 - a) GPK Products, Inc.
 - b) JMTM Eagle.
 - c) Multifittings, Ltd. /Iplex, Inc.
 - d) The Harrington Corporation. (HARCO)
 - e) Vassallo Industries.
 - f) Colonial Engineering, Inc.
 - g) Plastic Trends, Inc.
 - h) Tigre Ads (Sewer) 'PVC' Fittings
- b. DIP and fittings:
- 1) Ductile iron pipe shall conform to the current requirements of AWWA C151, Pressure Class 350, with push-on joints.
 - 2) Factory Coated Interior pipe liner.
 - a) Interior Lining Materials.

- (1) Gravity Piping: Double thickness cement mortar lining (1/8") in conformance with ANSI/AWWA C104/A21.4
 - (2) Pressure Piping: Minimum 40.0 mils dry film thickness (DFT) with:
 - (a) Protecto 401 Ceramic Epoxy.
 - (b) Corropipe II WasteLiner.
 - (c) Or equal.
 - (3) Where specified: Amine-cured novolac epoxy containing ceramic quartz pigment as supplied by:
 - (a) Induron Protective Coatings.
 - (b) Or equal.
 - (4) Where specified: Liquid-applied polyurethane as supplied by:
 - (a) Madison Chemical Industries Inc.
 - (b) Or equal.
- 3) Factory Coatings for DIP Fittings:
- a) Exterior Coating: Zinc Coating conforming to AWWA C150 and C151 with the following minimum properties, or approved equal.
 - (1) Coating system shall conform to ISO 8179
 - (2) Coated with a layer of arc-sprayed zinc.
 - (a) 200 g of zinc shall be applied per m² of pipe surface area.
 - (3) Asphaltic top-coat shall be applied. The mean dry film thickness shall be greater than or equal to 3 mils. The local allowable minimum thickness is 2 mils.
 - b) V-Bio polyethylene flat tube encasement (minimum 8 mil) for all zinc coated ductile iron pipe and fusion bonded coated fittings (not applicable to cathodically protected systems.).
 - c) Polyethylene compatible adhesive tape for use with V-Bio Polyethylene flat tube encasement.
 - d) Approved Manufacturers
 - (1) American Cast Iron Pipe Co.
 - (2) United States Pipe and Foundry Co.
 - (3) McWane Cast Iron Pipe Company
- 4) Each piece of pipe shall bear the manufacturer's name or trademark, the year in which it was produced and the letters "DI" or the word "DUCTILE". Fittings shall be ductile iron and rated for a minimum of 250 psi in accordance with the current requirements of AWWA C110 (ANSI A21.10) shown therein. Fittings shall have mechanical joints meeting the current requirements of AWWA C111 (ANSI A21.11). Compact ductile iron fittings meeting the current requirements of AWWA C153 will also be acceptable.

- 5) Provide AWWA C110 mechanical joint plugs and locked or restrained pipe joints where indicated on drawings. Fittings shall be mechanical joint with MegaLug glands or equal.
- 6) The cleaning and assembly of pipe and fitting joints shall be in accordance with the manufacturer's recommendations.
- 7) Piping and flanges located within a vault shall follow all specifications for Zinc Coated DIP specified above except pipe and flanges are permitted to be painted by the manufacturer with paint that has a minimum of 85% zinc in the dry film. Arc-spray technique for zinc coating application is not required but is permitted for pipe and flanges within vaults and if used shall follow specifications provided above.
 - a) Approved Manufacturers of zinc paint
 - (1) Tnemec Series 90-98
 - (2) Rustoleum Cold Galvanizing paint
- 8) Fittings: Ductile iron bell, mechanical, or push on joint, unless shown otherwise on Drawings or Standard Details.
 - c. Size, dimensions, and tolerances: AWWA C110 or AWWA C153 and AWWA C111.
 - d. Mechanical joint solid sleeves: AWWA C110 or AWWA C153 and AWWA C111.
 - e. Unless otherwise shown, furnish fittings 3 inch through 24 inch diameter having minimum pressure rating of 350 psi, and furnish fittings larger than 24 inch diameter having minimum pressure rating of 250 psi.
 - f. Coatings:
 - (1) Exterior and interior: Fusion bond epoxy coated: Follow AWWA C110 and AWWA C116.
 - a. Shop applied materials: (fusion bonded epoxy)
 - g. Fittings 36 inch and larger diameter: In addition to cast markings required in AWWA C110 and C153, clearly stencil on with waterproof paint on each fitting the year, month, and day cast, lot number, and manufacturer's fitting control number.
 - h. Approved manufacturers:
 - (1) American Cast Iron Pipe Co.
 - (2) Clow Water Systems Company, (Division of McWane Incorporated).
 - (3) Tyler Union, (Division of McWane Incorporated)
 - (4) United States Pipe and Foundry Co.
- 9) Flanged Pipe and Fittings:
 - a. Flanged pipe: AWWA C115 and requirements for

pipe above.

- (1) Approved Manufacturers for Flanged Pipe:
 - a) American Cast Iron Pipe Company.
 - b) United States Pipe and Foundry Co. (U.S. Pipe)
 - c) McWane Cast Iron Pipe Company
 - b. Flanged fittings: AWWA C110 and requirements for fittings above except for flanged joints.
 - (1) Flanges for fittings: Cast integrally with body and with same thickness over their entire circumference.
 - a) Faces: Perpendicular to axis of pipe.
 - b) Bolt holes: Equally centered and spaced.
 - (2) Bolts, nuts and studs: ANSI A21.11 for end flange joints, except provide minimum 304 stainless steel nuts and bolts with protective coating to prevent galling.
 - (3) Approved Manufacturers for Flanged Fittings (excluding any fittings manufactured in Mexico):
 - a) American Cast Iron Pipe Company.
 - b) United States Pipe and Foundry Co.
 - c) Tyler Union (Division of McWane Incorporated).
 - d) Clow Water Systems Company, (Division of McWane Incorporated).
 - (4) Blind flanges for entry ports: Steel following AWWA C207
 - a) Drill for bolt circle to match flange on entry port tee.
 - b) Class D for total pressures (operation plus surge) up to 150 psi.
 - c) Class E for total pressures (operation plus surge) up to 275 psi.
 - d) Class F for total pressures (operation plus surge) up to 300 psi.
 - e) Coatings:
 - (1) Exterior and interior: Fusion bond epoxy coated following AWWA C110 and AWWA C116
- 10) Tapping sleeves for existing gray iron, ductile iron, and PVC pipe 36 inch and smaller.
- a. Cast from gray iron, ductile iron, or material manufactured from ASTM A283 Grade C, ASTM A36, or equal.
 - b. Full sleeve type (with test plug) capable of containing

- pressure with full volume of sleeve.
- c. Gaskets butt against existing pipe ensuring a watertight seal.
 - d. Suitable for use with Class AB or CD cast iron pipe or ductile iron for sizes 12 inches and smaller without changing either half of sleeve, unless field measurements are taken for type and outside diameter of existing pipe.
 - e. Rated at minimum 200 psi water working pressure for 12 inch and smaller diameter sleeves and minimum 150 psi working pressure for 14 inch to 24 inch.
 - f. Capable of withstanding rated working pressure without leakage past side and end gaskets and no leakage at junction of the two.
 - g. Mechanical Joint:
 - 1) Bolts, hexagonal nuts, rubber gaskets, and other accessories: AWWA C111, except provide minimum 304 Stainless Steel nuts and bolts with protective coating to prevent galling.
 - h. Valve flange:
 - 1) Suitable for connecting to mating end of tapping valve, which has a raised face to ensure true alignment of valve and tapping machine, following Manufacturers Standardization Society (MSS) SP60.
 - 2) AWWA C207 Class D, Class E, or Class F (match tapping valve flange) for material manufactured from ASTM A283 Grade C, ASTM A36, or equal.
 - i. Coatings and linings:
 - 1) No coating or linings for NSF certified Stainless Steel.
 - 2) Gray or ductile iron casted tapping sleeves AWWA C110.
 - a) Material manufactured from ASTM A283 Grade C, ASTM A36, or equal tapping sleeves.
 - b) Interior Lining: Fusion bonded epoxy that is EPA or NSF approved for contact with potable water, a minimum thickness of 12 mils, following AWWA C213.
 - c) Exterior Coating: Fusion bonded epoxy, a minimum thickness of 12 mils, following AWWA C213.
 - j. Approved manufacturers:
 - 1) American Flow Control, Series 2800C and 1004.
 - 2) Clow Valve Company (A Division of McWane Inc.), Figure FS5205.
 - 3) M&H Valve Company (A Division of McWane Inc.),

Style 1574 and 1674.

4) Mueller Company, Style H-615-24.

5) Tyler Pipe/Utilities Division.

6) United States Pipe and Foundry Co., Ductile Iron T-9.

7) JCM Industries, Inc., Nash, Texas, Number JCM 412 Fabricated Steel Tapping Sleeves with 150 lb ANSI outlet flange.

- 11) Tapping sleeves for existing gray iron or DIP larger than 36 inch:
 - a. Material manufactured from ASTM A283 Grade C, ASTM A36, or equal.
 - b. Full sleeve type capable of containing pressure with full volume of sleeve.
- 1) Gaskets butt against existing pipe providing watertight seal.
 - c. Rated at minimum 150 psi water working pressure.
 - d. Capable of withstanding rated working pressure without leakage past the side and end gaskets and no leakage at the junction of the two.
 - e. Furnish test plug on sleeve for field pressurization of sleeve, valve, and tapping machine assembly before making tap.
 - f. Interior Lining: Lined with fusion bonded epoxy that is EPA or NSF approved for contact with potable water, minimum thickness of 12 mils, following AWWA C213.
 - g. Exterior Coating: Fusion bonded epoxy, a minimum thickness of 12 mils, following AWWA C213.
 - h. Mechanical joint bolts, hexagonal nuts, rubber gaskets and all other accessories: AWWA C111, except provide minimum 304 stainless steel nuts and bolts with protective coating to prevent galling.
 - i. Gasket material: AWWA C111.
 - j. Valve flange:
 - 1) Manufactured: AWWA C207 Class D, Class E, or Class F (match tapping valve flange).
 - 2) Suitable for connecting to mating end of tapping valve, which has raised male face to ensure true alignment of valve and tapping machine, following MSS SP60.
 - 3) Bolts, nuts and studs: ANSI A21.11 for end flange joints, except provide minimum 304 stainless steel nuts and bolts with protective coating to prevent galling.
 - k. Marking on sleeve: Manufacturer's name or logo and barrel and outlet diameters, at a minimum. Either cast or stenciled with waterproof paint and all markings must be legible.
 - l. Approved manufacturers:

- 1) JCM Industries, Inc.
 - 2) Romac Industries, Inc.
 - 3) Or approved equal
- c. RCP: Unless shown otherwise on Drawings, do not use RCP in 30 inch diameter and smaller sizes.
- (1) Standards: ASTM C76, Class following Drawings.
 - a) Concrete used in production of pipe and fittings: 28-day minimum compressive strength following ASTM C76.
 - b) Cement: ASTM C150 with no additives and blends added without prior approval of Engineer. Other exceptions are as modified herein.
 - c) Pipe:
 - (1) Accepted, if each length of pipe passes hydrostatic test required herein before delivery to Contract site.
 - (2) Not accepted from manufacturer's stock, except Engineer may accept from manufacturer's stock a maximum of 10 pieces of pipe, meeting requirements herein.
 - d) Shorts, Fittings, and Beveled Pipe: Hydrostatic tests not required.
 - e) Pipe and Fitting: Free of coatings.
 - (2) Ends of pipe and fittings: Circumferential reinforcing steel equivalent in area to single reinforcing cage used in barrel of pipe or fittings.
 - a) Extend longitudinal steel to hold circumferential steel in place to within 1 inch of face of ends.
 - (3) Lengths and types:
 - a) Length: Minimum 8-foot lengths, with rubber gasket joints meeting requirements of ASTM C443. Lifting holes will not be permitted.
 - b) Bevel pipe: Provide when specified or when required to open pipe joint more than permitted herein.
 - c) Non-float concrete pipe: Meet requirements specified above and following:
 - (1) Outside diameter: Increased so pipe contains sufficient concrete to resist floatation with pipe empty and uncovered.
 - d) Increased thickness: Homogeneous or heterogeneous, of same concrete strength as pipe, and reinforced to prevent shrinkage and temperature cracks.
 - e) Joints: Interchangeable with those of adjoining sewer pipe.
 - (4) Approved manufacturers:
 - a) Concrete Pipe and Precast.

- b) Rinker Materials, Hydro Conduit Division.
- c) Or approved equal

3. Force Mains:

- a. DIP and Fittings:
 - (1) Unless otherwise noted on Drawings, furnish Pressure Class 350, push-on joint pipe as specified herein with restrained joint fittings (mechanical type or similar as approved by Engineer).
 - (2) For coating and lining requirements see DIP under Gravity Sewer specified herein.
- b. PVC AWWA C900: See Section 33 05 31.13 for 12" and smaller pipe.
- c. PVC SDR 21: As shown on drawings or as approved by Engineer per Section 33 31 26 Low Pressure Sanitary Sewer Systems.
- d. HDPE: See section 33 05 33 High Density Polyethylene Pipe

B. Connection Appurtenances.

- 1. Connections 8" and larger will be made by way of Manhole built over existing sewer following Standard Details.
- 2. Saddles: For connecting sewer service connections to existing main line.
 - a. PVC Main: Follow manufacturer's recommendations.
 - b. Approved saddle manufacturers for connecting to asbestos cement, vitrified clay, concrete, cast iron, or ductile iron sewer pipe with outside diameter:
 - (1) The General Engineering Company, SEALTITE Type "S" saddle with FERNCO adapter, following GENECO Drawing R-3450-D,
 - (2) Romac Industries, Inc., "CB" style saddles.
 - (3) FERNCO, EZ Tap
 - (4) Or equal.
 - c. Approved wye manufacturer for making wye connection to asbestos cement, vitrified clay, concrete, cast iron, or ductile iron sewer pipe with outside diameter 36-inch and smaller:
 - (1) The General Engineering Company, SEALTITE Type "E" saddle with FERNCO adapter following GENECO Drawing R-3413-D1, View 1.
 - (2) Or equal.
- 3. Thimbles: Use where conditions preclude use of a tee or saddle when connecting to existing sewer pipe.
 - a. Approved manufacturers:
 - (1) Inserta Tee.

- (2) Or equal.
- 4. Coupling/Adapters: For connections between different types of pipe and point repairs:
 - a. Approved manufacturers:
 - (1) FERNCO Joint Sealer Co. with shear ring.
 - (2) DFW by NDS non-shear.
 - (3) Or equal.
- 5. Flexible Gasket Connectors:
 - a. For connecting pipes to sewer manholes, see Section 03450.
 - b. Transition Gasket to connect DIP to PVC Pipe.
 - (1) Approved manufacturers:
 - a) Harrington Corporation (HARCO)
 - b) Romac Industries.
 - c) Or equal.
- 6. Stoppers for non-pressure pipe.
 - a. Open ends of pipe, branches and connections: Close with pre-molded gasket joint stopper meeting requirements for pipe used.
 - b. Watertight mechanical plug for placement on interior of pipe.
- 7. Connections to Forcemains.
 - a. Flexible gasket connectors for connecting forcemain to precast manholes: See Section 33 05 61.
 - b. Connections to new forcemains constructed under same contract: Use fittings indicated on Drawings.
 - c. 2-inch diameter and smaller connections: Use tapped service tee fittings.
 - d. Connections to existing forcemain: Sleeve in appropriate fitting or use appropriate saddles or sleeves as specified herein.
 - e. Tapping sleeves: Used for 3-inch diameter and larger connections to existing forcemain.
 - (1) Full sleeve mechanical joint type capable of containing pressure within full volume of sleeve.
 - (2) Rated for minimum 150 psi water operating pressure.
 - (3) Capable of withstanding rated operating pressure without leakage past side and end gaskets and junction of the two.
 - (4) Castings: Clean and sound without defects that will impair their service.
 - (5) No plugging or welding of defects permitted.
 - (6) Flanged outlet: ANSI B 16.1, Class 125.
 - (7) Provided with tap and test plug.
 - f. Tapping valves: Use with tapping sleeves having flanged inlets compatible with outlet flange of tapping sleeve.
 - (1) Mechanical joint outlet.
 - (2) Other tapping valve requirements: See specifications for gate valves.

C. Miscellaneous Materials.

1. Cast-in-Place Concrete: See Section 03 30 00.
2. Precast Concrete Manholes and Service Connection Cleanout Boxes: See Section 03 40 00.
3. Castings, Miscellaneous Metal Connectors, and Appurtenances: See Section 05 50 00 and follow Standard Details and Drawings.
4. Lamphole Style Cast Iron Cover Assembly:
 - a. Approved manufacturers for 4 inch Cleanout:
 - (1) Bingham & Taylor Corporation;
 - (2) Capital Foundry, Inc.;
 - (3) Chesapeake Foundries, Inc.;
 - (4) Or equal.
 - b. Approved manufacturers for 6 inch Cleanout:
 - (1) Bingham & Taylor Corporation;
 - a) Cover: Model No. INDMLAMPLID
 - b) Frame: Model No. INDMLAMPBOX
 - (2) Capital Foundry, Inc.;
 - (3) Chesapeake Foundries, Inc.;
 - (4) East Jordan Iron Works, Inc., Catalog No. 1565.
 - (5) Or equal.
5. Masonry Work: See Section 04 20 00.
6. Mortar Bonding Admixture: Addition to mortar for installation of precast concrete grade ring adjustment.
 - a. Approved manufacturers and admixtures:
 - (1) Euclid Chemical Co., Flex-con.
 - (2) Parchem Construction Products, Nitobond Acrylic.
 - (3) Thoro System Products, Inc., Acryl-60.
7. Curing Compound: ASTM C 309, Type 2, Class B white pigmented resin based for use with parging and precast grade rings.
8. Slide Gates.
 - a. Aluminum plate slide gates:
 - (1) Structurally reinforced members to limit deflection of slide under full head conditions to less than 1/260 of gate span.
 - (2) Self-contained, rising stem gates with guides designed to mount on face of concrete.
 - (3) Resilient seal mounted on lower edge or securely attached to frame along invert.
 - a) Flush bottom closure with effective seal on structural angle or channel.
 - (4) Aluminum guides with resilient bearing strip inserts on

- surfaces in contact with gate.
 - (5) Stainless steel stems and fasteners.
 - (6) Approved manufacturer:
 - a) Rodney Hunt Company, Series 761.
 - b) Or equal.
 - b. Crank-operated floor stand operators:
 - (1) Weatherproof housing with solid bronze operating nut.
 - (2) Equipped with roller bearings and mechanical seals around operating nut and pinion shaft.
 - (3) Maximum crank effort required to operate gate: Not to exceed 40 pounds.
9. Mandrel.
- a. All metal parts of such stiffness that mandrel will not deform during test.
 - b. Seven equally spaced circumferential runners or fins.
 - c. Minimum length of runners in contact with pipe not less than nominal diameter of pipe.
 - d. Inside pipe and outside mandrel diameters as follows:

<u>Pipe Size In Inches</u>	<u>Mandrel Outside Diameter In Inches</u>
6	5.45
8	7.28
10	9.08
12	10.79
15	13.20

- e. Approved manufacturers:
 - (1) HURCO Technologies.
 - (2) Cherne.
 - (3) Or equal.
10. Tracer Wire and Tape: See Section 33 05 97.
11. Drop Bowl for Inside Drop Connections.
- a. Marine grade fiberglass finished in bright white gel coat.
 - b. Stainless steel adjustable clamping brackets.
 - c. Adequate size for incoming pipe diameter.
 - d. Approved manufacturer:
 - (1) RELINER® by Duran Inc.
 - (2) Or Equal.
12. External Heat Shrinkable Sleeve
- a. Material: Irradiated and cross-linked polyethylene impermeable backing, coated with protective heat-activated adhesive. Available in bulk rolls either 12-inch or 18-inch in width.

- (1) Bonds to primed concrete, metal, and fiberglass surfaces.
 - (2) Compatible with concrete, steel, iron, and fiberglass.
 - (3) Separate closure seal to secure sleeve in place during installation and seal overlap area. Each closure seal shall correspond in length to the respective bulk widths as noted above.
- b. Functional Performance of Heat-Shrinkable Sleeves:
 - (1) Peel Strength, ASTM D 1000: 8.6 psi (15 N/cm).
 - (2) Lap Shear, ASTM D 1002: 1.5 psi (1.0 N/cm²).
 - (3) Water Absorption, ASTM D 570: 0.05 % maximum.
 - (4) Low Temperature Flexibility, ASTM D 2671: -40 °F (-40 °C).
 - c. Physical Properties of Heat-Shrinkable Sleeves:
 - (1) Thickness, Nominal, “As Applied”: 125 mils (3.13 mm).
 - (2) Fully Recovered (“Unrestrained”) Thickness: 141 mils (3.53 mm).
 - (3) Stretch Ratio: 70%.
 - d. Sleeve Adhesive:
 - (1) Softening Point, ASTM E 28: 212° F (100° C).
 - e. Sleeve Backing:
 - (1) Tensile Strength, ASTM D 638: 2900 psi (20 MPa).
 - (2) Elongation, ASTM D 638: 600%
 - (3) Hardness, ASTM D 2240, Shore D: 46.
 - (4) Abrasion Resistance, ASTM D 1044: 35 mg.
 - f. Primer:
 - (1) Primes steel, concrete, and fiberglass surfaces for installation of sleeve.
 - (2) Compatible with common substrates and sleeve adhesive.
 - g. Approved Manufacturers
 - (1) WrapidSeal as Manufactured by CCI Pipelines, Breaux Bridge, LA
 - (2) Or Equal

2.02 SOURCE QUALITY CONTROL

A. General.

1. Notify Engineer at least 10 working days before performance of tests required herein.
2. Manufacturers or Suppliers: Responsible for facilities, equipment, and competent personnel for conducting load bearing, hydrostatic, and other tests required in applicable reference specifications.
 - a. Set up instruments, gages, and other testing and measuring equipment to evaluate quality of proper range, type, and accuracy to verify conformance with specification requirements.
 - b. Assure that equipment is calibrated and certified at annual

intervals.

- (1) Calibrate against measurement standards with known relationship to national standards.
- (2) Calibrate and certify gages on equipment to which they belong, and keep them on that piece of equipment following certification.
- (3) Do not use instruments, gages, testing, and measuring equipment found to be out of calibration or adjustment until applicable requirements have been met.
- (4) Hire agency regularly engaged in this type of activity to perform calibration.

B. PVC Pipe.

1. Test Standards for Gravity Pipe:
 - a. PVC pipe 4 inch through 15 inch diameter: ASTM D3034.
 - b. PVC pipe 18 inch through 27 inch diameter: ASTM F679.
 - c. Elastomeric gaskets: ASTM D3212.
 - d. Closed profile PVC pipe: ASTM F1803.
 - e. Open profile PVC pipe: ASTM F794.
2. Test Standards for Pressure Pipe: AWWA C900.
3. Engineer may request that pipe manufacturer witness source quality control testing of PVC pipe and fittings specified herein.

C. RCP.

1. Load-bearing and Hydrostatic Tests:
 - a. Perform in presence of Engineer.
 - b. Complete before pipe delivery to site.
2. Test Specimens: As selected at random by Engineer from pipe produced for Contract.
 - a. Quantity:
 - (1) Load-bearing test: At least half of 1 percent of number of pipes to be furnished for each size and class for each contract, but in no case less than 1 piece for each size and class.
 - (2) Hydrostatic test: 100 percent of pipe.
 - b. Testing Sequence: Load-bearing test may be conducted with hydrostatic testing, using pieces of pipe from same class and lot as hydrostatic test specimens.
 - (1) If a given contract has 2 or more classes of pipe of same size and joint design, hydrostatic testing may be combined by jointing 2 pieces of pipe with different classes.
 - (2) If pipe furnished is from previously tested lot, required testing will be waived provided pipe at time of offering is less than 1 year old.
 - (3) Test pipe more than one year old unless lot offered was

tested within 6 months of date of offering.

- (4) Definition of lot as used herein: Assemblage of 100 or fewer concrete pipe sections, all being of like size, design, material, and strength and designation, manufactured by same process and without interruption, during a time period not to exceed 10 consecutive working days using same types of materials.
3. Load-bearing Test:
 - a. RCP, 72 inch and smaller diameter:
 - (1) Acceptance will be based on:
 - a) Plant load-bearing tests to 0.01 inch crack and to specified ultimate load.
 - b) Material tests and inspection of manufactured pipe for visual defects and imperfections.
 - c) Stipulations set forth in appropriate ASTM specification and modified herein.
 - (2) Retest of failed specimens:
 - a) For each specimen failing strength tests, Engineer will randomly select 2 additional specimens from same lot as failed specimen, for each specimen that failed, and will accept pipe only when all of retest specimens meet strength requirements.
 - b) One pipe from previous lot will be subjected to load test, and procedure for retest will be as stated above, including test of previous lot.
 - b. RCP, 78 inch and larger diameter:
 - (1) Acceptance: Based on compressive strength and absorption tests and inspection of finished pipe, including amount and placement of reinforcing steel.
 - c. Load-bearing test specimens will not be accepted for incorporation into Work.
 4. Hydrostatic Test: ASTM C497.
 - a. Basis of acceptance of pipes for gravity sewers: Withstand minimum internal hydrostatic pressure of 13 psi for 10 minutes with no leakage before delivery to Contract site.
 - b. Testing conditions:
 - (1) Soak pipes, under reduced pressure, for maximum of 24 hours before testing.
 - (2) Moisture appearing as patches or beads not resulting in runs on pipe walls is not considered leakage, if pipe walls are dry upon retesting at prescribed test pressure after elapse of not more than 24 hours.
 - (3) Test pressure may be maintained between initial test and retest at option of manufacturer.

(4) At manufacturer's option, standpipe as specified below may be used in lieu of water-calibrated pressure gage.

a) Standpipe:

- (1) Calibrated in 1/2 foot increments with permanent markings.
- (2) At a height and with adjusted overflow line developed for specified pressure.
- (3) Ensure continuous visible stream of water from overflow line during test.

c. Fittings: Test not required.

PART 3: EXECUTION

3.01 INSTALLATION OF SANITARY SEWER

A. Handling of Pipe and Fittings after Delivery

1. Unloading and handling.

- a. Handling of Pipe and Fittings: Zinc coated ductile iron pipe and fittings following AWWA C600. If damage or coating abrasion occurs and is repairable, repair following approved manufacturer's recommendations. Paint used for repair of zinc coating must meet ISO 8179 requirements of a minimum 85% zinc in the dry film.
 - 1) Approved Manufacturer
 - a) Tnemec Series 90-98
 - b) Rustoleum Cold Galvanizing Paint
 - c) Or equal
- b. If pipe is cut in the field in such a way that the zinc label is removed, paint a circumferential band around one end of the pipe using grey or silver paint. Repair paint as specified above can be used for this application.
- c. Cement Mortar Lining:
 - 1) Remove and replace rejected pipe, fittings or appurtenance at Contractor's expense.
 - 2) Field cut and remove damaged section of pipe to 6 inches beyond damaged lining.
- d. Alternative Externally Coated pipe and fittings.
 - 1) Repair as directed by coating manufacturer.
 - 2) For cathodically protected systems, test coating for flaws electrically with holiday detector, following NACE SP0274 or SP 0188. Repair holidays and recheck. Coating must be verified free of holidays prior to use.
- e. PVC pipe and fittings: Use proper equipment, avoiding severe impact blows, especially during cold weather.
- f. PVC pressure pipe and fittings: AWWA C605.

- g. Ductile and gray iron pipe, DIP fittings, and appurtenances: Follow Section 33 33 21.1.4.
 - h. RCP, manholes, and appurtenances: Use crane or backhoe of proper capacity equipped with appropriate slings to protect material from damage.
 - i. Storage: Store in reasonably level area, well drained, away from brush, and in area accessible for inspection.
 - 1) Store individual pieces or bundles with safe walking space and clearance between to allow full view for inspection purposes.
 - 2) Do not place excavated or other materials over or against stored pipe.
 - 3) Store on flat surface so barrel of pipe is evenly supported and not piled more than 4 feet high.
 - 4) Do not stack bundles or containers.
 - 5) If left bundled, place bundles on flat smooth surface with boards in contact with ground.
 - 6) Gasket: Store in cool place out of direct sun.
2. Inspection and Repair: Pipe will be inspected before installation.
- a. Repair damage during handling and placement following Engineer's direction and approved manufacturer's recommendation.
 - b. Remove and replace any damaged pipe deemed not repairable by Engineer, at no cost to the Owner.
 - c. Closed profile PVC pipe:
 - 1) Do not repair in field.
 - 2) Acceptable marks: Scrapes or gouges less than 2 inches in length and less than 1/2 total wall thickness on exterior of barrel.
 - 3) Dispose of damaged pipe following manufacturer's recommendation.
3. Cleanliness.
- a. Clean and remove foreign matter from each pipe, fitting, and appurtenance before placing in trench.
 - b. Should foreign matter be observed in previously installed pipe, fitting, or appurtenance, cease work until foreign matter is removed.
 - c. Close open ends of pipes and fittings with watertight cap or plug when work is stopped.
- B. Trench Excavation, Backfill, and Test Pits: Follow Section 31 23 00 and 02 32 19.
1. Before pipe installation:
- a. Dig test pits to determine size, type, and exact location of existing pipe to which proposed pipe will connect.
 - b. Excavate sufficient trench in advance and test pit all existing underground utilities/structures, whether shown on Drawings or visually identified in field, to:

- 1) Verify actual locations.
 - 2) Make reasonable changes in line and grade to resolve conflicts, at Engineer's approval.
 - c. Furnish Engineer location and elevation information when previously unknown or different underground utilities/structures are encountered.
 2. Perform additional work made necessary because of failure to take above precautions at no cost to the Commission.
- C. Pipe Embedment Material: Follow Standard Details and Section 31 23 00.
1. Encasement and/or concrete cradle where indicated.
- D. Pipe Placement.
1. Before pipe installation bring bedding material to grade along entire length of pipe to be installed.
 2. Excavate bell holes, for type placed, at each joint to permit proper joint assembly and firm bedding for entire length of pipe barrel.
 3. Install pipe to true uniform line and grade with continuous bearing of barrel on bedding material. A laser shall be used for horizontal and vertical control.
 4. Where indicated, place erosion checks or concrete anchors following Standard Details.
 - a. Cure concrete anchors minimum of 2 hours before placing backfill.
 5. Install pipe upgrade with bell pointing in the direction of laying. Pipe may be installed with bell pointing downstream with Engineer's approval.
 6. Place each section of pipe to form close concentric joint with adjoining section and to prevent sudden offsets in flow line.
 7. Place sufficient backfill on each section of pipe, as it is installed, to hold it firmly in place. Allow Engineer to inspect the joints, alignment and grade prior to completing backfilling.
 8. Should water be encountered, the CONTRACTOR shall furnish and operate suitable pumping equipment of such capacity adequate to dewater the trench. The trench shall be sufficiently dewatered so that the laying and joining of the pipe is not performed in water. The CONTRACTOR shall convey all trench water to a natural drainage channel or storm sewer without causing any property damage.
 9. The interior of the pipe shall be clean and dry as the work progresses. Whenever pipe-laying operations are not in progress, the exposed end of the pipe shall be sealed with a plug or bulkhead fitted into the pipe bell, so as to exclude earth, water, or other material. During excavation and backfilling, the exposed end of the pipe should be blocked to prevent excavated material or backfill material from entering the pipe. A watertight plug or bulkhead shall also be installed and maintained in the most downstream manhole of the project throughout construction to prevent dirt, rocks, muddy water, or

other debris from entering the existing sewer system. This plug or bulkhead shall not be removed until the entire sewer has been installed, cleaned, tested, and accepted, unless directed otherwise by the Engineer.

10. If a length of pipe is cut to fit in a line, it shall be cut according to the manufacturers recommendations to leave a smooth end at right angles to the longitudinal axis of the pipe.
11. No fittings (except service wyes and repair couplings) shall be allowed in gravity sewers. Open ends of wyes shall be plugged or sealed until service laterals are installed.
12. Pipe Joints – Preparatory to making pipe joints, all joint surfaces shall be cleaned of all dirt, dust and foreign matter and shall be dry, smooth and free of imperfections before placing jointing materials (i.e. Gaskets, lubricants, primers, adhesives, etc.). Gaskets, lubricants, primers, adhesives, or other jointing materials shall be used as recommended by the pipe or joint manufacturer’s specifications. Generally, lubricants and primers and adhesives shall be placed on both the bell and spigot portions of the joint. The pipe shall then be placed, fitted, joined, and adjusted in such a workmanlike manner as to obtain the degree of water tightness required. In the event that pipe previously laid is disturbed due to any cause, it shall be removed and relaid.

a) Permissible Deflection in Push-On Joint Pipe – Whenever it is desirable to deflect push-on joint pipe, the amount of deflection shall not exceed the maximum limits shown in the Table below. Pipe sections shall always be properly jointed and pushed “home” with their axes parallel (straight) before deflecting the joint even if this necessitates extra excavation.

Maximum Permissible Deflection in Laying Push-On Joint Pipe

Size Pipe	18 Ft. Length	20 Ft. Length
6”	19”	21”
8”	19”	21”
10”	19”	21”
12”	19”	21”
14”	11”	12”
16”	11”	12”
18”	11”	--
20”	11”	--
24”	11”	--

13. Joints that show leakage will not be accepted. If after backfilling and inspection, any joints are found to be allowing groundwater to enter the sewer, such joints shall be sealed by the CONTRACTOR at no cost to the OWNER.

14. Joining of Mechanical Joint Pipe and Fittings:
- a. Cleaning and Assembly of Joint – All lumps, blisters, excess coating, grit, oil, grease, and other foreign material shall be removed from at least the last 8 inches of the bell and spigot ends of each pipe. The outside of the spigot and the inside of the bell shall be wire brushed and thoroughly cleaned and dried before the pipe is laid. The cast iron gland shall then be slipped on the spigot end of the pipe with the lip extension of the gland toward the bell end. The rubber basket shall be placed on the spigot end with the thick edge toward the gland.
 - b. Bolting of Joint – The entire section of the pipe shall be pushed forward to seat the spigot end into the bell. The gasket shall then be pressed into place within the bell; care shall be taken to locate the gasket evenly around the entire joint. The cast iron gland shall be moved along the pipe into position for bolting; then all of the bolts shall be inserted and the nuts finger-tightened. All nuts shall then be tightened with a suitable (preferably torque-limiting) wrench. The torque for ¾” size bolts shall be 75-90 foot – lbs. Nuts spaced 180 degrees apart shall be tightened alternately in order to produce an equal pressure on all parts of the gland.
 - c. Permissible Deflection Mechanical Joint Pipe – Whenever it is desirable to deflect mechanical joint pipe, the amount of deflection shall not exceed the maximum limits shown in the Table below. Pipe sections shall always be properly jointed and pushed home with their axes parallel (straight) before deflecting the joint even if this necessitates extra excavation. Bolts shall be hand tightened before the joint is deflected.

Size Pipe	18 Ft. Length	20 Ft. Length
6”	27”	30”
8”	20”	21”
10”	20”	22”
12”	20”	22”
14”	13”	15”
16”	13”	15”
18”	11”	--
20”	11”	--
24”	9”	--

15. Steep Slope Protection – Sewers on twenty percent (20%) or greater slopes shall be anchored securely with concrete (or approved equal) anchors spaced as follows:
- a) Not over 36 feet center to center on grades 20% - 35%;
 - b) Not over 24 feet center to center on grades 35% - 50%;
 - c) Not over 16 feet center to center on grades over 50%.

16. Install DIP and fittings following AWWA C600 and AWWA C153.

17. V-Bio polyethylene encasement:

- a. Zinc Coated DIP and fusion bonded epoxy coated fittings and valves: AWWA C105, for Method A, secured with polyethylene compatible adhesive tape.
 - 1) Seal V-Bio polywrap with minimum two layers of tape on the zinc coated DIP and overlap polyethylene at joint to provide double layer of polyethylene, secure end with minimum two layers of tape.
 - 2) Along pipe barrel, take up slack in V-Bio polywrap tube, making snug but not tight fit. Fold over on top of pipe and secure in place every three feet along the barrel of pipe with minimum 6-inch length of tape. In wet trench area, secure in place every two feet along barrel of pipe with minimum one layer of tape around the pipe.
 - 3) For odd-shaped appurtenances, use flat sheet V-Bio polywrap: AWWA C105, Section 4.4.4, secure ends with minimum two layers of tape.
- b. PVC pipe: Encase fusion bonded epoxy coated ductile iron fittings and valves in V-Bio polywrap as specified herein. Overlap V-Bio polywrap onto PVC pipe minimum 6 inches.

18. PVC AWWA C900 Pressure Pipe: Follow AWWA C605.

- E. Point Repairs: Replacement of existing sewer from 5 linear feet to 10 linear feet to correct identified problems with sewer main.
- F. Verification of Design Slope and Invert Elevations:
 1. Installations of 0.5 Percent or Less: Survey immediately upon completion of each segment before setting the cone section.
 2. Reinstall segment(s) of pipe where slope or elevations are not to design at no additional cost to the Owner.
- G. Ductile iron pipe to be installed in casing pipe bored and jacked under highway and railroad shall be restrained joint type.

3.02 JOINTS

A. PVC Pipe:

1. Clean joint surfaces immediately before jointing.
2. Apply lubricant, align spigot to bell, inserting until it contacts gasket evenly all around, then force pipe units together with proper equipment.
 - a. Insert spigot ends into bells to depth marked on pipe.
 - b. If spigot depth reference mark is missing, improperly placed, or on field-cut pipe, mark depth reference around entire circumference of pipe

before making joint.

3. Field Cut:
 - a. Cut square and bevel outer edge same as factory-made spigot ends.
 - b. Closed profile PVC pipe: Seal exposed cells on cut ends following manufacturer's recommendation.
 - c. Open profile PVC pipe: Cut 18 inch and larger pipe following manufacturer's recommendation.

B. DIP: See AWWA C600.

C. RCP:

1. Clean RCP joint surfaces immediately before jointing and liberally coat pipe joints with lubricant.
2. Fit bell or spigot with gasket following manufacturer's instructions.
 - a. Joint pipes with equipment designed for purpose.
 - b. Before joint is completely home, check gasket position using suitable gage.
 - c. If gasket is dislocated, repeat entire joining process using new gasket.
3. For pipe with steel end ring joints, after joining has been completed, completely fill exterior joint spaces with mastic or mortar and fill interior joint spaces on pipes 36 inch and larger diameter with mastic or mortar and remove excess material from inside of pipe.
4. Joint Opening: Maximum 1/2 inch, unless otherwise shown on Drawing.

D. PVC AWWA C900 Pressure Pipe: Follow Section 33 05 31.13.

3.03 SEWER SERVICE CONNECTIONS

A. Install following Standard Details and Contract Documents.

B. Service connections to DIP, PVC, AWWA C900.

1. Install transition gasket to mechanical joint tee.

C. Tapping Existing Main:

1. Tap existing sewer with motor driven tapping machine utilizing diamond core bit.

D. Sewer Service Connection Renewal.

1. Before connection to mainline, take necessary steps to assure minimum 2 percent grade. Refer to Engineer for resolution when 2 percent grade cannot be obtained.
2. Utilize existing tee at main line unless otherwise directed by Engineer.
3. When not utilizing existing tee remove existing pipe and replace with PVC

- pipe and tee, wye, or tap with approved saddle.
4. Reconnect and restore service by end of work day.
 5. Abandon existing tap, tee, wye, or thimble not utilized for renewal as described herein.
 6. Where sewer service connection is same size as existing sewer, cut in PVC tee or wye branch with adapters.
 7. Where existing tap with double connection requires replacement, install 2 single connections.
 8. Where indicated or directed by Engineer, tap directly into manholes for sewer service connections specified herein.
 9. Renewal of existing asbestos cement (AC) pipe.
 - a. Comply with OSHA requirements for sawing AC pipe.
 - b. Use water during sawing to prevent dust from being generated, and to shield and contain debris.
 - c. Allow only workers directly involved in sawing AC pipe in work area during sawing operations.
 - d. Leave AC pipe to be abandoned intact in largest possible pieces.
 - 1) Do not crush, break up or cut into small pieces.
 - e. Move cut sections of AC pipe to side wall of trench excavation.
 - 1) Do not damage or break AC pipe into smaller debris.
 - 2) Abandon AC pipe minimum of 8 inches from new service.
 - f. Cover cut sections and ends with 6 mil plastic sheeting before backfilling.
 - g. Install new pipe without disturbing AC pipe sections.
 - h. Install cleanout at property line following Standard Details.

E. Post Lining Installation of New Service Lateral.

1. See Section 33 01 30.75 – Lateral Connection Restoration

3.04 CONNECTIONS TO EXISTING SEWERS AND MANHOLES

- A. Install following Standard Details and Contract Documents.
- B. Verify proposed connection for grade, alignment and existing pipe material to existing sewer before installation of pipe.
- C. Maintain existing sewage flows during connection to existing sewer.
 1. Take precautions and employ methods required to prevent sewage backup.
 2. Bypass pumping may be used as option for flow diversion.
 3. Return diverted sewage to sanitary system and do not discharge on surfaces or into streams or storm drains.
 - a. Use enclosed bypass flumes equivalent in size to existing sewer being

- diverted, when required.
4. Immediately clean and disinfect raw sewage spills and overflows caused by operation.
 - a. Immediately report sanitary sewer spills and overflows onto any surface to the Owner.
 - 1) No surfaces or amounts are exempt.
 - D. Connect pipe to existing concrete manhole by core drill method.
 1. Unless otherwise noted, provide flexible gasket connector following manufacturer's recommendation.
 - E. When connecting DIP or RCP to existing brick manhole: Follow Standard Details.
 - F. When building manhole on existing sewer: Follow Standard Details.
 - G. Sewer service connections: Connect to existing main line sewers as specified herein and following Standard Details.

3.05 FIELD TESTING

- A. Refer to Section 33 31 31.
- B. Gravity Sewer - Except for 42-inch and larger RCP.
 1. Perform Air Test including service connections, with low air pressure after completion of backfill in accordance with Section 33 31 31.
 - a. Before placing testing apparatus, inspect sewers and manholes and eliminate discernible water leaks.
 - b. Contractor may perform preliminary tests at their own discretion for their information, without presence of Engineer, at no cost to the Owner.
 - c. Perform tests in presence of Engineer.
 - 1) Provide material, equipment, and labor required.
 - 2) Test sewers from manhole to manhole or from manhole to terminus.
 - 3) Contractor may before air testing RCP, soak interior with clean water.
 - a) Remove water before air testing begins.
 2. Perform Pipe Mandrel Deflection Test - PVC pipe 15 inch and smaller in accordance with Section 33 31 31.
 - a. Thoroughly clean test section prior to test.

- b. Contractor may perform preliminary test at their own discretion, for their information, without Engineer's presence and at no cost to the Owner.
 - c. Perform test in presence of Engineer.
 - 1) Provide material, equipment and labor required.
 - d. Push or pull mandrel through pipeline.
- C. Force Mains: Follow Section 33 31 31.

END OF SECTION 33 31 21

SECTION 33 31 31

LEAKAGE AND TESTING OF SEWER MAINS

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Prior to final acceptance and commissioning of the sewers and force main, the CONTRACTOR shall conduct the following acceptance tests:
1. Gravity sewers: Vertical deflection test
 2. Gravity sewers: TV inspection
 3. Gravity sewers: Low pressure air test
 4. Force mains: Hydrostatic pressure test
- B. The gravity sewers and force mains shall be considered acceptable when the results of all acceptance tests meet the requirements of this section as approved by the OWNER and ENGINEER. The CONTRACTOR shall be responsible to repair or replace all defective materials or workmanship determined from the acceptance tests.
- C. The pipe system under test and any closures in the test section should be restrained against sudden uncontrolled movement from catastrophic failure. Piping system rupture may result in sudden, forcible, uncontrolled movement of system piping or components, or parts of components. Test equipment should be examined before pressure is applied to ensure that it is tightly connected. All low pressure filling lines and other items not subject to the test pressure should be disconnected or isolated.
- D. No water from Pennsylvania American Water Company (PAWC) will be permitted for use in hydrostatic testing. The CONTRACTOR shall be responsible for securing all water and for providing all labor, equipment and materials to transport the water to the pump station sites and fill the force main. All costs for obtaining clean water shall be included within the various unit prices bid within the Contract.
- E. Test medium and test section temperatures shall be maintained below 100°F. At temperatures above this level, reduced test pressure is required. Before applying test pressure, time may be required for the test medium and test section to temperature equalize.
- F. Testing shall not be conducted until after trench backfill is completed and concrete thrust blocks have been allowed sufficient time to completely cure. All testing shall be conducted in the presence of the ENGINEER, PROJECT INSPECTOR or their designated representative. Should the pipeline fail the test, the CONTRACTOR shall determine the cause of failure, replace the defective joints, fittings or pipes, and retest the pipeline, repeating the process until the test is passed at no additional costs to the OWNER. The

CONTRACTOR is responsible for all costs associated with remedies for a section of pipeline failing the pressure testing.

PART 2: PRODUCTS

2.01 EQUIPMENT

- A. The CONTRACTOR shall furnish all equipment and personnel required to conduct each of the acceptance tests as described under Part 3 of this section.
- B. The CONTRACTOR shall determine appropriate lengths for test sections. Test equipment of proper capacity shall be provided by the CONTRACTOR.
- C. The CONTRACTOR shall furnish labor, equipment, gauges, water, air, and all else necessary for carrying out the testing of all piping. All piping, fittings, caps, and plugs shall be adequately braced and anchored to withstand the test pressures. The CONTRACTOR shall review the Contract Drawings before starting piping installation and shall take special note of where piping begins or terminates with fittings which will be difficult or impractical to seal, plug and anchor. For these cases, the CONTRACTOR shall devise and perform such tests as shall be acceptable and approved by the ENGINEER and as shall demonstrate that the piping meets the test pressures and leakage requirements specified herein.

PART 3: EXECUTION

3.01 VERTICAL DEFLECTION TEST OF GRAVITY SEWERS

- A. The CONTRACTOR shall furnish all equipment and personnel to conduct deflection testing on all PVC pipe installed. The total vertical wall deflection of the PVC sewer pipe shall not exceed five (5) percent of the inside pipe diameter. Deflection testing shall **not** be conducted earlier than fourteen (14) days after placement and compaction of the backfill.
- B. The vertical deflection shall be checked by manually pulling a go, no-go deflection testing mandrel through the pipe. The mandrel shall be specifically designed for this purpose, and the CONTRACTOR shall submit shop drawings to the ENGINEER detailing the type of mandrel to be used. The mandrel shall be as manufactured by Armco, Inc. or equal and shall have the specified accuracy in all positions of rotations.
- C. The CONTRACTOR shall conduct all deflection testing in the presence of the ENGINEER, PROJECT INSPECTOR or their designated representative. Should any pipe section exceed the maximum deflection specified, the CONTRACTOR shall undertake any remedial action as required to reduce the deflection to within that limit.

3.02 TV INSPECTION OF GRAVITY SEWERS & SERVICE LATERALS

- A. All television inspections shall be performed by personnel experienced and trained in locating breaks, obstructions, service connection laterals, etc. in sewer lines by closed circuit television. The CONTRACTOR shall submit an equipment and personnel experience list to the ENGINEER for approval prior to commencement of the work. Picture quality and definition of all video equipment and recordings shall be to the complete satisfaction of the ENGINEER. CCTV equipment shall include all equipment necessary for satisfactory televising and recording. Any recordings deemed unsatisfactory by the ENGINEER shall be redone at the CONTRACTOR's expense until a satisfactory recording is produced.
- B. The CONTRACTOR shall furnish all equipment for video tape recording and for taking photographs of the pictures observed on the monitor. All sewer inspections shall be recorded on portable digital drives for future reference.
- C. All CCTV inspections shall be conducted under bypass pumping conditions with no sewage flowing in the segment to be inspected. The CONTRACTOR shall first clean and flush all lines, and debris flushed out shall be removed at each downstream manhole. Where branch lines connect directly to the sewer being inspected without manholes, the inspection shall be performed during periods of low flow. Under no circumstance shall the depth of flow within the sewer being inspected exceed 5 percent of the sewer diameter.
- D. Any sewers that contain steam or vapors that may obscure the televised view of the sewer shall not be inspected with the steam or vapors in the sewer. When this situation arises, the CONTRACTOR shall use an air blower to ventilate the sewer line and improve visibility to an acceptable level as determined by the ENGINEER.
- E. The television inspection equipment shall be self contained complete with manual or powered winches, cable, a flexible push rod for service connection laterals, closed circuit television pan and tilt camera, video recorder, camera, film, monitor, a measuring device to accurately determine the position of the camera at all times and all miscellaneous equipment required to perform a complete television inspection.
- F. The television camera shall be one specifically designed and constructed to perform closed circuit television sewer inspections. The camera shall be waterproof and capable of operating in 100 percent humidity conditions and shall have 360 degrees of rotation, 240 degrees of pan and tilt; lens sensitivity of 3 lux; remotely controlled focus and iris adjustment and auto centering realignment to axial viewing. The camera, television monitor and all components of the video system shall produce a minimum of 400 line resolution color video picture. Video recordings shall be made and provided to ENGINEER and OWNER in an acceptable digital format. . Lighting shall be head and camera mounted and of adequate intensity and coverage to produce a clear, well lit image of the entire sewer perimeter and length.
- G. Television inspection shall begin at the centerline of the upstream manhole of

the sewer segment to be inspected and shall progress downstream to the centerline of the next manhole. If camera movement is obstructed in the downstream direction, the inspection shall be conducted from the centerline of the downstream manhole and progress upstream. If camera movement is still obstructed, the CONTRACTOR shall investigate and remove the source of obstruction and reinspect the line. Under no circumstances shall a line be rehabilitated which has not been CCTV inspected first.

- H. In addition to the sewer segments, upstream, intermediate and downstream manholes shall be television inspected to determine the condition of the walls, invert, branch connections, benching, steps, etc.
- I. Manual winches, power winches, TV cable and power rewinds or other mechanical devices that do not interfere with proper documentation of the sewer condition, damage the sewer or obstruct the camera view shall be used to move the camera through the sewer line. If non-remotely controlled power winches are used to move the camera through the sewer line, radios or telephones shall be used to ensure adequate communication between crew members. The CONTRACTOR shall take the necessary precautions to protect the sewer line and manholes being inspected from damage by the winch cables or any other inspection equipment and shall repair any damage resulting from their operations at their expense.
- J. The camera shall be moved through the sewer line at a uniform rate, pausing for a minimum of 5 seconds at defects, service connections, etc. as necessary. The rate of camera movement shall not exceed 30 feet per minute. Measurement for the accurate location of features along the pipe alignment shall be provided and operated by the CONTRACTOR. The footage meter shall be mounted on the TV reel power level winding assembly. The meter shall be equipped with a local mechanical readout for use at the rear of the TV vehicle and an electronic cable which is connected to the data view system for display on the video monitor and the video tape. The footage meter shall accurately record the distance in feet which the video cable has traveled. The measurement shall be accurate to 0.30 feet per 100 feet of inspected sewer length.
- K. The CONTRACTOR shall log the results of all observations and prepare all necessary data that may be required for record purposes. The inspection log shall include the following items as a minimum: inspection date; street location; segment reach (MH # to MH #); starting footage meter reading; condition of all manholes encountered; locations of all obstructions, service connections, branch connections, defects and other items of interest; and ending footage meter reading. The CONTRACTOR shall submit the inspection log format to be used throughout the Contract to the ENGINEER for approval prior to any inspection operations.
- L. The CONTRACTOR shall describe on the video recording all features encountered while moving the camera from the center of the entry manhole to the distance in the pipe where they set their footage meter. An audio

recording of estimated footage shall be made for all features described prior to setting the footage meter. At the time of the inspection, the CONTRACTOR shall provide an audio description of all defects, joints, discharges, service connection laterals and other important features on the video recording. The date of the TV inspection, location (MH # to MH #) and the distance that the camera has traveled through a particular sewer reach shall be continuously displayed on the monitor and recorded cassette. All digital recordings obtained during the work shall be turned over to the ENGINEER and shall become property of the OWNER.

- M. Sewer Service Connections shall be inspected by CCTV sewer service connections from cleanout to main line sewer. Repair or replace defective sewer service connections installed under this Contract and re-televiser within 5 working days.

Defects shall include:

1. Intermediate low points between cleanout and mainline connection.
2. Cracked pipe.
3. Infiltration.
4. Joints:
 - a. Not made in accordance with manufacturer's recommendations.
 - b. Deflected joints.
5. Excessive vertical pipe deflection.

Replacement of defective sewer service connections installed under this contract, and re-televising will be at no additional cost to the Owner.

3.03 LOW PRESSURE AIR TEST OF GRAVITY SEWERS

- A. Before final acceptance of the sewers, the CONTRACTOR shall furnish all equipment and personnel to conduct an acceptance test where practical using low pressure air.
- B. The CONTRACTOR shall first clean and flush all lines, and all debris flushed out shall be removed at each downstream manhole.
- C. All test plugs, gauges, an air compressor, and personnel for conducting the acceptance test shall be furnished by the CONTRACTOR. The test shall be conducted under the supervision of the ENGINEER.
- D. The section of line being tested shall be securely plugged at each manhole. All stoppers shall be adequately braced.
- E. For the acceptance test, air shall be slowly supplied to the plugged section of pipe to be tested until the internal air pressure reaches 4.0 psi greater than the average back pressure of any groundwater that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further. The back pressure of any groundwater caused by the

water head above the invert of the pipe must be determined by a method approved by the ENGINEER. This back pressure must be added to the standard test pressures to compensate for the groundwater effect on the air test.

- F. The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 psi to 2.5 psi greater than the average back pressure of any groundwater that may submerge the pipe.
- G. The pipeline shall be considered acceptable when the 1.0 psi pressure drop is not less than the holding time listed in the air test table included at the end of this section.
- H. If the pipe installation fails to meet these requirements, the CONTRACTOR shall determine at their own expense the source or sources of exfiltration, and they shall repair or replace all defective materials or workmanship. The complete pipe installation shall meet the requirement of this test.

3.04 GRAVITY SEWER – 42- INCH AND LARGER DIAMETER RCP

- A. Conduct individual joint air tests after at least 2 lengths of pipe have been installed beyond joint undergoing test and trench is backfilled to at least top of installed pipes.
- B. Before testing first joint beyond pipe/manhole connector, brace or block first length installed out of manhole.
- C. Conduct individual joint tests as follows: Clean joint area, and at CONTRACTOR'S option, wet joint area before placing air test equipment.
- D. Position joint tester so end elements are located on both sides of joint to be tested.
- E. Inflate end sealing elements to pressure specified by manufacturer of equipment.
- F. Determine depth of groundwater level above inverts immediately before testing.
- G. Pressurize center cavity with air or water following manufacturer's recommendation through separate pressurizing lines to 3.5 psi.
- H. ENGINEER will increase gage pressures accordingly but total pressure including increased amount of groundwater backpressure at springline of pipe shall not exceed 5.5 psi.
- I. Pressure relief device may be installed to pressurizing line to avoid over pressurization.

- J. Allow test pressure to stabilize and maintain for approximately 10 to 15 seconds, and then turn off pressure source.
- K. If pressure holds or drops less than 1.0 psi in 10 seconds or more, joint is acceptable.
- L. Remove equipment by releasing air from center cavity and then from end elements.
- M. If test fails, check leakage of air or water at end sealing elements.
- N. If leakage is at end sealing elements, eliminate this leakage and perform retest.
- O. If pipe joint fails test, remove pipe length(s), inspect joint area for defects and correct, clean joint area and rejoin pipe.
- P. Repeat joint test procedure as stated above.
- Q. To be accepted pipe joint must pass air test.

3.05 HYDROSTATIC PRESSURE TEST OF FORCE MAINS

- A. The CONTRACTOR shall test all sections and appurtenances of the force mains at 100-PSI, or as otherwise directed by Engineer (if normal operating pressure is greater than 100 PSI, test at minimum of 1.5 times the normal operating pressure)
- B. Test pressures shall be held continuously for 2 hours. The test reading shall be taken at the high point on the line or at a location approved by the ENGINEER. The CONTRACTOR shall be required to keep detailed records of all testing and all records shall be submitted to the OWNER for review and record.
- C. All tests must be conducted in the presence of the OWNER'S representative. Any tests not witnessed by the OWNER'S representative shall be void and the CONTRACTOR shall be required to re-test that particular section in the presence of the OWNER's representative at the CONTRACTOR's own expense.
- D. When segments of force main are completed and ready for testing, the line shall be thoroughly vented and a leakage test made with the line free of air. The leakage testing will not be permitted unless the pipeline is thoroughly vented of all air. All concrete thrust blocks shall be allowed sufficient time to cure before the commencement of testing.
- E. Leaks at joints or in the pipe and fittings shall be corrected by approved means and the piping retested in accordance with this specification until it successfully passes the tests.

- F. Under the foregoing conditions, the allowable leakage shall be determined by the following formula:

$$L = \frac{(S) (D) (\sqrt{P})}{148,000}$$

L = Allowable Leakage, Gallons per hour

S = Length of Pipe Tested, feet

D = Nominal Pipe Diameter, inches

P = Average Test Pressure, psi

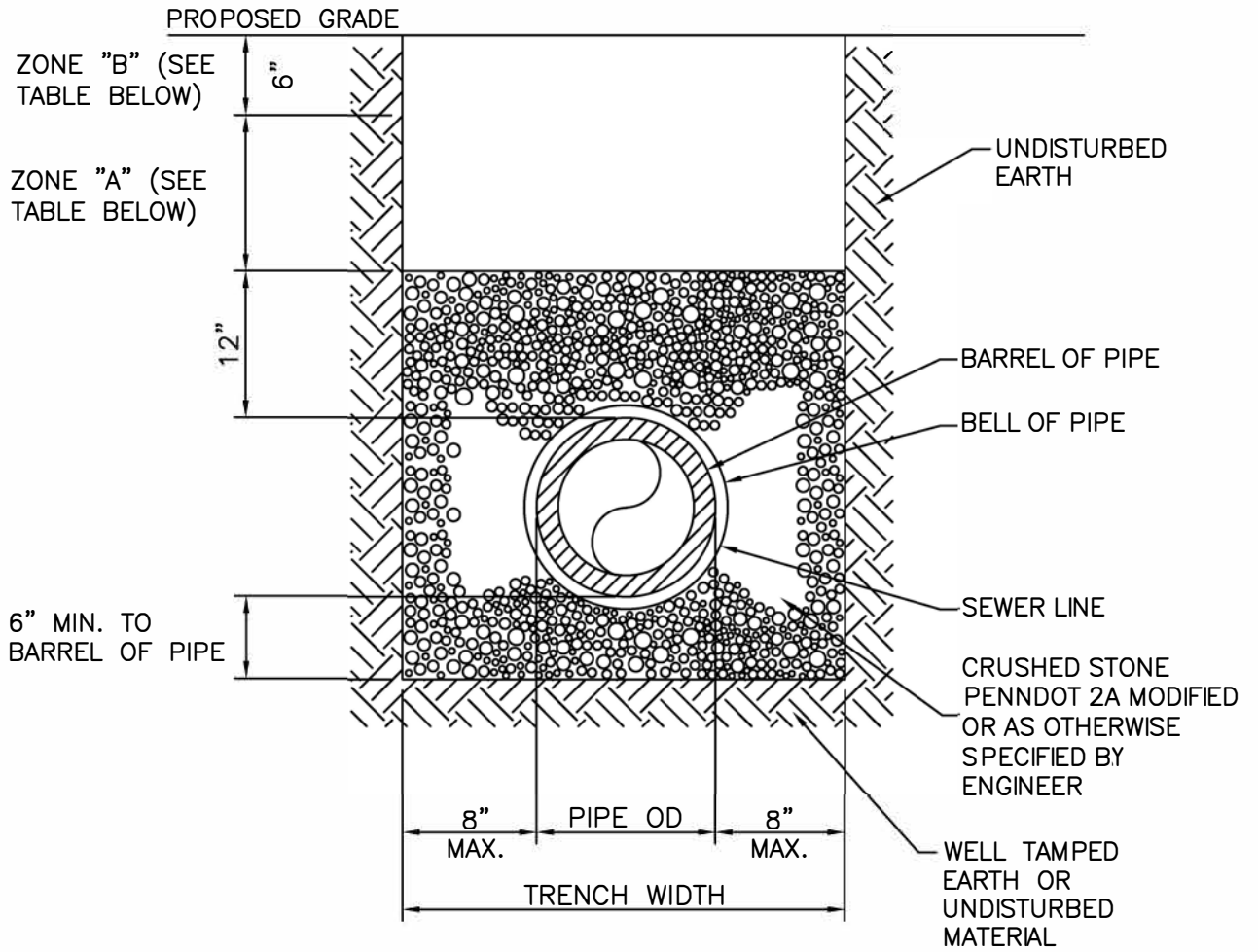
- G. Joints that leak shall be repaired and retested under the same conditions and under the same period of operation. If joints are found to be defective, they shall be replaced until the line passed the required test at the CONTRACTOR's expense.
- H. All water, valves, plugs, fittings and appurtenances necessary to complete testing shall be included within the various unit prices bid throughout the Contract.

MINIMUM HOLDING TIME REQUIRED FOR PRESSURE TO DROP FROM 3-1/2 TO 2-1/2 PSIG

Pipe (In)	Specification Time for Lengths Below (Min:Sec)											Time for Longer Length (Sec)
	100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft	500 ft	550 ft	600 ft	
6	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:25	7:07	7:50	8:33	0.854 x L (ft)
8	7:33	7:33	7:33	7:33	7:36	8:52	10:08	11:24	12:40	13:56	15:12	1.519 x L (ft)
10	9:27	9:27	9:27	9:54	11:52	13:51	15:50	17:48	19:47	21:46	23:45	2.374 x L (ft)
2	11:20	11:20	11:20	14:15	17:06	19:57	22:48	25:39	28:30	31:20	34:11	3.419 x L (ft)
15	14:10	14:10	17:48	22:16	26:43	31:10	35:37	40:04	44:31	48:58	53:25	5.342 x L (ft)
18	17:00	19:14	25:39	32:03	38:28	44:52	51:17	57:42	64:06	70:31	76:56	7.692 x L (ft)
21	19:50	26:11	34:54	43:38	52:21	61:05	69:48	78:32	87:15	95:59	104:42	10.47 x L (ft)
24	22:48	34:11	45:35	56:59	68:23	79:47	91:10	102:34	113:58	125:22	136:46	13.67 x L (ft)
27	28:51	43:16	57:42	72:07	86:33	100:58	115:24	129:49	144:14	158:40	173:05	17.3 x L (ft)
30	35:37	53:25	71:14	89:02	106:51	124:39	142:28	160:16	178:05	195:53	213:41	21.36 x L (ft)
33	43:06	64:38	86:11	107:44	129:17	150:50	172:23	193:55	215:28	237:01	258:34	25.85 x L (ft)


REF: UNI-BELL PLASTIC PIPE ASSOCIATION, PUB. UNI-B-6-79 “RECOMMENDED PRACTICE FOR LOW-PRESSURE AIR TESTING OF INSTALLED SEWER PIPE”

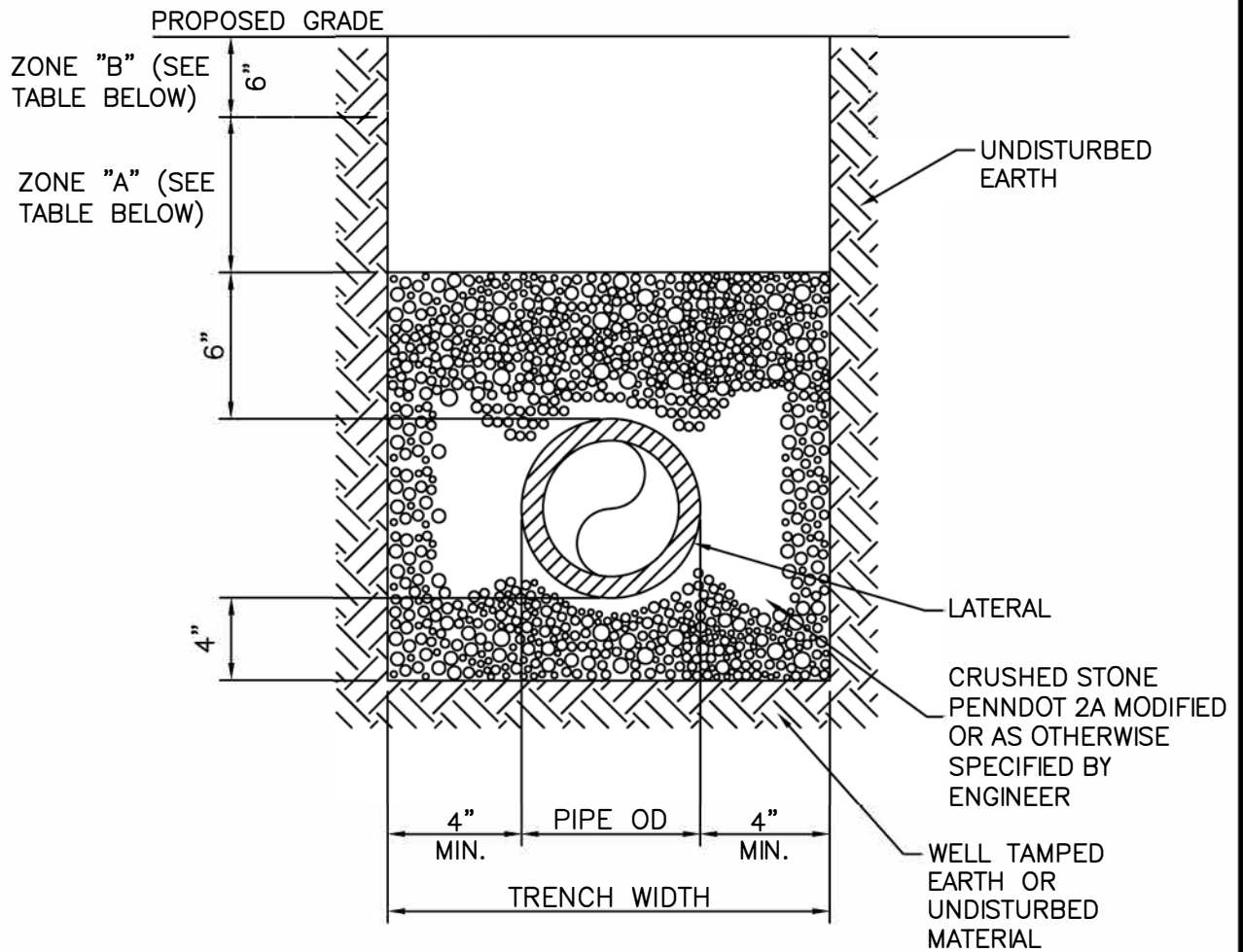
END OF SECTION 33 31 31



SCHEDULE OF BACKFILLING REQUIREMENTS FOR ZONES 'A' AND 'B'


DESCRIPTION OF AREA	ZONE 'A'	ZONE 'B'
AREAS OUTSIDE ROADWAYS	ON-SITE BACKFILL COMPACTED IN 6" LAYERS TO BOTTOM OF TOPSOIL. REPLACE TOPSOIL TO APPROXIMATE DEPTH OF EXISTING AND CROWN TO SUCH HEIGHT AS REQUIRED BY THE ENGINEER.	
AREAS WITHIN R/W LIMITS OF STATE HIGHWAYS	CONFORMING TO THE REQUIREMENTS OF PaDOT	
SHOULDERS OF PROPOSED AND EXISTING STREETS OTHER THAN STATE HIGHWAYS	MEETING THE REQUIREMENTS OF THE LOCAL MUNICIPALITY HAVING JURISDICTION	
STONE DRIVEWAYS AND PARKING AREAS	ON-SITE BACKFILL COMPACTED ON 6 INCH LAYERS	STONE SURFACE BACKFILL
UNIMPROVED STREETS	AGGREGATE BACKFILL COMPACTED IN 6 INCH LAYERS	

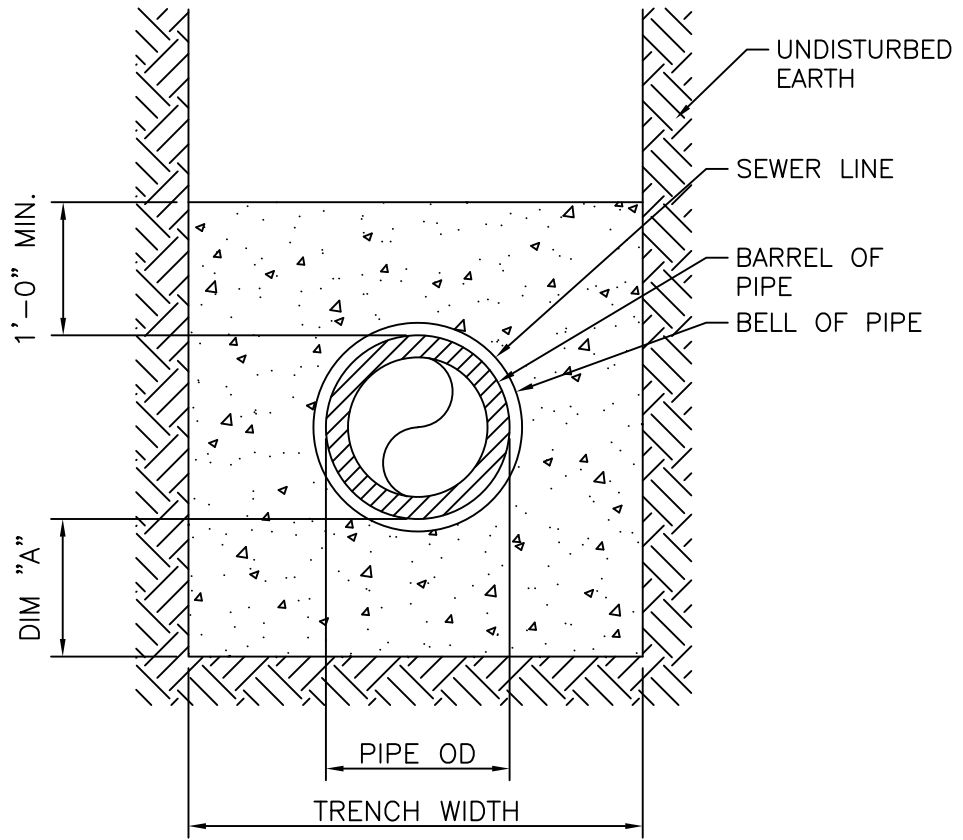
	REVISIONS	SEWER LINE BEDDING AND BACKFILL DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-1



SCHEDULE OF BACKFILLING REQUIREMENTS FOR ZONES 'A' AND 'B'


DESCRIPTION OF AREA	ZONE 'A'	ZONE 'B'
AREAS OUTSIDE ROADWAYS	ON-SITE BACKFILL COMPACTED IN 6" LAYERS TO BOTTOM OF TOPSOIL. REPLACE TOPSOIL TO APPROXIMATE DEPTH OF EXISTING AND CROWN TO SUCH HEIGHT AS REQUIRED BY THE ENGINEER.	
AREAS WITHIN R/W LIMITS OF STATE HIGHWAYS	CONFORMING TO THE REQUIREMENTS OF PaDOT	
SHOULDERS OF PROPOSED AND EXISTING STREETS OTHER THAN STATE HIGHWAYS	MEETING THE REQUIREMENTS OF THE LOCAL MUNICIPALITY HAVING JURISDICTION	
STONE DRIVEWAYS AND PARKING AREAS	ON-SITE BACKFILL COMPACTED ON 6 INCH LAYERS	STONE SURFACE BACKFILL
UNIMPROVED STREETS	AGGREGATE BACKFILL COMPACTED IN 6 INCH LAYERS	

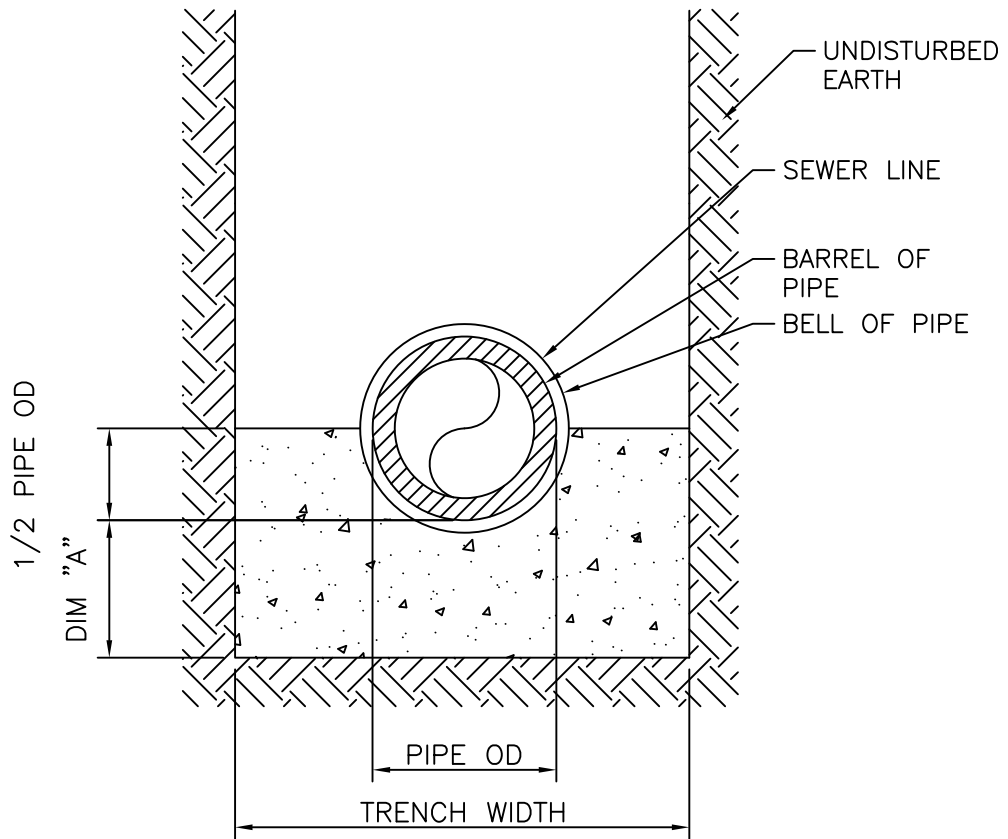
	REVISIONS	LATERAL LINE BEDDING AND BACKFILL DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-2



PIPE SIZE	DIM "A"
4" - 16"	6"
18" - 48"	8"
54" - 84"	10"


NOTE:
 ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF
 3000 PSI AT THE END OF 28 DAYS.

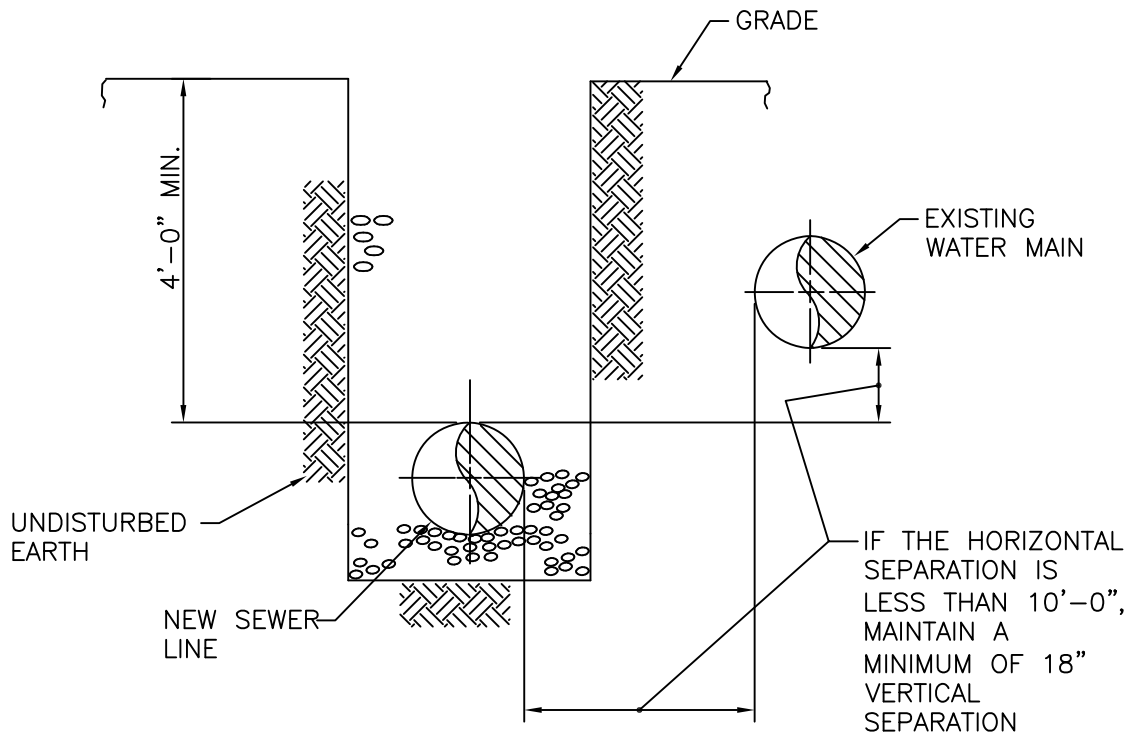
	REVISIONS	CONCRETE ENCASEMENT DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES		SD-3	



PIPE SIZE	DIM "A"
4" - 16"	6"
18" - 48"	8"
54" - 84"	10"

NOTE:
 ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.

	REVISIONS	CONCRETE CRADLE DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES			SD-4



REVISIONS

NEW SEWER LINE PARALLEL TO
EXISTING WATER MAIN DETAIL

PENNSYLVANIA AMERICAN WATER

Company Name
Company Address
Company Address



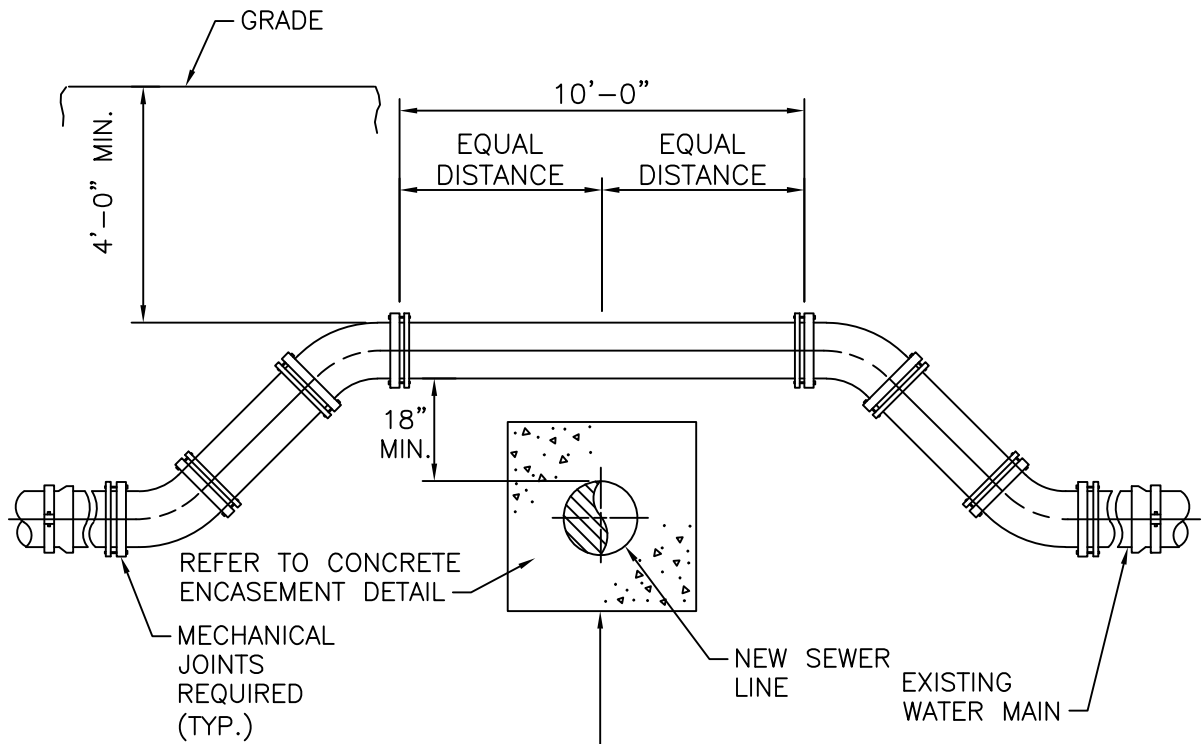
DRAWN BY
PROJECT ENG'R
APPROVED

DATE
PROJECT

USE DIMENSIONS ONLY
SCALE NO SCALE


USE APPROVED DRAWINGS ONLY
FOR CONSTRUCTION PURPOSES

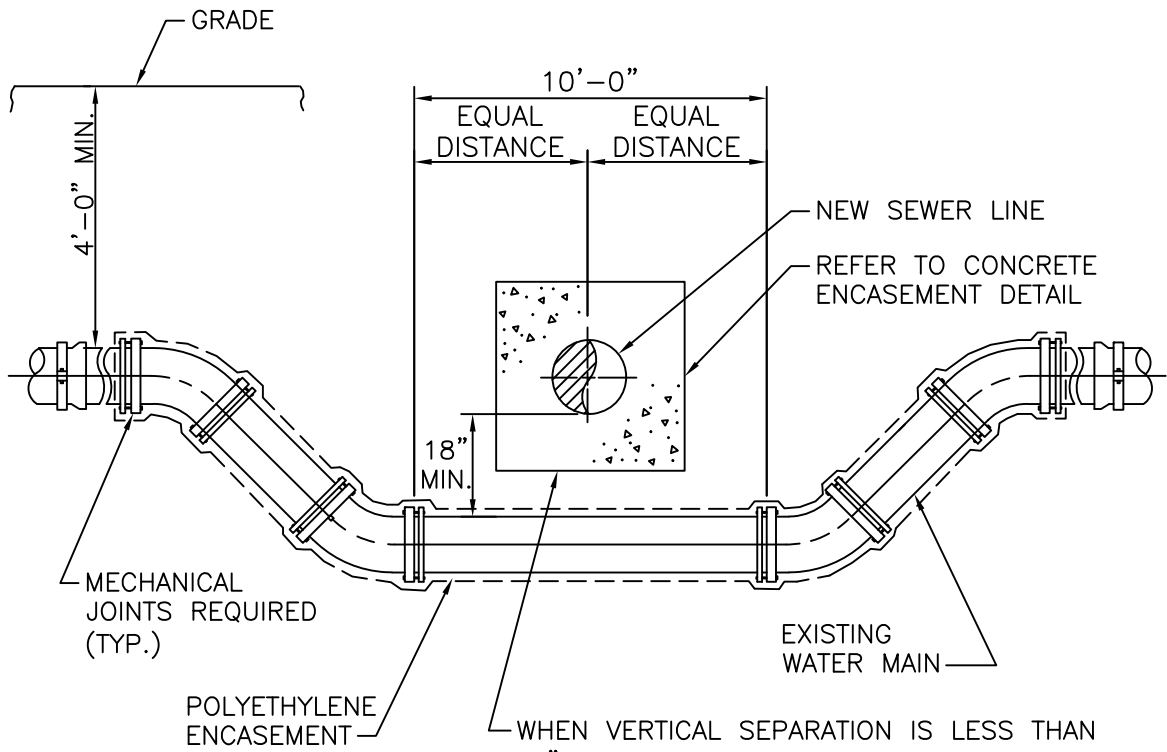
SD-5



WHEN VERTICAL SEPARATION IS LESS THAN 18", PROVIDE CONCRETE ENCASEMENT ON UNDISTURBED GROUND. THE LENGTH OF THE ENCASEMENT SHALL BE EXTENDED A MINIMUM OF 3 FEET BEYOND THE CENTERLINE OF THE WATER MAIN IN BOTH DIRECTIONS.


NOTE:
ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.

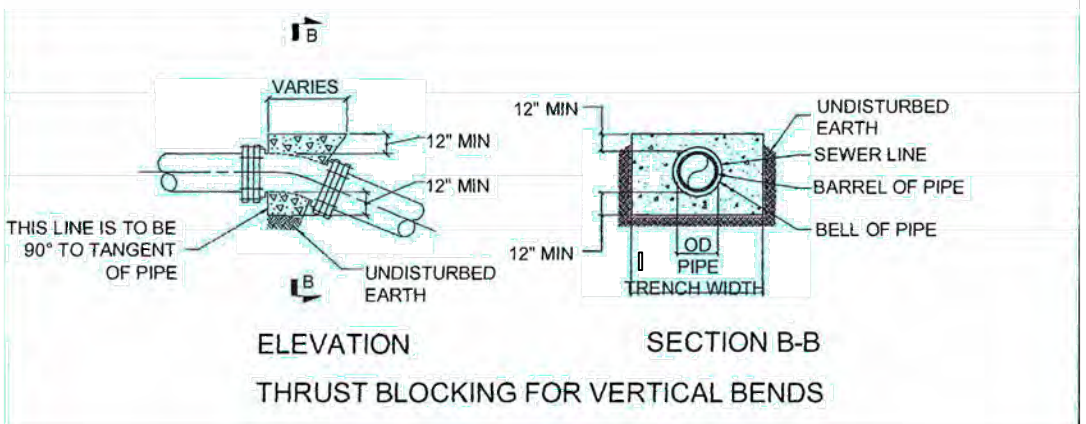
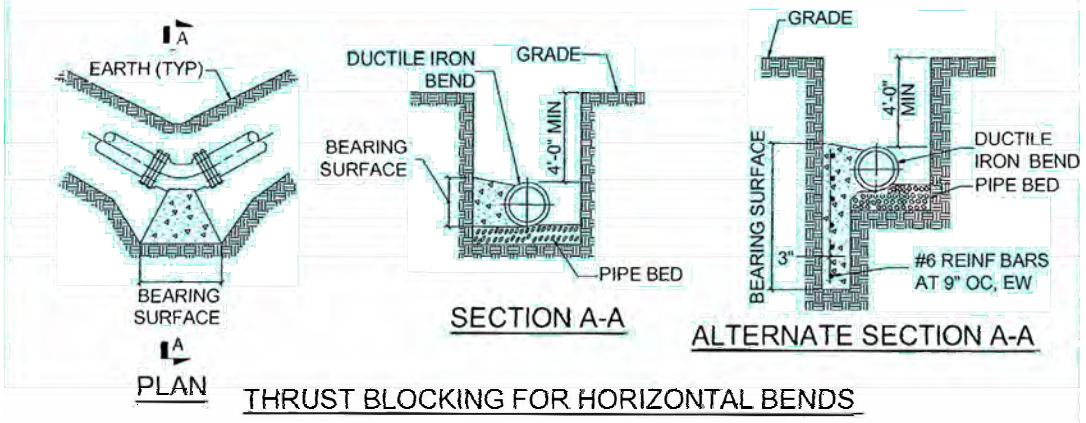
	REVISIONS	NEW SEWER LINE CROSSING UNDER EXISTING WATER MAIN DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-6




WHEN VERTICAL SEPARATION IS LESS THAN 18", PROVIDE CONCRETE ENCASEMENT ON UNDISTURBED GROUND. THE LENGTH OF THE ENCASEMENT SHALL BE EXTENDED A MINIMUM OF 3 FEET BEYOND THE CENTERLINE OF THE WATER MAIN IN BOTH DIRECTIONS.

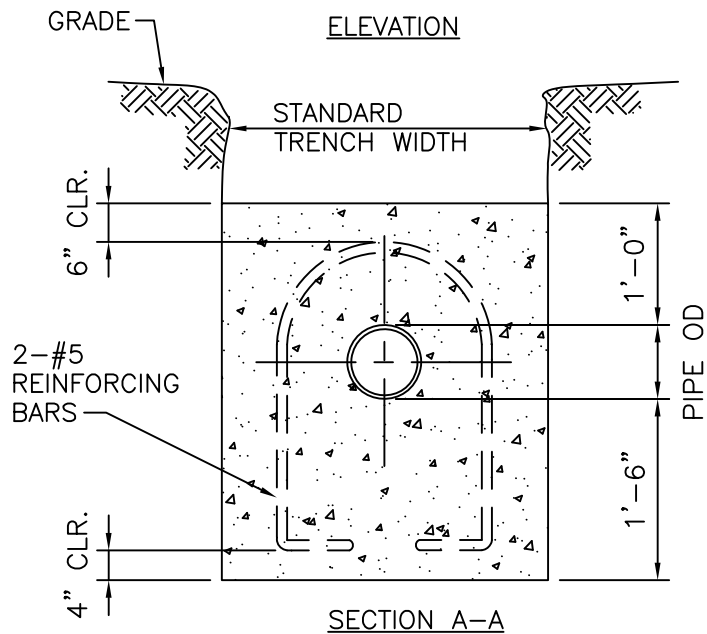
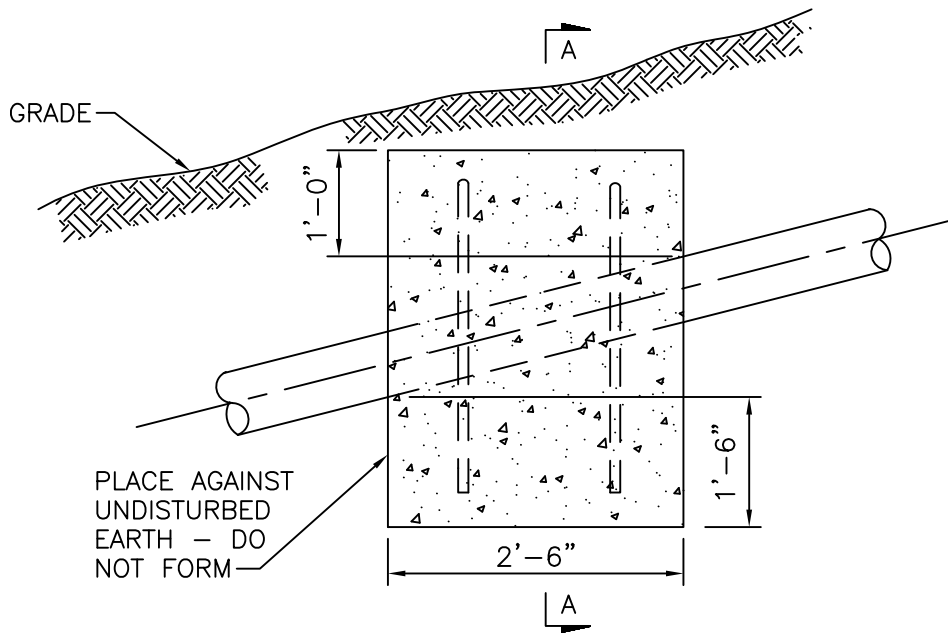
NOTE:
 ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.

	REVISIONS	NEW SEWER LINE CROSSING OVER EXISTING WATER MAIN DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-7




- NOTES:**
1. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.
 2. ALL REINFORCING STEEL SHALL BE DEFORMED BARS.
 3. NO COUPLING OR JOINTS SHALL BE COVERED WITH CONCRETE.
 4. INSTALL CONCRETE THRUST BLOCKS AT EACH ELBOW, TEE AND CAPPED END FITTINGS LOCATED IN THE HORIZONTAL PLANE.
 5. HARNESS PIPE IF ORDERED BY BUILDER/DEVELOPER ENGINEER.
 6. SIZE OF THRUST BLOCKS TO BE DETERMINED INDIVIDUALLY AT THE TIME OF CONSTRUCTION BY BUILDER/DEVELOPER ENGINEER

	REVISIONS	THRUST BLOCKING DETAILS	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-8

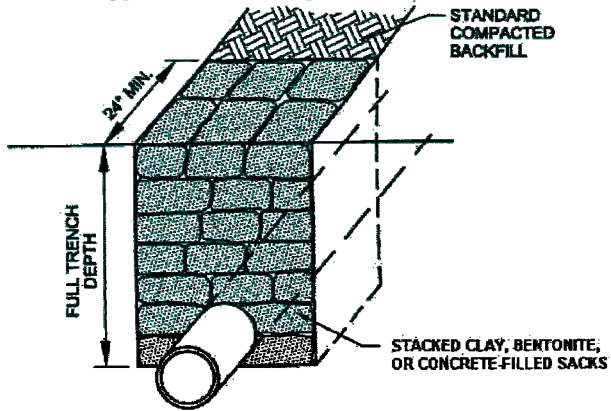


NOTES:

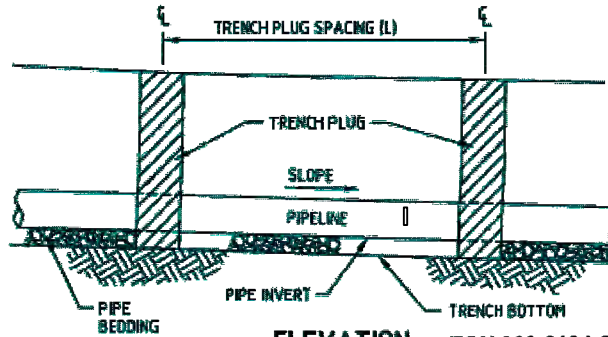
1. ANCHORS ARE NOT REQUIRED ON SLOPES LESS THAN 20% UNLESS NOTED ON DRAWINGS.
2. PROVIDE ANCHORS ON 3'-0" CENTERS FOR SLOPES BETWEEN 20% AND 34%.
3. PROVIDE ANCHORS ON 2'-0" CENTERS FOR SLOPES BETWEEN 35% AND 50%.
4. PROVIDE ANCHORS ON 1'-4" CENTERS FOR SLOPES BETWEEN 51% AND 70%.
5. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.

	REVISIONS	CONCRETE ANCHOR DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-9

**STANDARD CONSTRUCTION DETAIL # 13-4
Typical Trench Plug Installation**



SECTION VIEW



ELEVATION

TGN 363-2134-008 March 2012


PA DEP

**TABLE 13.1
Maximum Spacing and Materials for Trench Plugs**

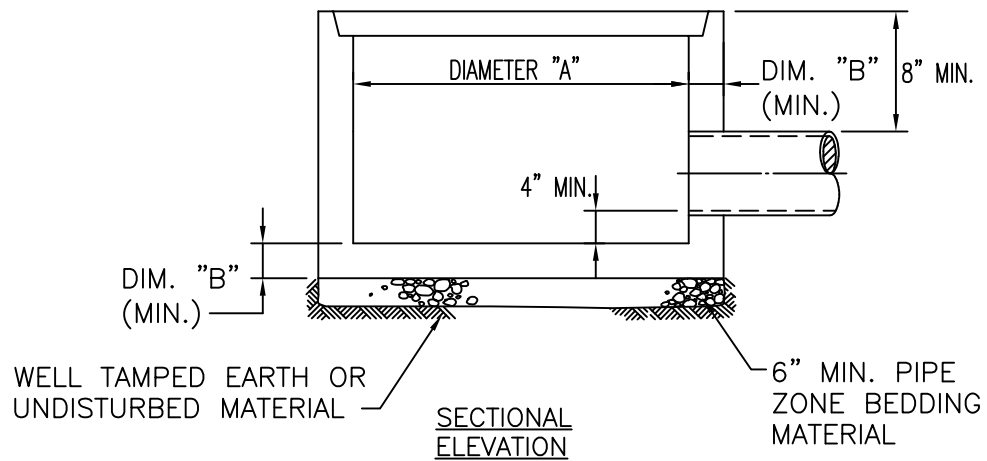
Trench Slope (%)	Spacing L (FT)	Plug Material
< 5	1,000	* Clay, Bentonite, or Concrete Filled Sacks
5 - 15	500	* Clay, Bentonite, or Concrete Filled Sacks
15 - 25	300	* Clay, Bentonite, or Concrete Filled Sacks
25 - 35	200	* Clay, Bentonite, or Concrete Filled Sacks
35 - 100	100	* Clay, Bentonite, or Concrete Filled Sacks
> 100	50	Cement Filled Bags (Wetted) or Mortared Stone

***TOPSOIL MAY NOT BE USED TO FILL SACKS.**

Impervious trench plugs are required for all stream, river, wetland, or other water body crossings.


	REVISIONS	TYPICAL TRENCH PLUG INSTALLATION DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-10

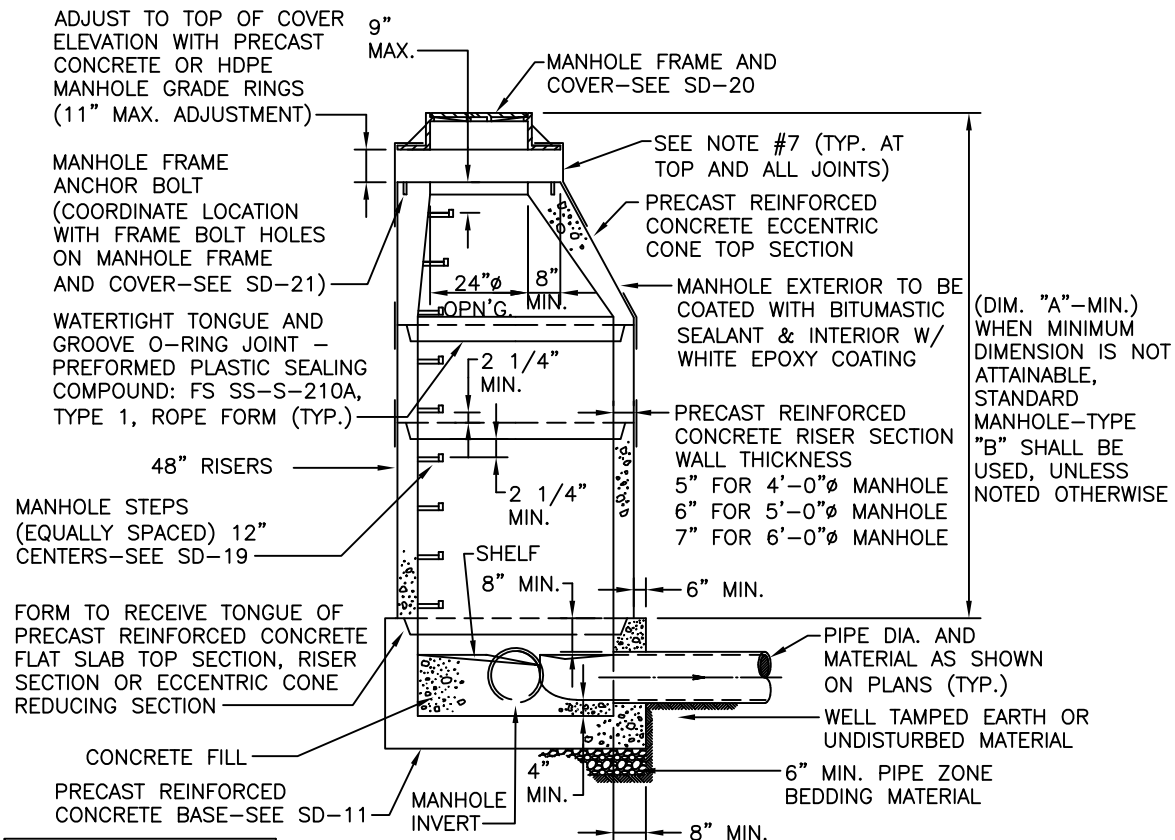
PRECAST REINFORCED CONCRETE MANHOLE BASE SCHEDULE OF DIMENSIONS	
DIA. "A"	DIM. "B"
4'-0"	5"
5'-0"	6"
6'-0"	7"
7'-0"	8"
8'-0"	9"
10'-0"	10"



PRECAST REINFORCED CONCRETE MANHOLE BASE NOTES

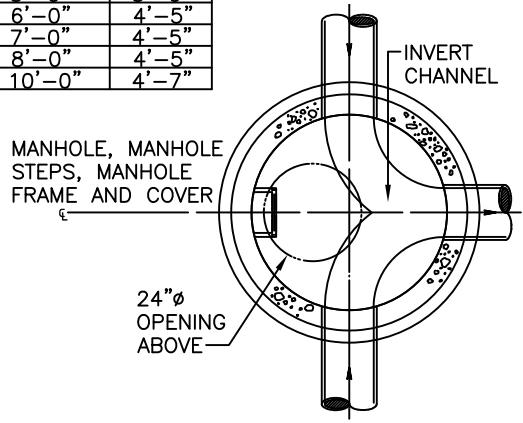
1. ORIENTATION AND DIAMETER OF PIPE OPENINGS SHOWN FOR ILLUSTRATION PURPOSES ONLY. SEE PLANS FOR LOCATION AND DIAMETER.
2. PRECAST REINFORCED CONCRETE MANHOLE BASE TO CONFORM TO ASTM SPECIFICATION C-478.
3. REINFORCING STEEL TO CONFORM TO ASTM SPECIFICATION A-185.

	REVISIONS	PRECAST REINFORCED CONCRETE MANHOLE BASE DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-11



STANDARD MANHOLE-TYPE "A" SCHEDULE OF DIMENSIONS


MANHOLE BASE DIAMETER	DIM. "A"
4'-0"	3'-9"
5'-0"	5'-9"
6'-0"	4'-5"
7'-0"	4'-5"
8'-0"	4'-5"
10'-0"	4'-7"

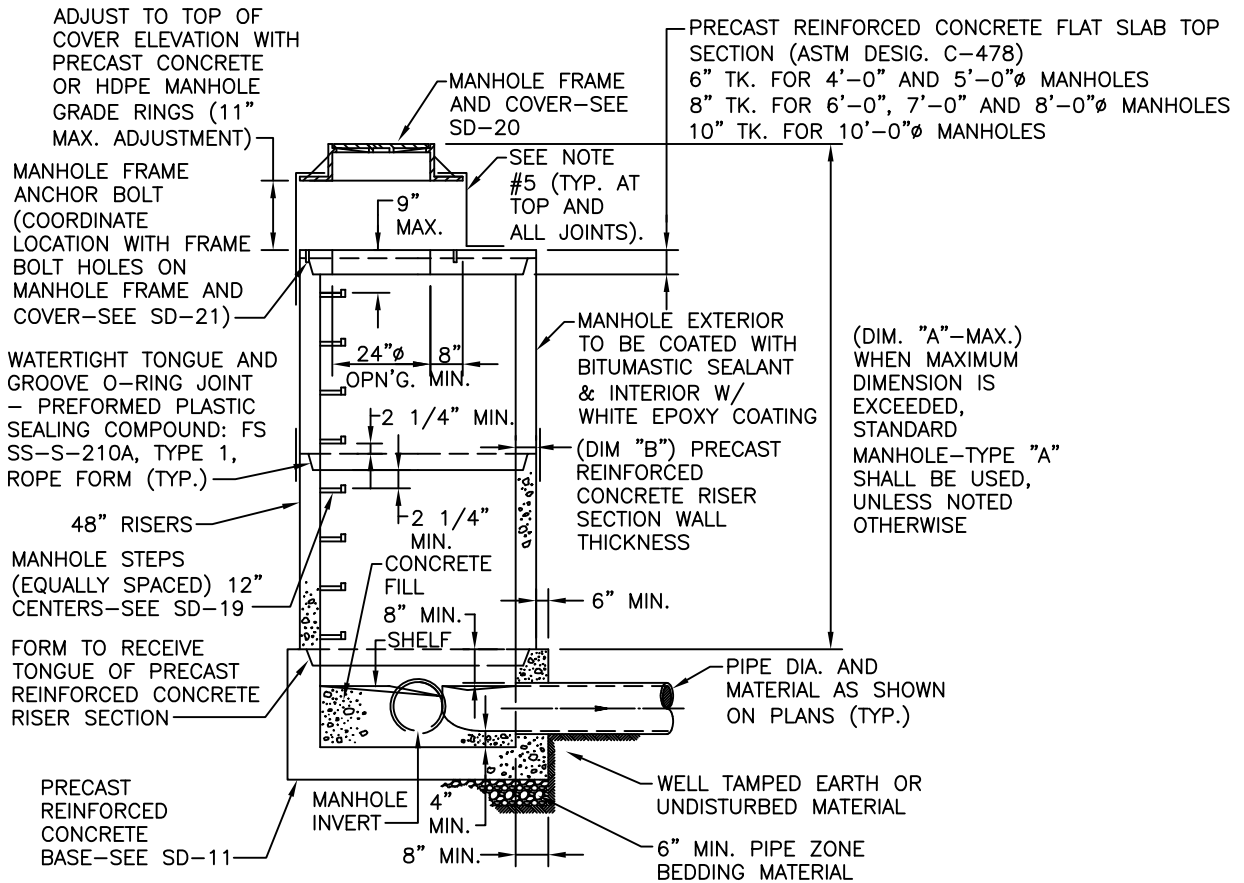


SECTIONAL PLAN THRU BASE

STANDARD MANHOLE - TYPE "A" NOTES

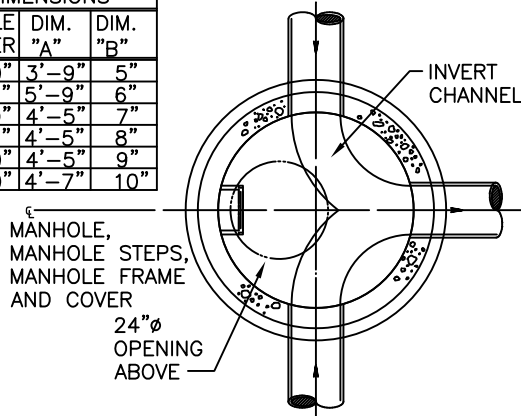
1. ORIENTATION OF PIPES SHOWN FOR ILLUSTRATION PURPOSES ONLY. FOR ACTUAL LOCATIONS SEE PLANS.
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT THE RATE OF 1" PER FOOT MIN.
3. THE DEPTH OF THE INVERT CHANNEL SHALL BE NOT LESS THAN 3/4 OF THE DIA. OF THE PIPE.
4. 4'-0"Ø BASE SHOWN. FOR 5'-0"Ø BASE, PROVIDE A 5'-0" TO 4'-0" ECCENTRIC CONE REDUCING SECTION AT THE FIRST JOINT ABOVE THE UPPERMOST PIPE CONNECTION TO WALL.
5. FOR MANHOLES HAVING A 6'-0"Ø BASE OR LARGER, PROVIDE A FLAT SLAB TOP WITH A 4'-0"Ø OPENING, ON THE BASE AT THE FIRST JOINT ABOVE THE UPPERMOST PIPE CONNECTION TO WALL, FOR INSTALLATION OF THE 4'-0"Ø PRECAST REINFORCED CONCRETE RISER SECTION OR ECCENTRIC CONE TOP SECTION.
6. FINISH GRADE SHALL BE FLUSH WITH TOP OF COVER ON MANHOLE FRAME AND COVER, UNLESS NOTED OTHERWISE.
7. HEAT SHRINKABLE MANHOLE ENCAPSULATING WRAP AROUND SLEEVE - SEE SD-23.

<p>REVISIONS</p>	STANDARD MANHOLE - TYPE A DETAIL	
	PENNSYLVANIA AMERICAN WATER	
	<p>Company Name Company Address Company Address</p>	
	<p>DRAWN BY PROJECT ENG'R APPROVED</p>	<p>DATE PROJECT</p>
<p>USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES</p>		<p>SD-12</p>



SECTIONAL ELEVATION

STANDARD MANHOLE—TYPE "B" SCHEDULE OF DIMENSIONS		
MANHOLE DIAMETER	DIM. "A"	DIM. "B"
4'-0"	3'-9"	5"
5'-0"	5'-9"	6"
6'-0"	4'-5"	7"
7'-0"	4'-5"	8"
8'-0"	4'-5"	9"
10'-0"	4'-7"	10"



SECTIONAL PLAN THRU BASE

STANDARD MANHOLE — TYPE "B" NOTES

1. ORIENTATION OF PIPES SHOWN FOR ILLUSTRATION PURPOSES ONLY. FOR ACTUAL LOCATIONS SEE PLANS.
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT THE RATE OF 1" PER FOOT MIN.
3. THE DEPTH OF THE INVERT CHANNEL SHALL BE NOT LESS THAN 3/4 OF THE DIA. OF THE PIPE.
4. FINISH GRADE SHALL BE FLUSH WITH TOP OF COVER ON MANHOLE FRAME AND COVER, UNLESS NOTED OTHERWISE.
5. HEAT SHRINKABLE MANHOLE ENCAPSULATING WRAP AROUND SLEEVE — SEE SD-23.

REVISIONS

STANDARD MANHOLE — TYPE B DETAIL

PENNSYLVANIA AMERICAN WATER

Company Name
Company Address
Company Address



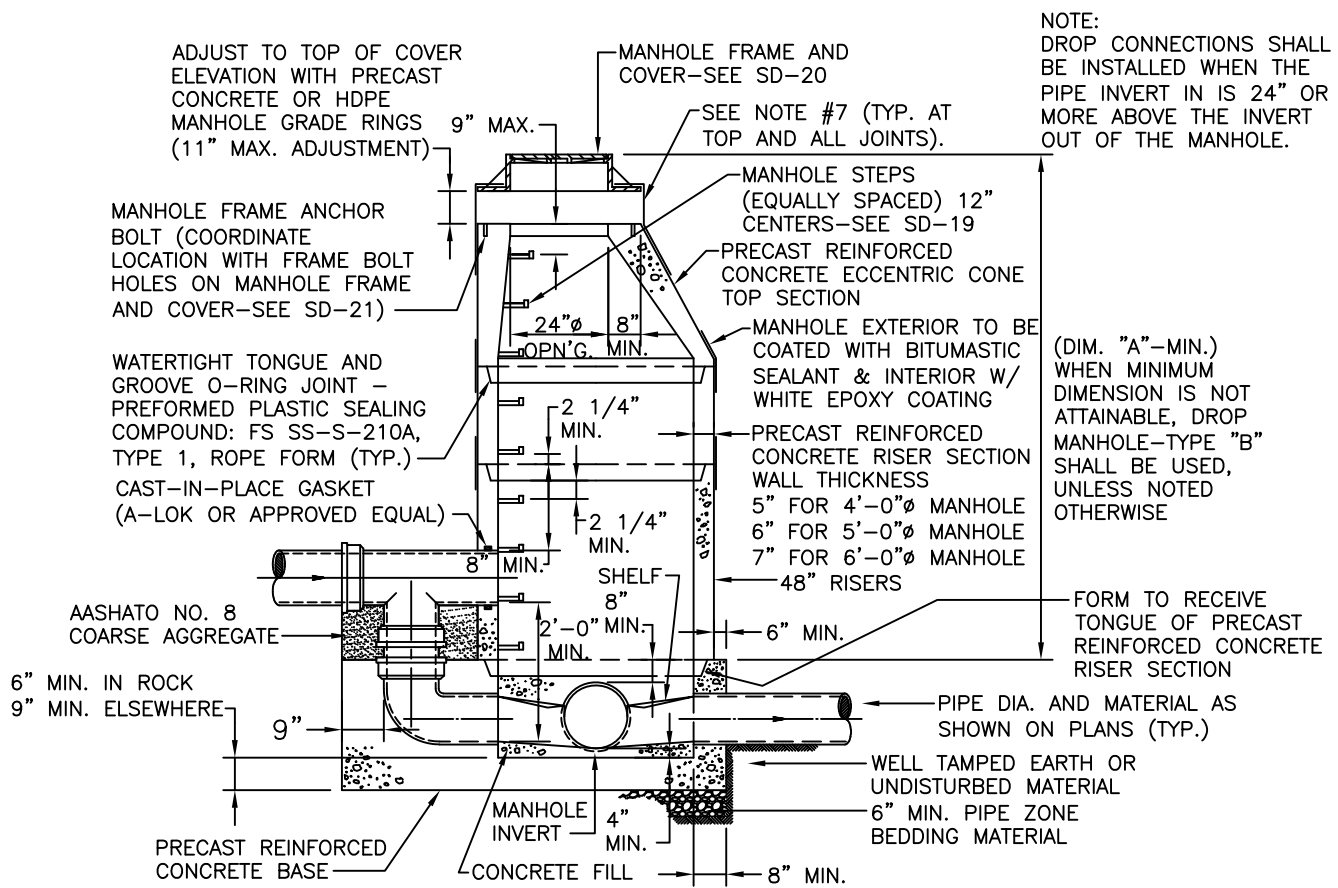
DRAWN BY
PROJECT ENG'R
APPROVED

DATE
PROJECT

USE DIMENSIONS ONLY
SCALE NO SCALE

USE APPROVED DRAWINGS ONLY
FOR CONSTRUCTION PURPOSES

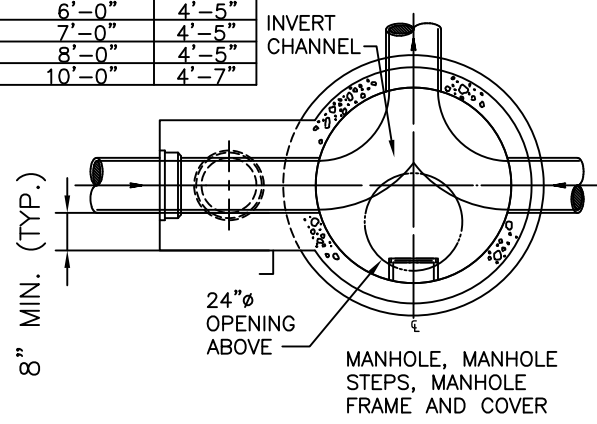
SD-13



DROP MANHOLE-TYPE "A" SCHEDULE OF DIMENSIONS

MANHOLE BASE DIAMETER	DIM. "A"
4'-0"	3'-9"
5'-0"	5'-9"
6'-0"	4'-5"
7'-0"	4'-5"
8'-0"	4'-5"
10'-0"	4'-7"


SECTIONAL ELEVATION

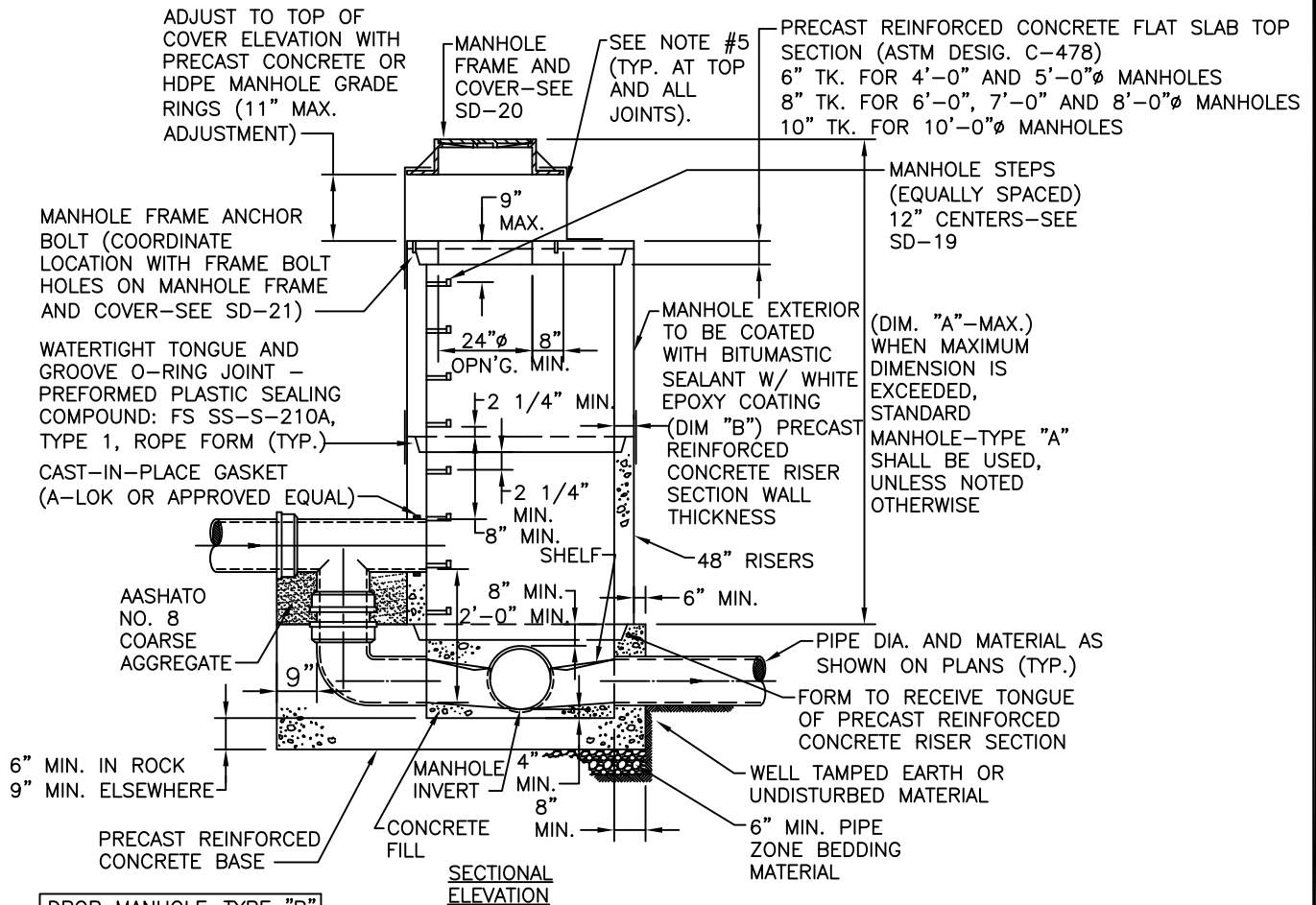


SECTIONAL PLAN THRU BASE

DROP MANHOLE - TYPE "A" NOTES

1. ORIENTATION OF PIPES SHOWN FOR ILLUSTRATION PURPOSES ONLY. FOR ACTUAL LOCATIONS SEE PLANS.
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT THE RATE OF 1" PER FOOT MIN.
3. THE DEPTH OF THE INVERT CHANNEL SHALL BE NOT LESS THAN 3/4 OF THE DIA. OF THE PIPE.
4. 4'-0"Ø BASE SHOWN. FOR 5'-0"Ø BASE, PROVIDE A 5'-0" TO 4'-0" ECCENTRIC CONE REDUCING SECTION AT THE FIRST JOINT ABOVE THE UPPERMOST PIPE CONNECTION TO WALL.
5. FOR MANHOLES HAVING A 6'-0"Ø BASE OR LARGER, PROVIDE A FLAT SLAB TOP WITH A 4'-0"Ø OPENING, ON THE BASE AT THE FIRST JOINT ABOVE THE UPPERMOST PIPE CONNECTION TO WALL, FOR INSTALLATION OF THE 4'-0"Ø PRECAST REINFORCED CONCRETE RISER SECTION OR ECCENTRIC CONE TOP SECTION.
6. FINISH GRADE SHALL BE FLUSH WITH TOP OF COVER ON MANHOLE FRAME AND COVER, UNLESS NOTED OTHERWISE.
7. HEAT SHRINKABLE MANHOLE ENCAPSULATING WRAP AROUND SLEEVE - SEE SD-23.

<p>REVISIONS</p>	DROP MANHOLE - TYPE "A" DETAIL	
	PENNSYLVANIA AMERICAN WATER	
	<p>Company Name Company Address Company Address</p>	
	<p>DRAWN BY PROJECT ENG'R APPROVED</p>	<p>DATE PROJECT</p>
<p>USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES</p>		<p>SD-14</p>



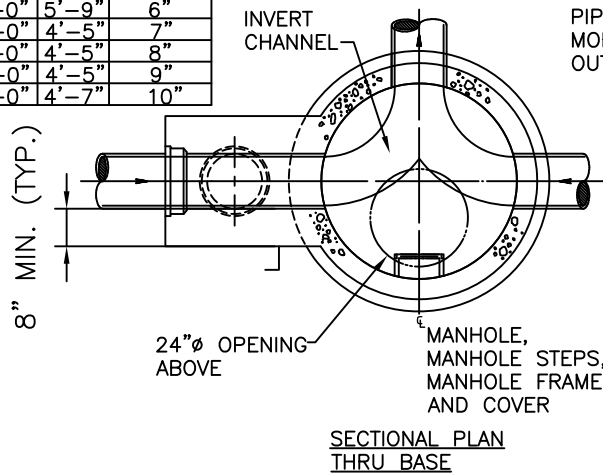
DROP MANHOLE—TYPE "B" SCHEDULE OF DIMENSIONS

MANHOLE DIAMETER	DIM. "A"	DIM. "B"
4'-0"	3'-9"	5"
5'-0"	5'-9"	6"
6'-0"	4'-5"	7"
7'-0"	4'-5"	8"
8'-0"	4'-5"	9"
10'-0"	4'-7"	10"

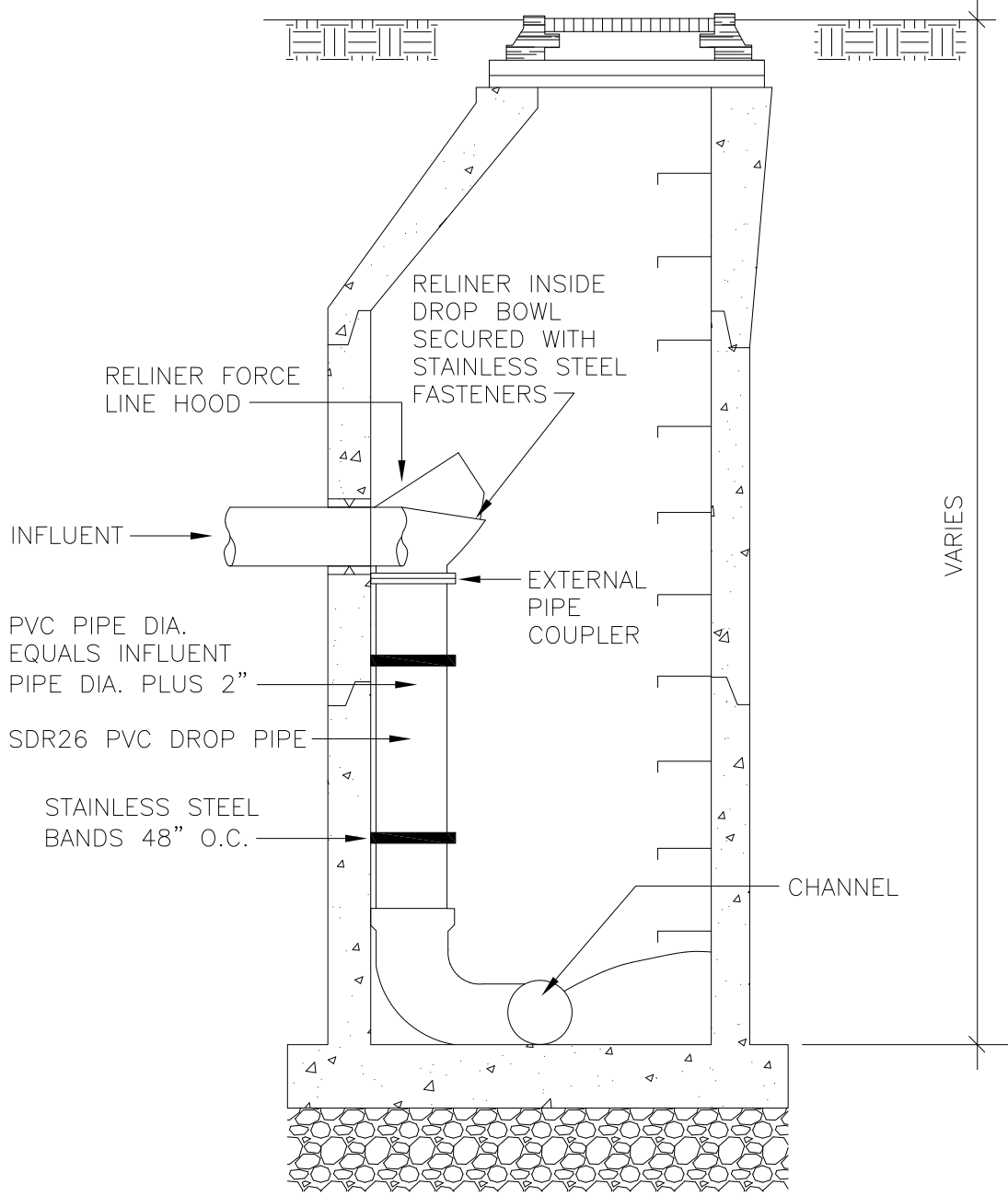
NOTE:
DROP CONNECTIONS SHALL BE INSTALLED WHEN THE PIPE INVERT IN IS 24" OR MORE ABOVE THE INVERT OUT OF THE MANHOLE.


DROP MANHOLE — TYPE "B" NOTES

1. ORIENTATION OF PIPES SHOWN FOR ILLUSTRATION PURPOSES ONLY. FOR ACTUAL LOCATIONS SEE PLANS.
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT THE RATE OF 1" PER FOOT MIN.
3. THE DEPTH OF THE INVERT CHANNEL SHALL BE NOT LESS THAN 3/4 OF THE DIA. OF THE PIPE.
4. FINISH GRADE SHALL BE FLUSH WITH TOP OF COVER ON MANHOLE FRAME AND COVER, UNLESS NOTED OTHERWISE.
5. HEAT SHRINKABLE MANHOLE ENCAPSULATING WRAP AROUND SLEEVE — SEE SD-23.

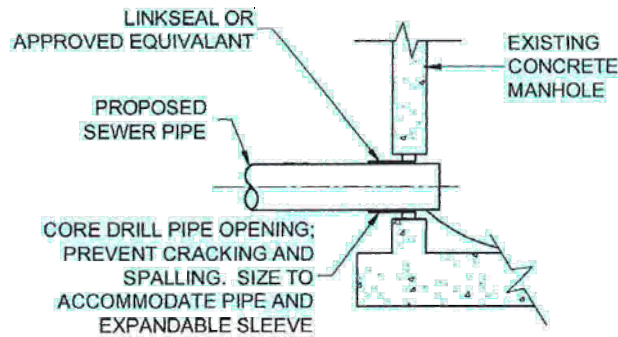


REVISIONS	DROP MANHOLE — TYPE "B" DETAIL	
	PENNSYLVANIA AMERICAN WATER	
	Company Name Company Address Company Address	
	DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
	USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-15



REVISIONS	TYPICAL INSIDE DROP MANHOLE DETAIL	
	PENNSYLVANIA AMERICAN WATER	
	Company Name Company Address Company Address	
	DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES		SD-16

USE DIMENSIONS ONLY
SCALE NO SCALE




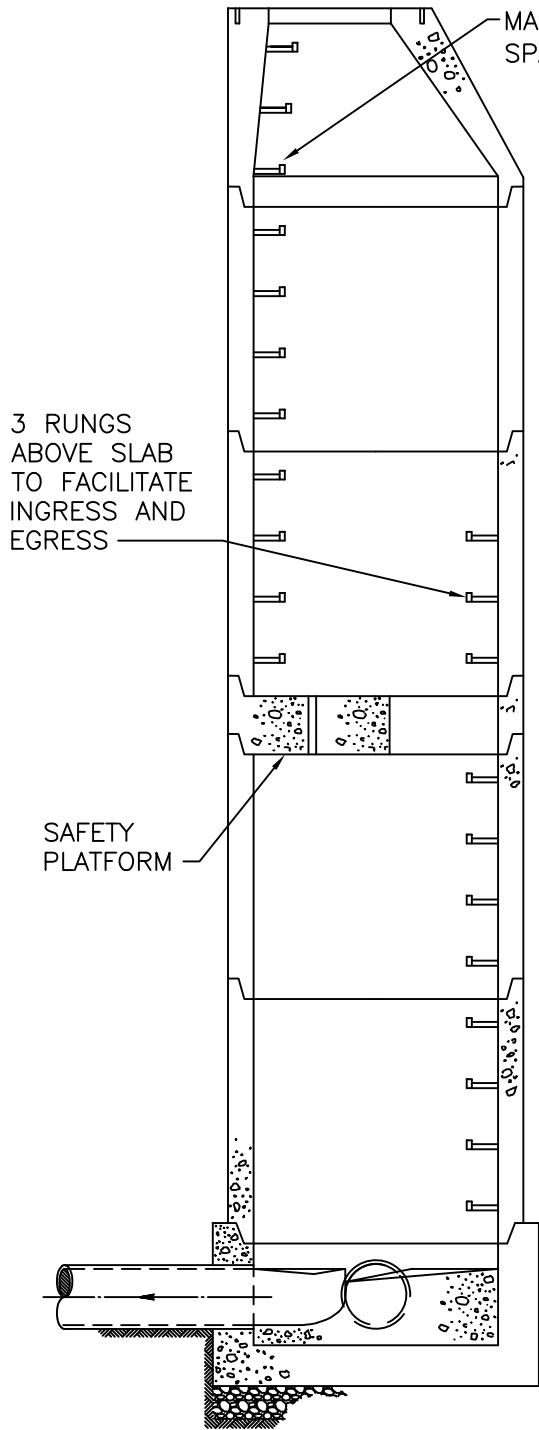
NOTES:

1. PROPOSED SEWER PIPE INVERT ELEVATION SHALL NOT BE BELOW EXISTING SEWER INVERT ELEVATION.
2. PROPOSED SEWER PIPE SHALL BE LOCATED A MINIMUM OF 8" ABOVE OR BELOW EXISTING MANHOLE JOINT.
3. AFTER CONNECTION OF PIPE TO MANHOLE, REMOVE CONCRETE CHANNEL AS REQUIRED AND RECONSTRUCT CHANNEL.
4. KEEP GROUNDWATER, SURFACE WATER AND DEBRIS FROM ENTERING EXISTING FACILITIES.
5. MAINTAIN EXISTING FLOW DURING CONSTRUCTION.
6. DROPS OVER 2 FT WILL REQUIRE AN INSIDE DROP CONNECTION.

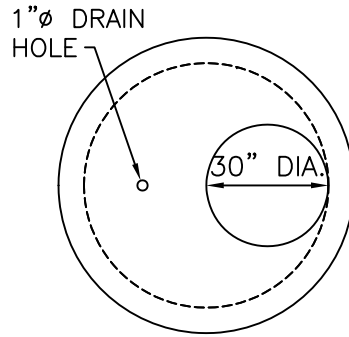
TYPICAL TIE-IN TO EXISTING MANHOLE DETAIL

SCALE: NONE

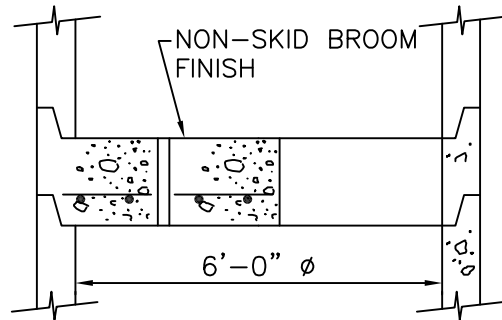
		REVISIONS	TYPICAL TIE-IN TO EXISTING MANHOLE DETAIL	
		PENNSYLVANIA AMERICAN WATER		
				
				<small>USE DIMENSIONS ONLY SCALE NO SCALE</small>
				<small>USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES</small>
				SD-17



MANHOLE CROSS SECTION




PLAN VIEW - SLAB



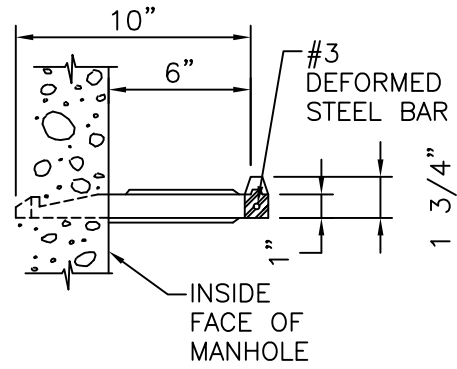
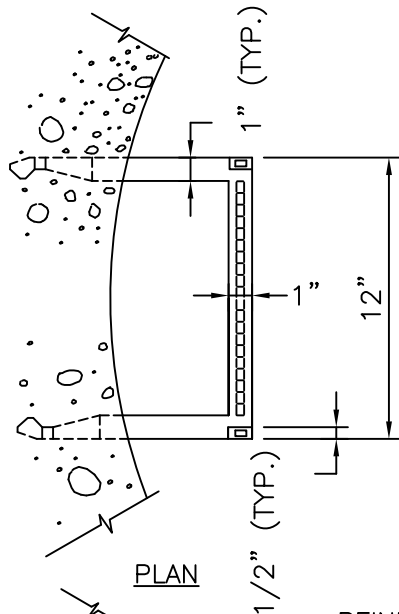
CROSS SECTION - SLAB

MANHOLE SAFETY PLATFORM SPECIFICATIONS

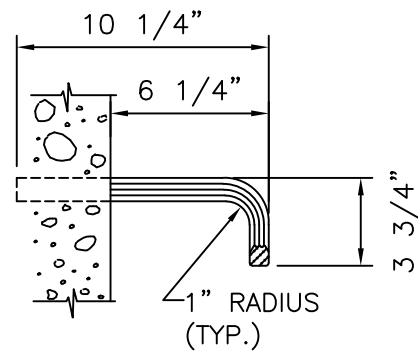
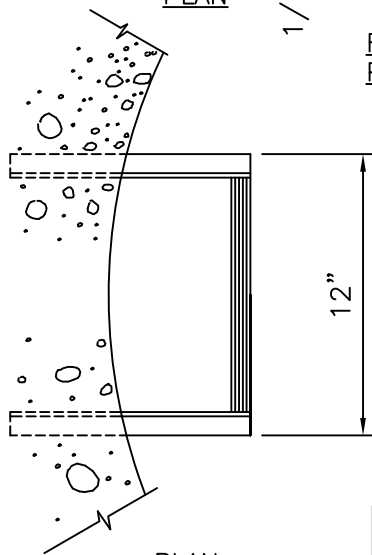
1. CONCRETE IS DESIGNED TO OBTAIN A STRENGTH OF 4,000 PSI IN 28 DAYS.
2. REINFORCING STEEL HAS A MINIMUM YIELD STRENGTH OF 60,000 PSI.
3. SLAB IS DESIGNED FOR A CONCENTRATED LOAD (P) OF 8,000 LBS.
4. A PLATFORM SHOULD BE INSTALLED FOR MANHOLES OVER 20 FEET DEEP; EVERY 10 VERTICAL FEET WITH NO LESS THAN 7 VERTICAL FEET BETWEEN PLATFORMS OR BOTTOM. OR AS DIRECTED BY ENGINEER/OWNER.

<p>REVISIONS</p>	<p>SAFETY PLATFORM FOR DEEP MANHOLES DETAIL</p>	
	<p>PENNSYLVANIA AMERICAN WATER</p>	
	<p>Company Name Company Address Company Address</p>	
	<p>DRAWN BY PROJECT ENG'R APPROVED</p>	<p>DATE PROJECT</p>
<p>USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES</p>		<p>SD-18</p>

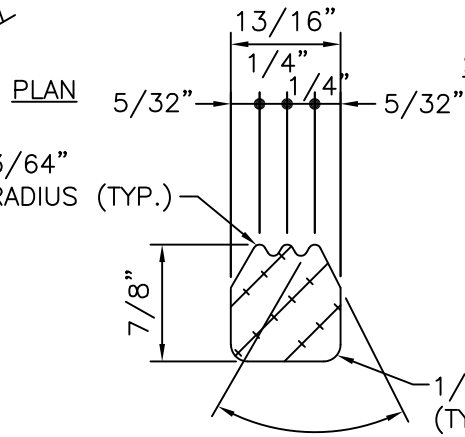
USE DIMENSIONS ONLY
SCALE NO SCALE



SECTIONAL ELEVATION




SECTIONAL ELEVATION



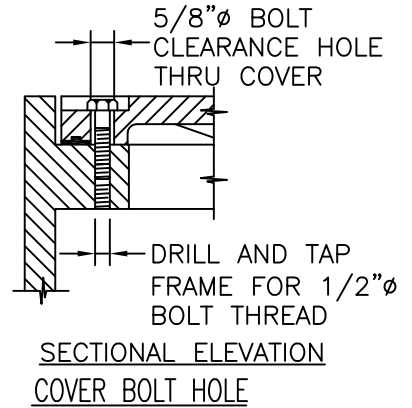
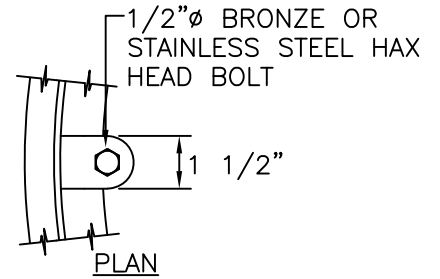
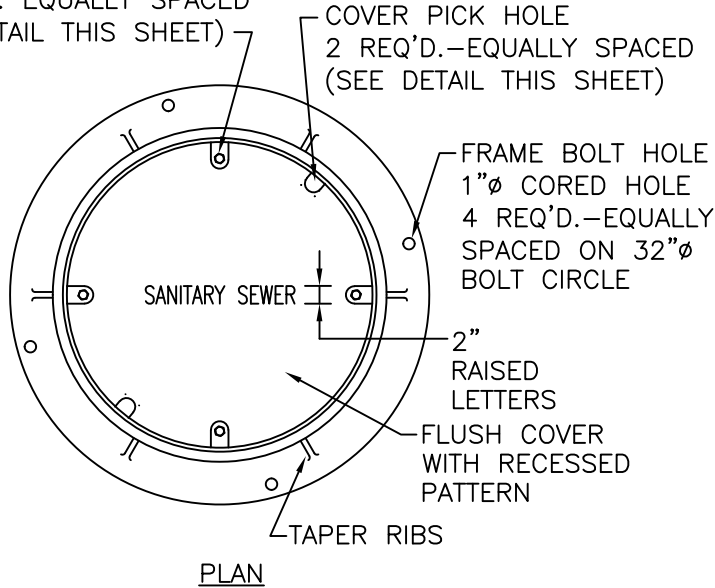
TYPICAL SECTION THRU ALUMINUM MANHOLE STEP

NOTE:
PROVIDE A HEAVY COAT OF BITUMINOUS PAINT ON ALUMINUM SURFACES IN CONTACT WITH CONCRETE.

6061-T6
ALUMINUM ALLOY

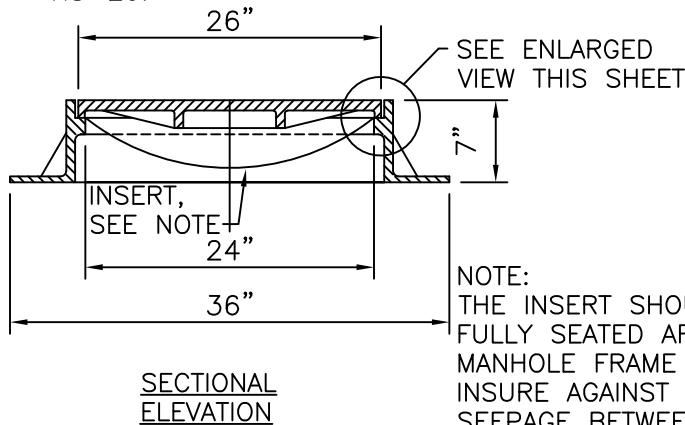
REVISIONS		MANHOLE STEPS DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name	 PENNSYLVANIA AMERICAN WATER
		Company Address	
		Company Address	
		DRAWN BY	DATE
		PROJECT ENG'R	PROJECT
		APPROVED	USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-19

COVER BOLT
HOLE—WATERTIGHT ONLY
4 REQ'D. EQUALLY SPACED
(SEE DETAIL THIS SHEET)

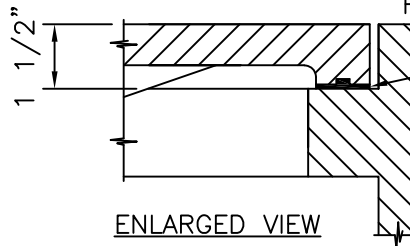
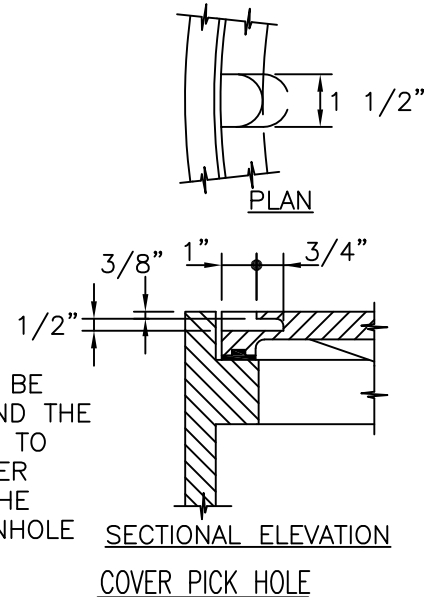



NOTE:
ALL MANHOLE FRAMES AND
COVERS SHALL BE FOR
HEAVY DUTY TRAFFIC, AASHTO
HIGHWAY LOADING CLASS
HS-20.

REQUIRED ONLY ON MANHOLES DESIGNATED
TO HAVE "WATERTIGHT" COVERS

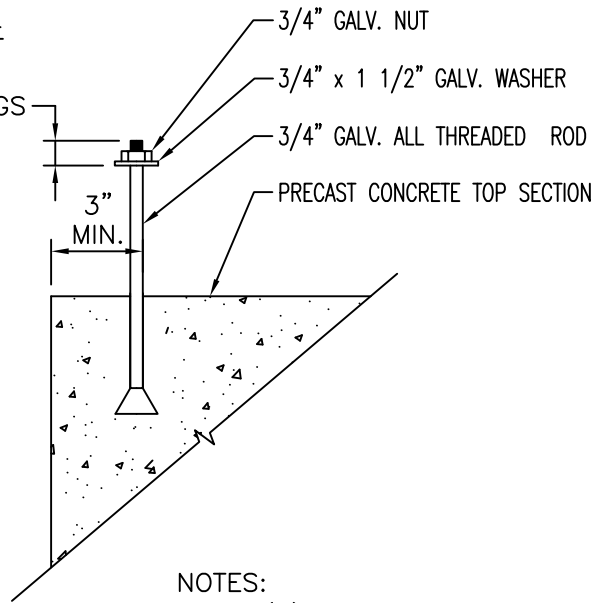


NOTE:
THE INSERT SHOULD BE
FULLY SEATED AROUND THE
MANHOLE FRAME RIM TO
INSURE AGAINST WATER
SEEPAGE BETWEEN THE
INSERT AND THE MANHOLE
FRAME RIM.



REVISIONS	STANDARD AND WATERTIGHT CAST IRON MANHOLE FRAME AND COVER DETAIL	
	PENNSYLVANIA AMERICAN WATER	
	Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
	DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES		SD-20

2 1/2" MIN
PROJECTION
ABOVE FINAL
COURSE OF
CONCRETE
GRADE RINGS



NOTES:
FOUR (4) BOLTS REQUIRED PER
MANHOLE.

REVISIONS

MANHOLE FRAME ANCHOR BOLT DETAIL

PENNSYLVANIA AMERICAN WATER

Company Name
Company Address
Company Address



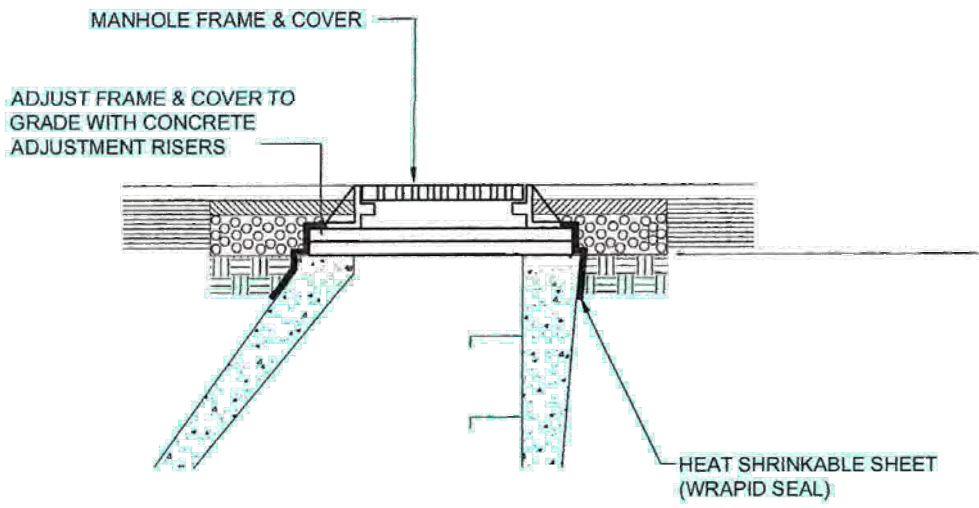
DRAWN BY
PROJECT ENG'R
APPROVED

DATE
PROJECT

USE DIMENSIONS ONLY
SCALE NO SCALE


USE APPROVED DRAWINGS ONLY
FOR CONSTRUCTION PURPOSES

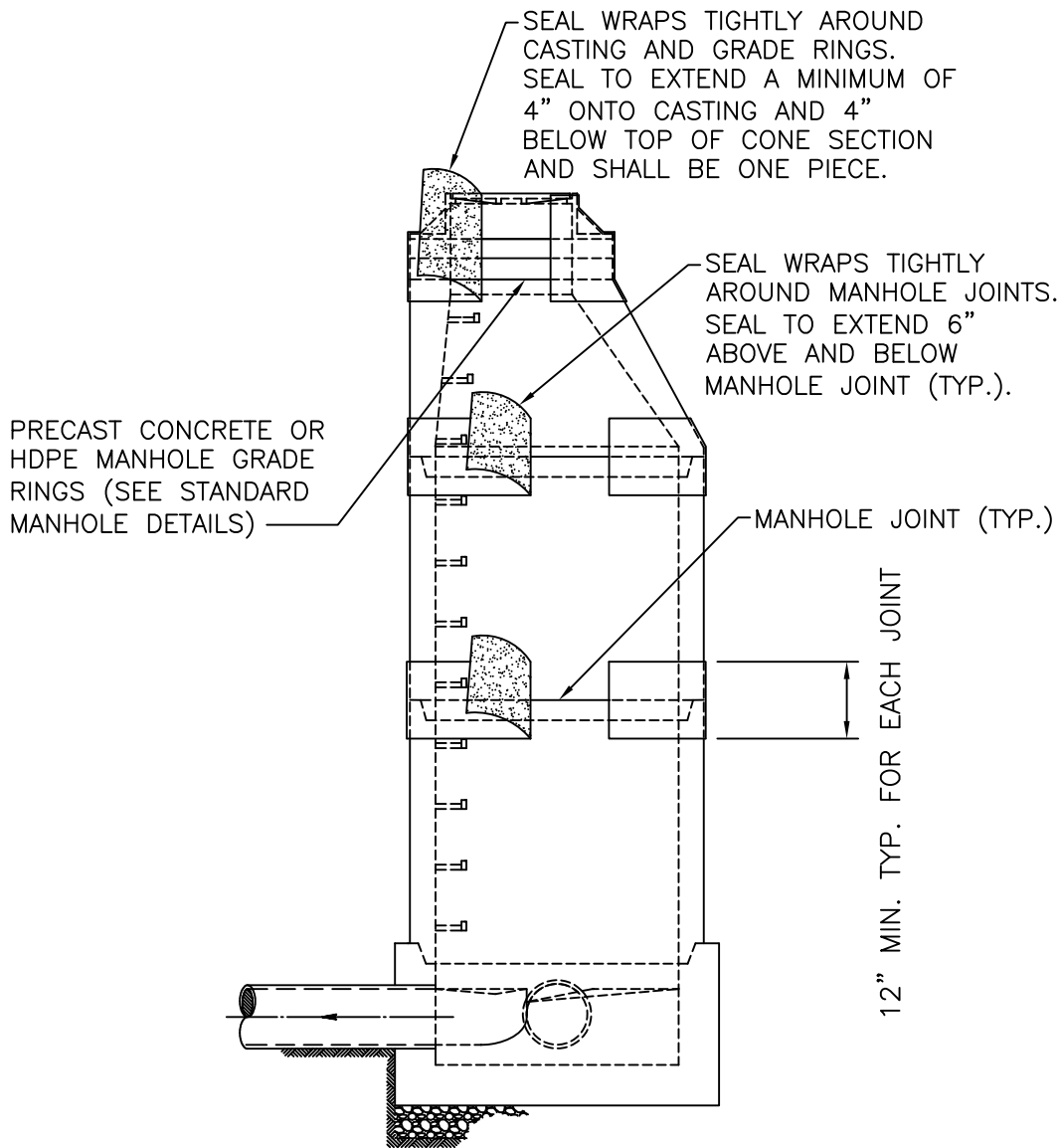
SD-21



MANHOLE FRAME AND COVER
ADJUSTMENT DETAIL

SCALE: NONE


	REVISIONS	MANHOLE FRAME AND COVER ADJUSTMENT DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address DRAWN BY PROJECT ENG'R APPROVED	 USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-22

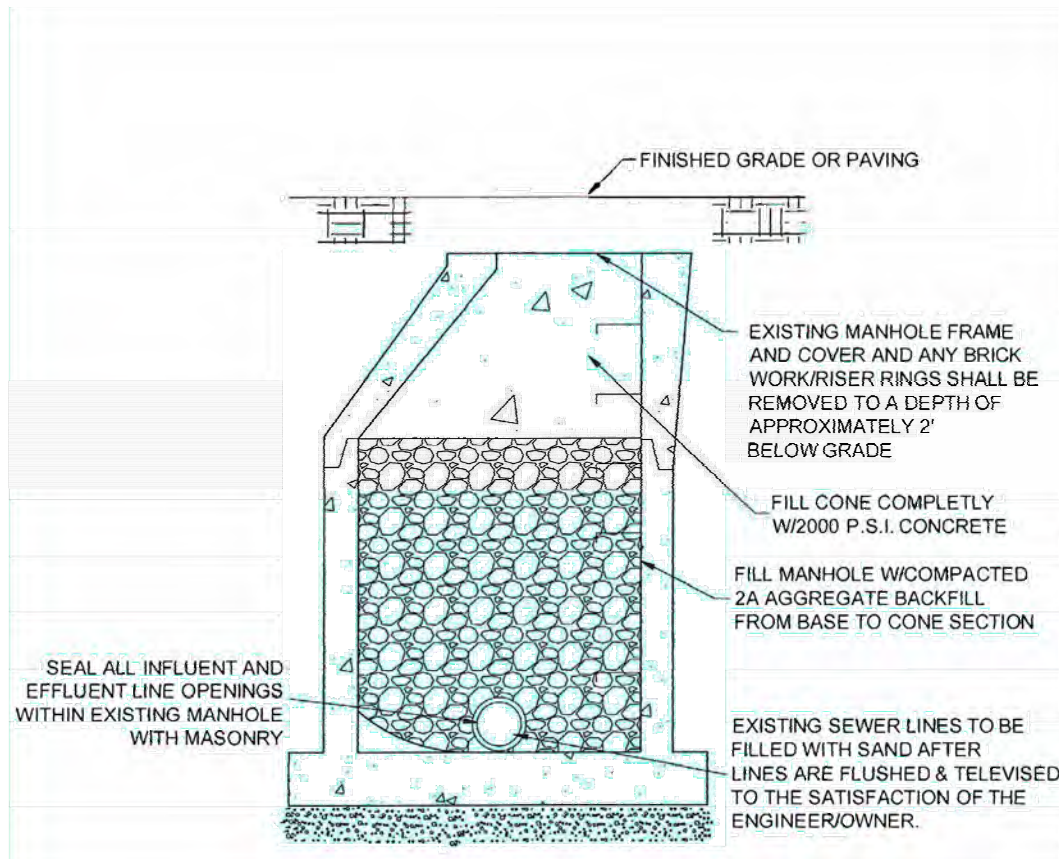


MANHOLE
ELEVATION

NOTES:


1. MANHOLE SEAL TO BE "WRAPIDSEAL" MANUFACTURED BY CANUSA-CPS OR APPROVED EQUAL.
2. MANHOLE JOINT SEAL INSTALLED AS DIRECTED BY THE AUTHORITY ENGINEER AND ON ALL JOINTS.

	REVISIONS	HEAT SHRINKABLE MANHOLE SEAL DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-23

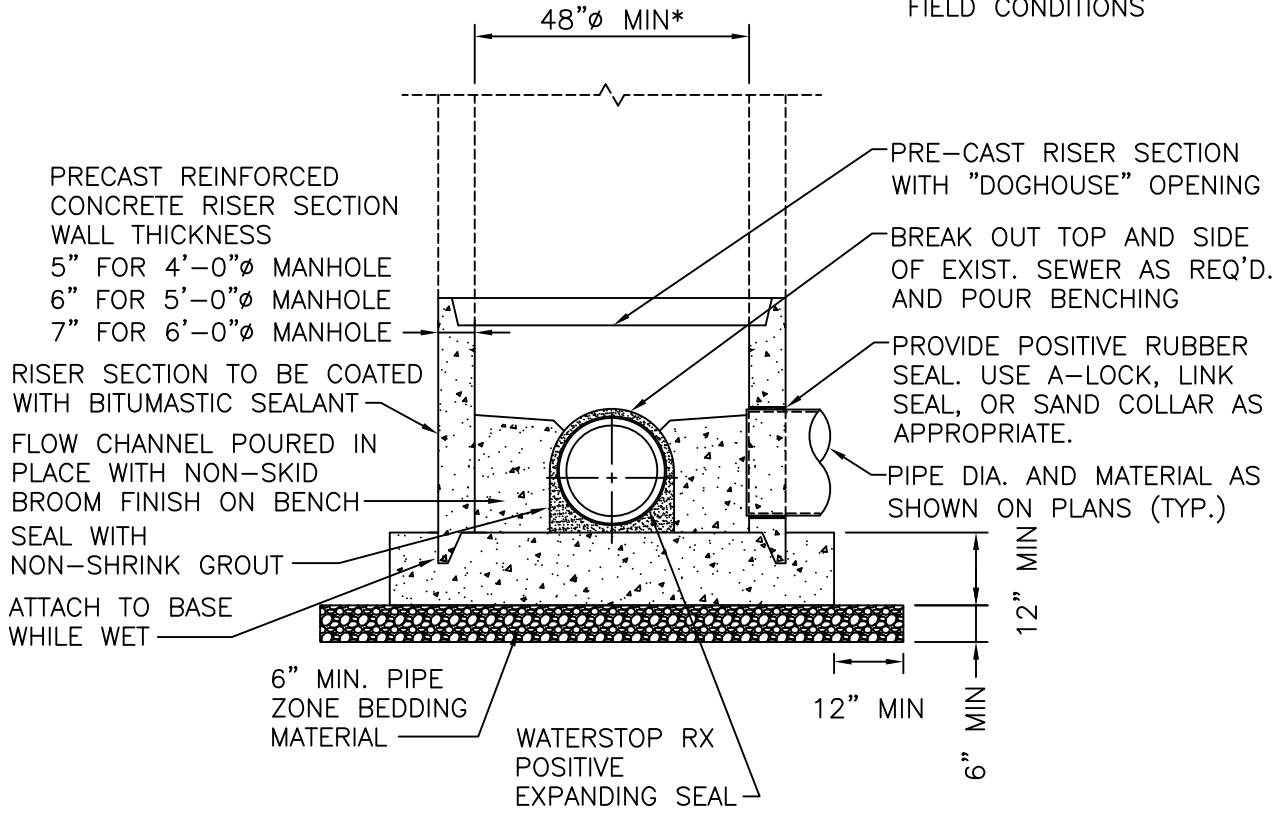


MANHOLE ABANDONMENT DETAIL

SCALE: NONE


	REVISIONS	MANHOLE ABANDONMENT DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-24

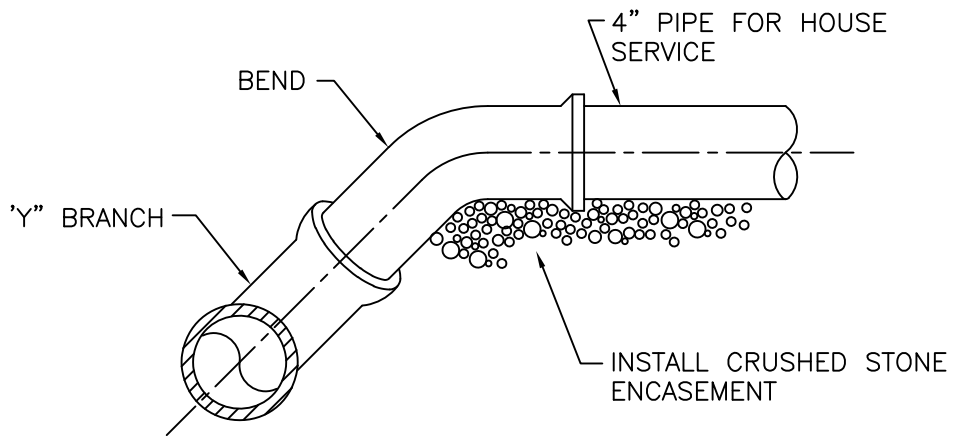
* LARGER DIAMETER MAY BE REQUIRED AS PER FIELD CONDITIONS




STANDARD DOGHOUSE MANHOLE NOTES

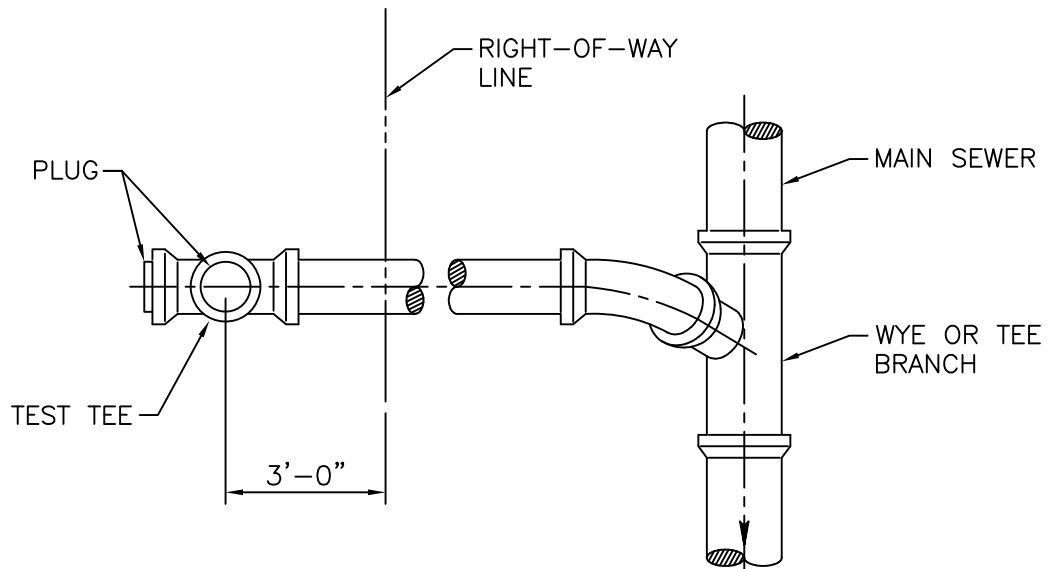
1. ORIENTATION OF PIPES SHOWN FOR ILLUSTRATION PURPOSES ONLY. FOR ACTUAL LOCATIONS SEE PLANS.
2. THE SHELF SHALL SLOPE TOWARD THE INVERT CHANNEL AT THE RATE OF 1" PER FOOT MIN.
3. THE DEPTH OF THE INVERT CHANNEL SHALL BE NOT LESS THAN 3/4 OF THE DIA. OF THE PIPE.

	REVISIONS	DOGHOUSE MANHOLE DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-25

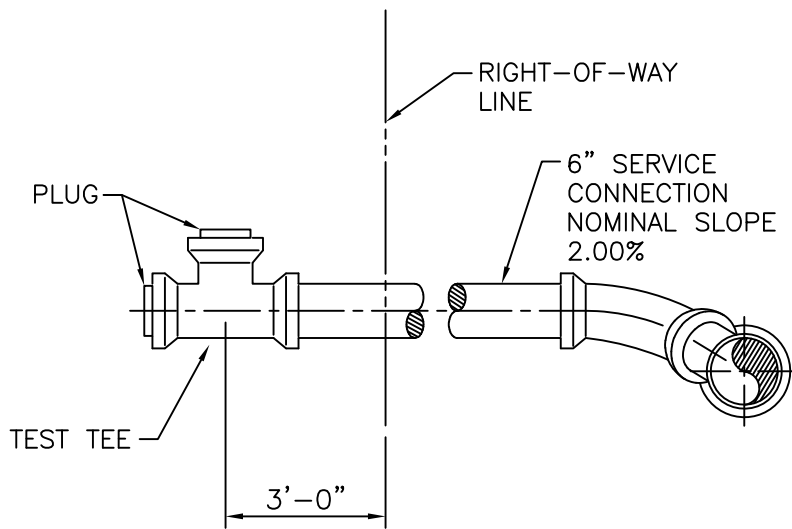


NOTE:
 THE SIZE OF THE HOUSE SERVICE BEND & "Y" BRANCH
 SHALL BE 4".


	<p>REVISIONS</p>	<p>Y BRANCH FOR LATERALS DETAIL</p>	
		<p>PENNSYLVANIA AMERICAN WATER</p>	
		<p>Company Name Company Address Company Address</p> <p>DRAWN BY PROJECT ENG'R APPROVED</p>	<p></p> <p>USE DIMENSIONS ONLY SCALE NO SCALE</p>
		<p>USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES</p>	<p>SD-26</p>

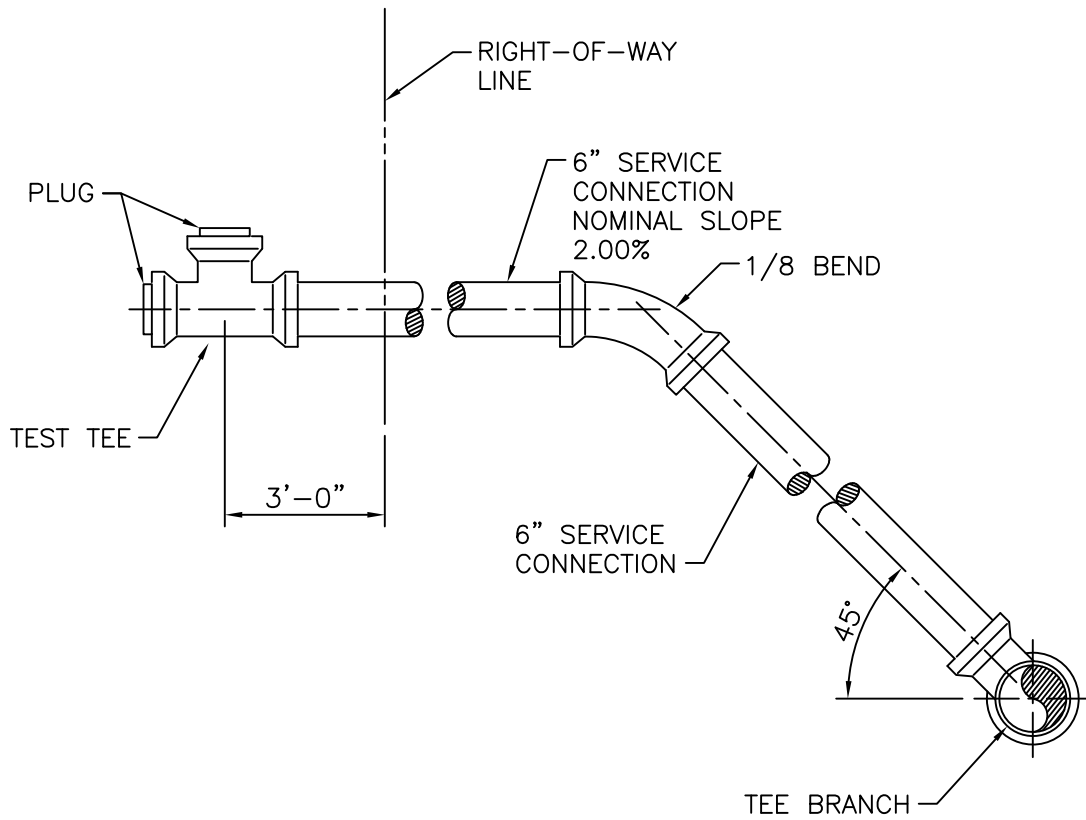


PLAN




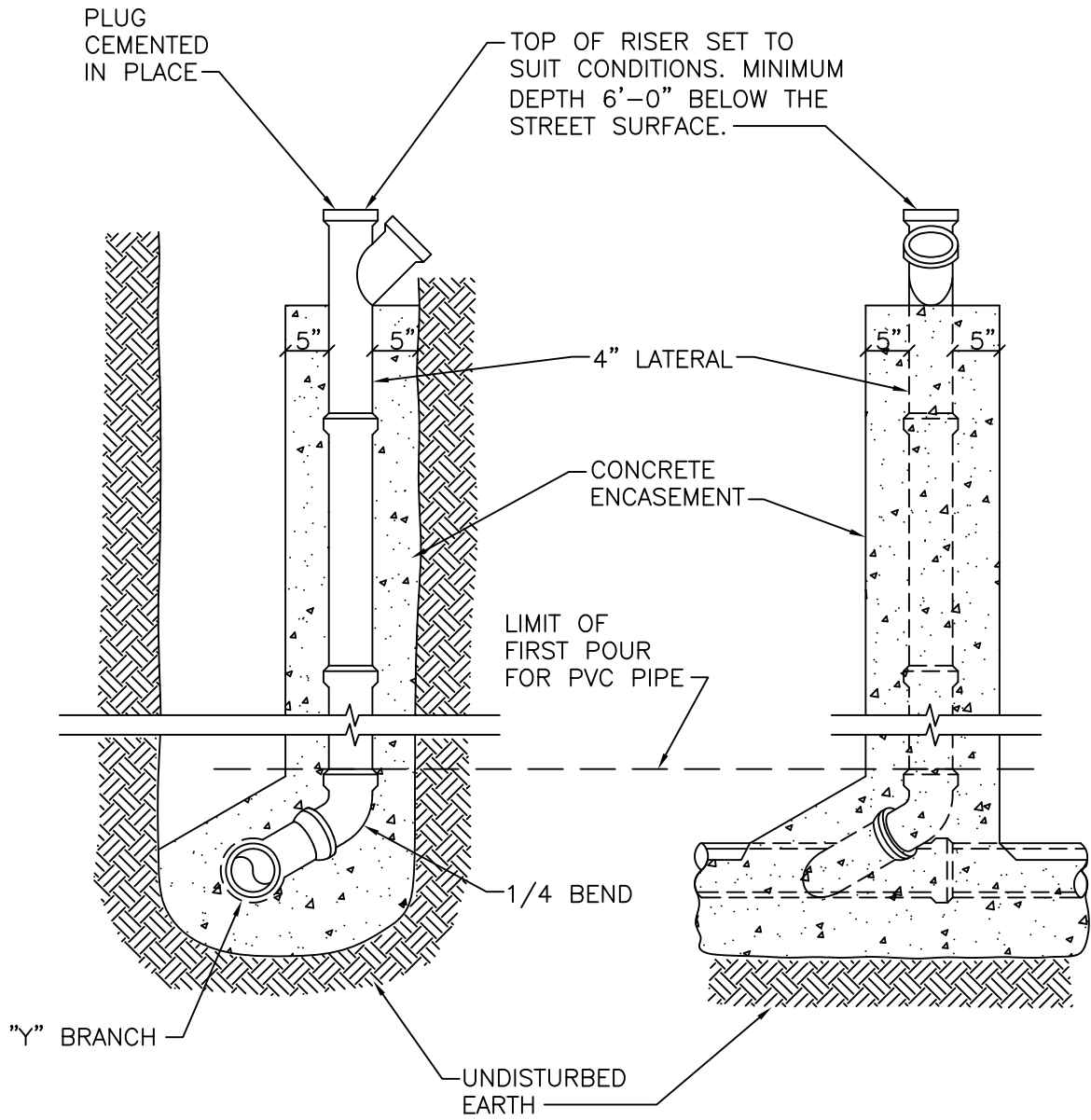
ELEVATION

<p>REVISIONS</p>	<p>SERVICE CONNECTION – SHALLOW SEWER DETAIL</p>	
	<p>PENNSYLVANIA AMERICAN WATER</p>	
	<p>Company Name Company Address Company Address</p>	
	<p>DRAWN BY PROJECT ENG'R APPROVED</p>	<p>DATE PROJECT</p>
<p>USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES</p>		<p>SD-27</p>




ELEVATION

<p>REVISIONS</p>	<p>SERVICE CONNECTION – DEEP SEWER DETAIL</p>	
	<p>PENNSYLVANIA AMERICAN WATER</p>	
	<p>Company Name Company Address Company Address</p> <p>DRAWN BY PROJECT ENG'R APPROVED</p>	<p> PENNSYLVANIA AMERICAN WATER</p> <p>USE DIMENSIONS ONLY SCALE NO SCALE</p>
	<p>USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES</p>	<p>SD-28</p>



NOTE:
 ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000
 PSI AT THE END OF 28 DAYS.

REVISIONS 	DEEP CUT LATERAL DETAIL	
	PENNSYLVANIA AMERICAN WATER	
	Company Name Company Address Company Address	
	DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES		SD-29

CAST IRON CLEANOUT/TEST TEE CAP PROTECTION CASTING (REFER TO CAP PROTECTION CASTING DETAIL SD-33 FOR ADDITIONAL INFORMATION)

CURB OR EDGE OF SIDEWALK

STREET

CONCRETE SIDEWALK

VENT CAP (MUSHROOM TYPE)

EXIST. GRADE

DWELLING

CLEANOUT (REFER TO NOTE 2)

4" PVC VENT PIPE

20" SQUARE x 3" TK. CONCRETE PAD

14" PVC YARD TRAP LOCATION TO BE FIELD DETERMINED

6" PVC SWEEP TEE

6" LATERAL

6" LATERAL

4" LATERAL

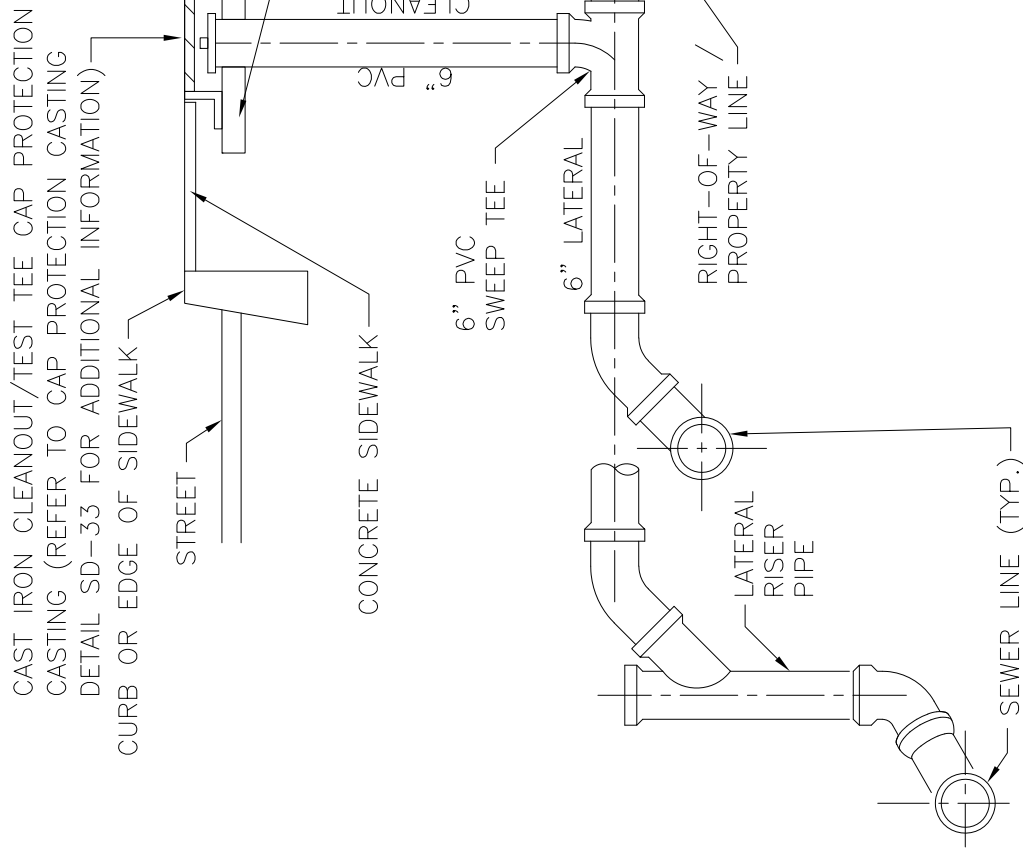
4" x 6" INCREASER

1/4" / FT SLOPE (MIN.)

RIGHT-OF-WAY / PROPERTY LINE

LATERAL RISER PIPE

SEWER LINE (TYP.)



NOTES:

1. MINIMUM DEPTH OF 4" LATERAL WILL BE 30" BELOW FINISHED GRADE AND THE CONTRACTOR WILL MARK THE END OF ALL LATERALS WITH A 2"x4" WOODEN STAKE WHERE THE TOP WILL REMAIN 2"± ABOVE FINISHED GRADE.
2. IF THERE IS NOT A CLEANOUT LOCATED INSIDE OF DWELLING A NEW CLEANOUT SHALL BE INSTALLED WITHIN 5'-0" OF POINT WHERE THE NEW LINE IS TO BE CONNECTED TO THE EXISTING LINE.
3. AN ADDITIONAL 4" CLEANOUT WILL BE REQUIRED BETWEEN THE DWELLING AND THE TRAP / VENT IF THE DISTANCE BETWEEN THEM IS GREATER THAN 50'.
4. LOCATE VENT CAP AND CLEANOUT IN LAWN AREA. MUSHROOM CAP SHALL BE USED ON VENT.
5. REFER TO DRAWING SD-2 FOR TYPICAL LATERAL TRENCH DETAILS AND SD-31 FOR LATERAL NOTES.

REVISIONS

TYPICAL HOUSE CONNECTION (IF APPLICABLE) DETAIL

PENNSYLVANIA AMERICAN WATER

Company Name
Company Address
Company Address

DRAWN BY
PROJECT ENG'R
APPROVED

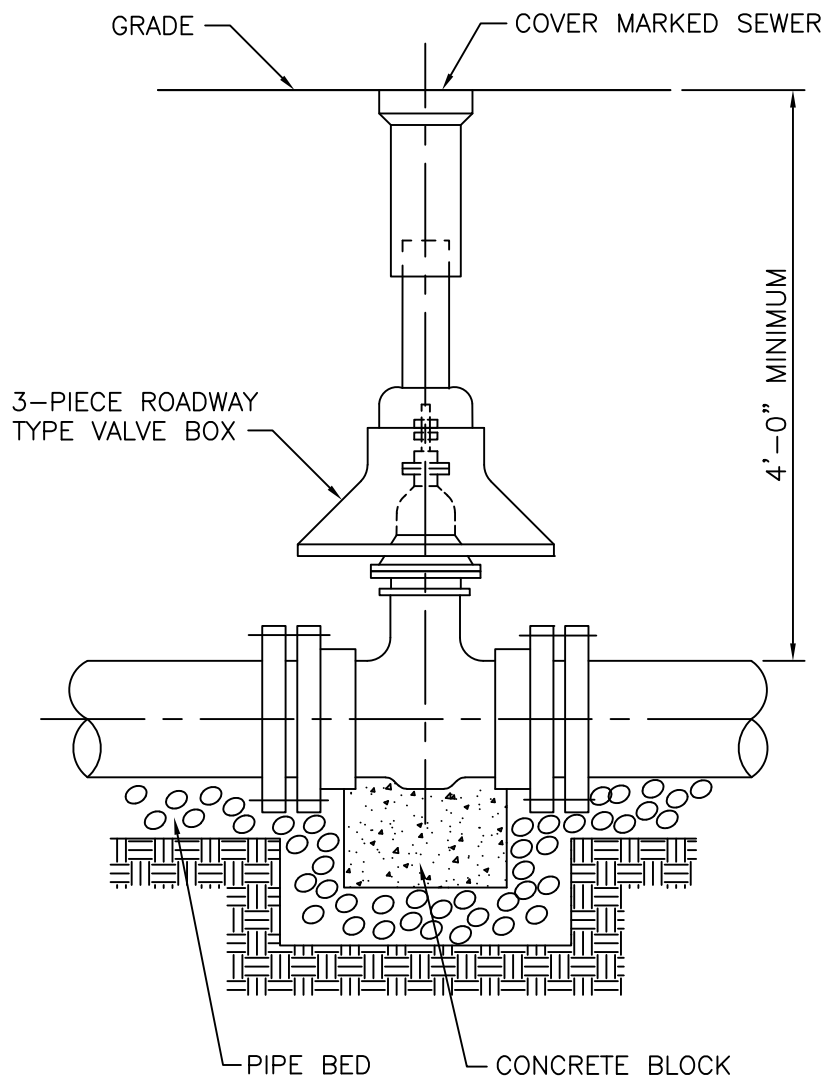
DATE
PROJECT




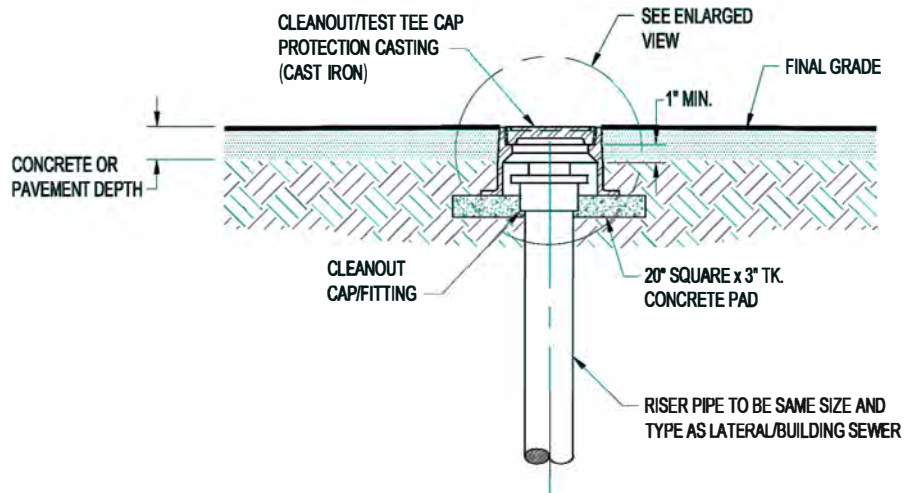
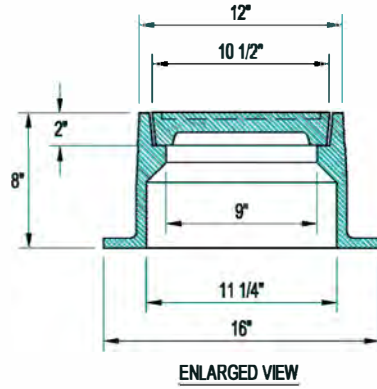
USE DIMENSIONS ONLY
SCALE NO SCALE

USE APPROVED DRAWINGS ONLY
FOR CONSTRUCTION PURPOSES


SD-30

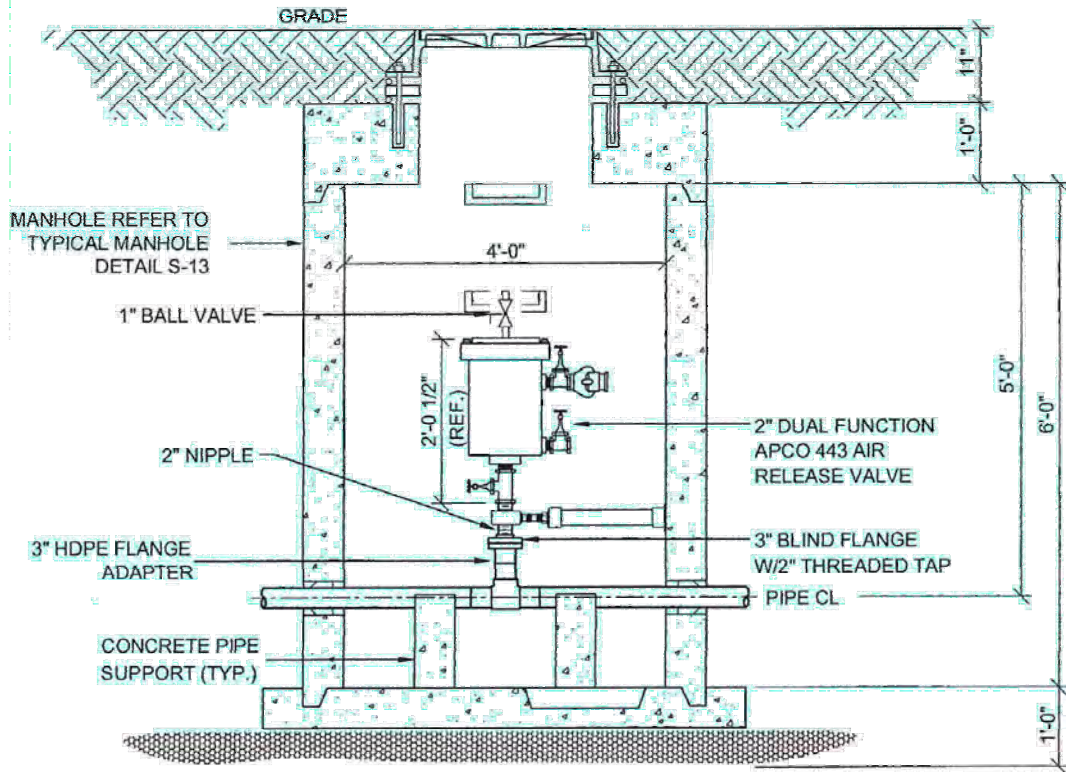


REVISIONS	VALVE AND VALVE BOX INSTALLATION DETAIL	
	PENNSYLVANIA AMERICAN WATER	
	Company Name Company Address Company Address DRAWN BY PROJECT ENG'R APPROVED	 PENNSYLVANIA AMERICAN WATER USE DIMENSIONS ONLY SCALE NO SCALE
	USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-32




NOTE:
FOR AREAS EXPOSED TO VEHICULAR TRAFFIC, SNOWPLOWING AND IN SIDEWALKS

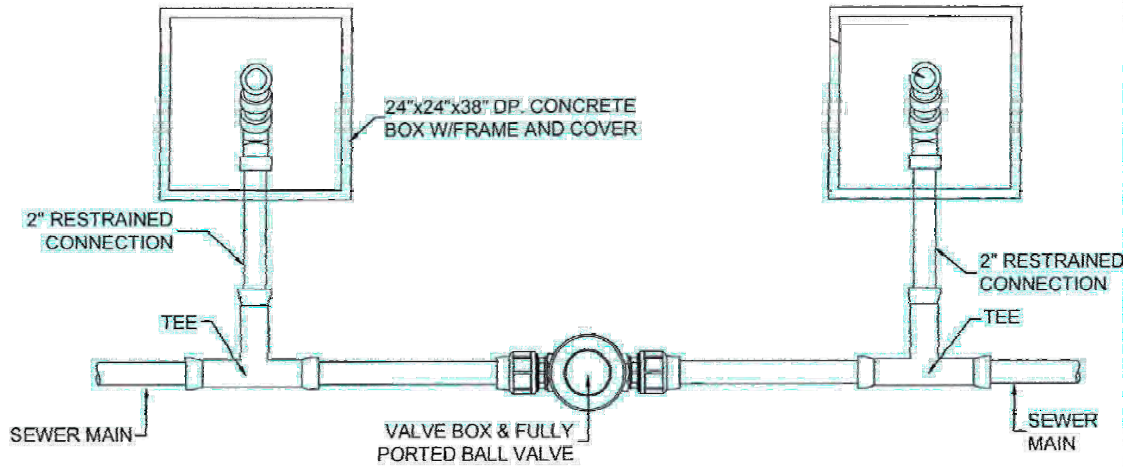
	REVISIONS	CAP PROTECTION CASTING DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-33



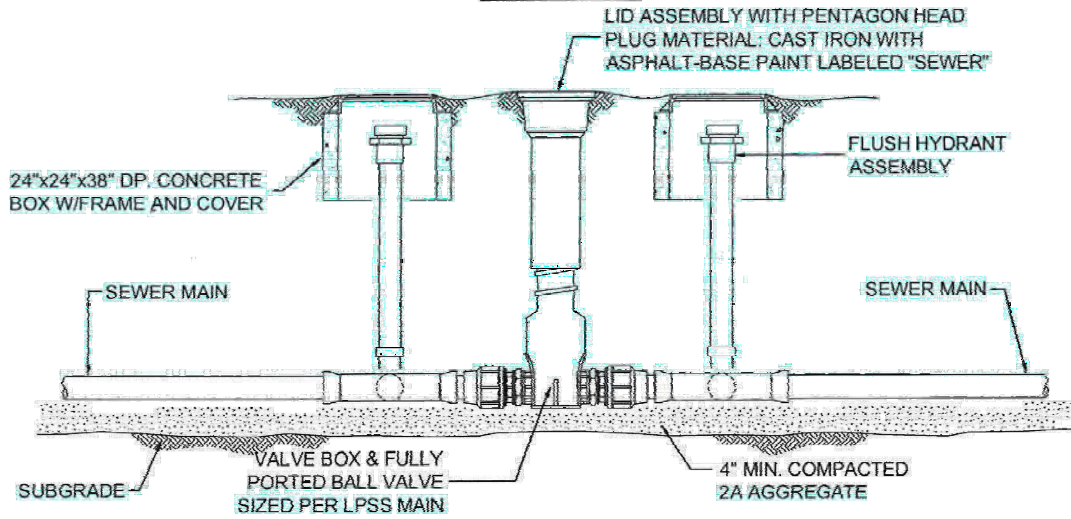
AIR RELEASE VALVE MANHOLE

SCALE: NONE

	REVISIONS	AIR RELEASE VALVE MANHOLE DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-34




PLAN VIEW

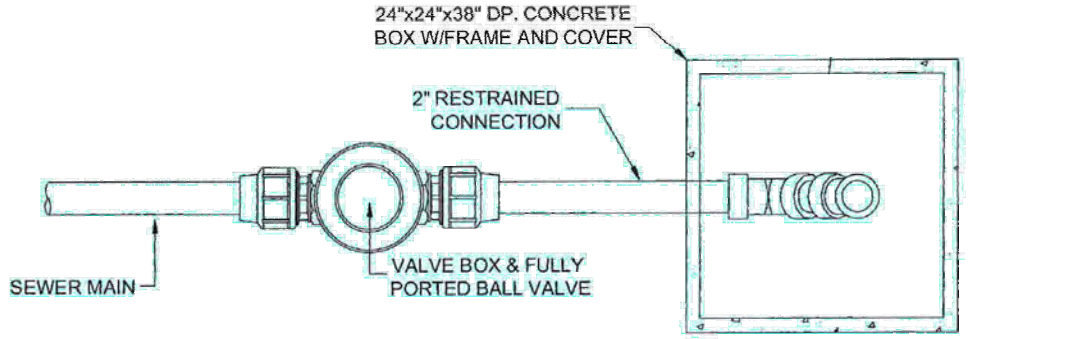


ELEVATION VIEW

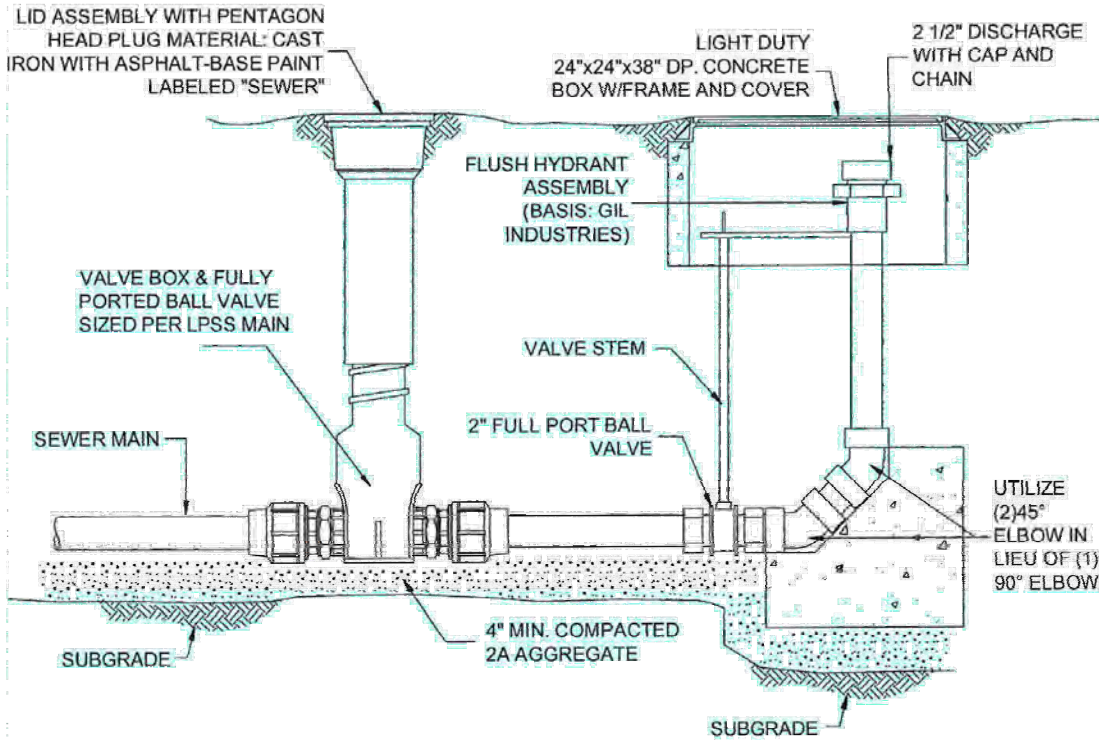
INTERMEDIATE CLEANOUT ASSEMBLY

SCALE: NONE

<p>REVISIONS</p>	INTERMEDIATE CLEANOUT ASSEMBLY DETAIL	
	PENNSYLVANIA AMERICAN WATER	
	<p>Company Name Company Address Company Address</p>	
	<p>DRAWN BY PROJECT ENG'R APPROVED</p>	<p>DATE PROJECT</p>
<p>USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES</p>		<p>SD-35</p>



PLAN VIEW

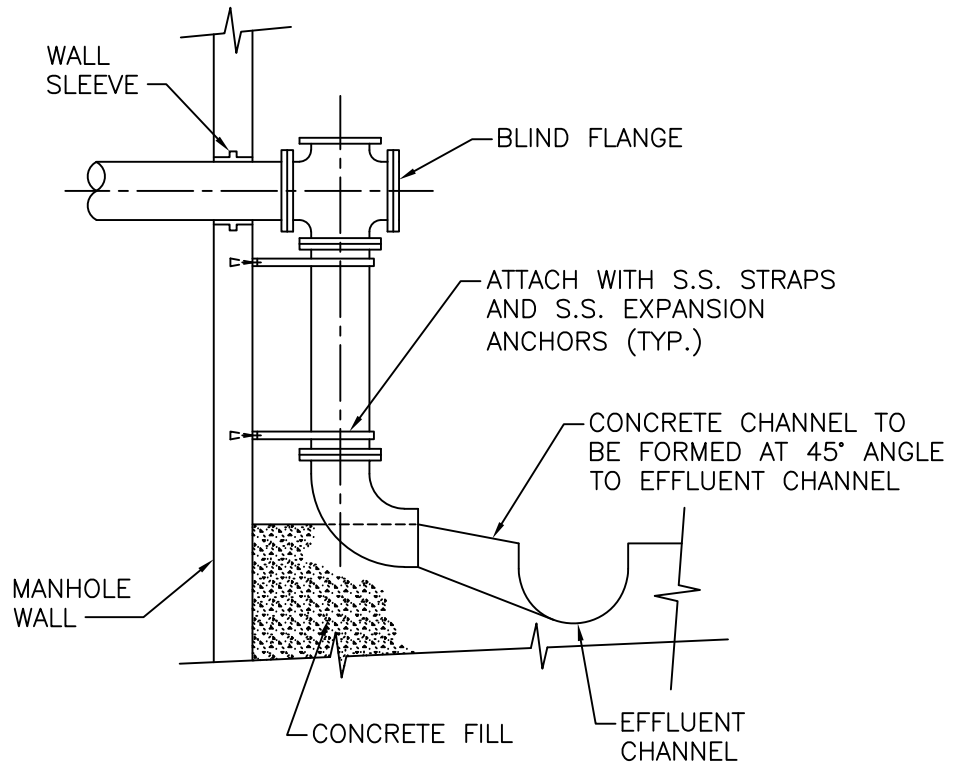


ELEVATION VIEW


TERMINAL CLEANOUT ASSEMBLY

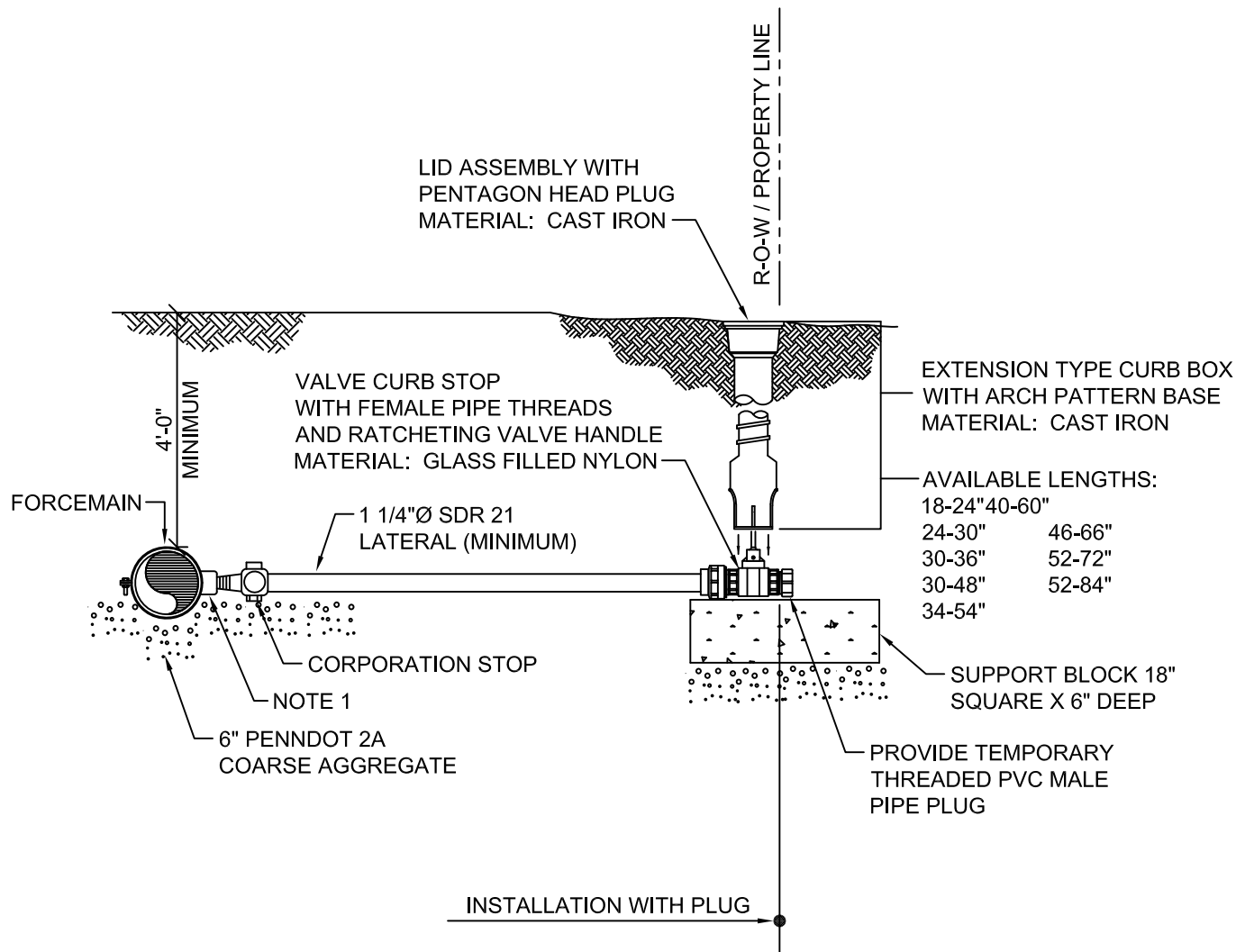
SCALE: NONE

	REVISIONS	TERMINAL CLEANOUT ASSEMBLY DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	
		SD-36	




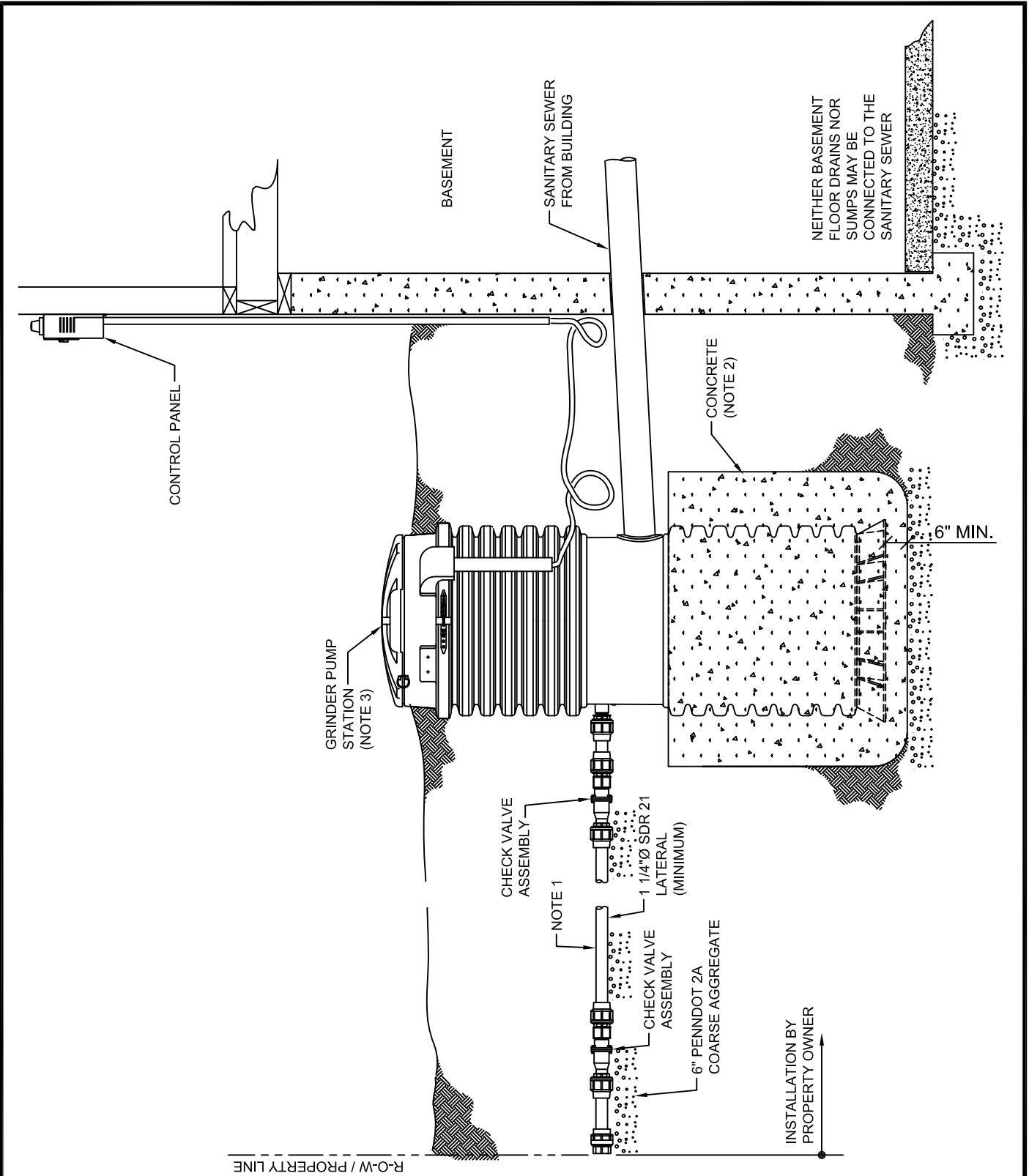
SECTIONAL
VIEW

	REVISIONS	LOW PRESSURE DROP CONNECTION DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address DRAWN BY PROJECT ENG'R APPROVED	 PENNSYLVANIA AMERICAN WATER USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-37



INSTALLATION WITH PLUG

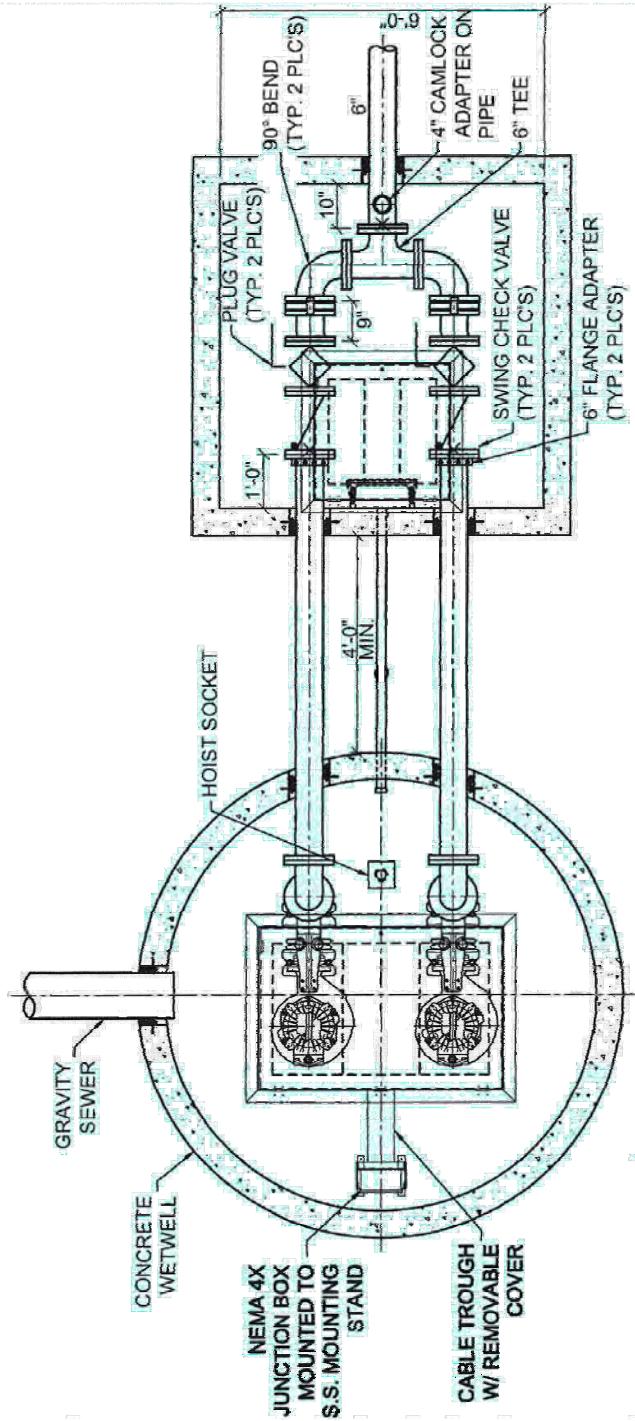
	REVISIONS	FORCEMAIN LATERAL DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-38



R-O-W / PROPERTY LINE


<p>REVISIONS</p>	<p>TYPICAL GRINDER PUMP INSTALLATION DETAIL</p>	
	<p>PENNSYLVANIA AMERICAN WATER</p> <p>Company Name Company Address Company Address</p> <p>DRAWN BY PROJECT ENG'R APPROVED</p> <p>DATE PROJECT</p> <p>USE DIMENSIONS ONLY SCALE NO SCALE</p>	
	<p>USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES</p>	<p>SD-39</p>

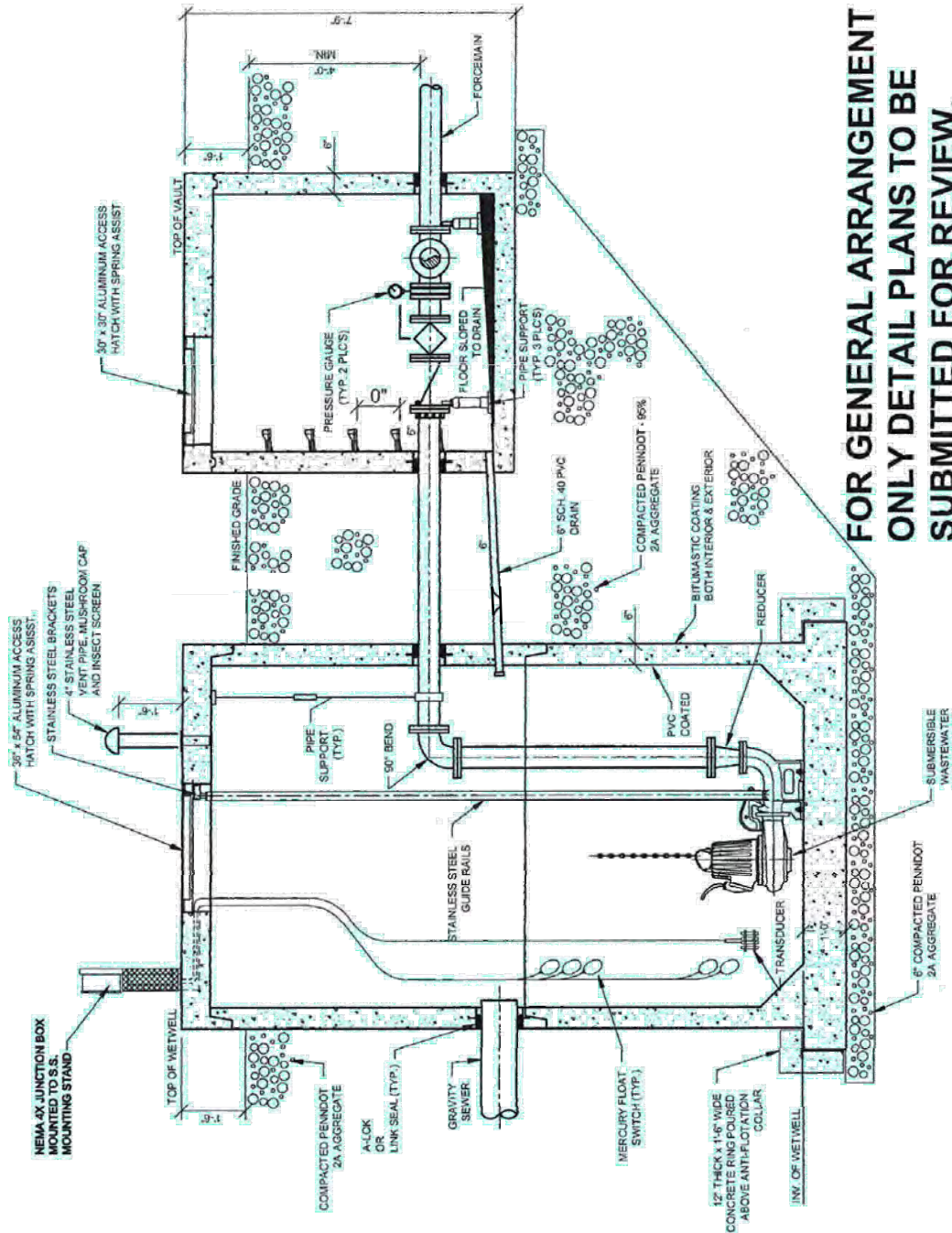
**FOR GENERAL ARRANGEMENT ONLY DETAIL
PLANS TO BE SUBMITTED FOR REVIEW.**



PLAN VIEW - PUMP STATION


SCALE: NONE

	REVISIONS	PLAN VIEW – PUMP STATION DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-40

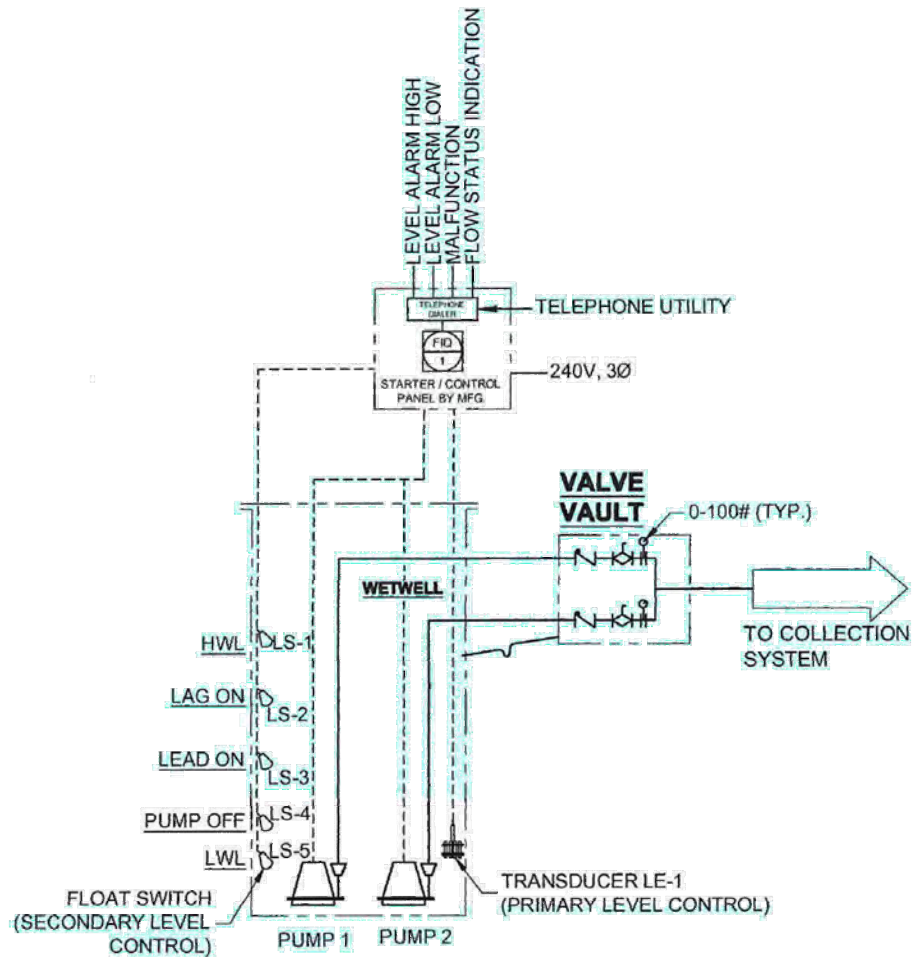


**FOR GENERAL ARRANGEMENT
ONLY DETAIL PLANS TO BE
SUBMITTED FOR REVIEW.**

SECTION VIEW - PUMP STATION
SCALE: NONE


REVISIONS	SECTION VIEW – PUMP STATION DETAIL	
	PENNSYLVANIA AMERICAN WATER	
	Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
	DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES		SD-41

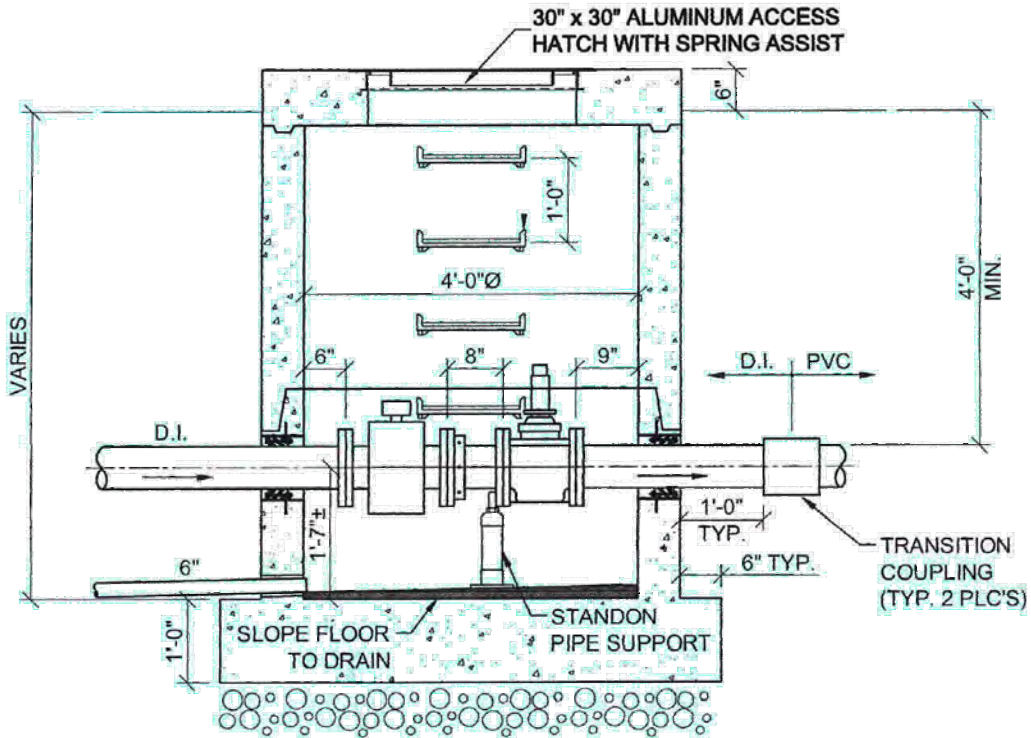
**FOR GENERAL ARRANGEMENT
ONLY DETAIL PLANS TO BE
SUBMITTED FOR REVIEW.**



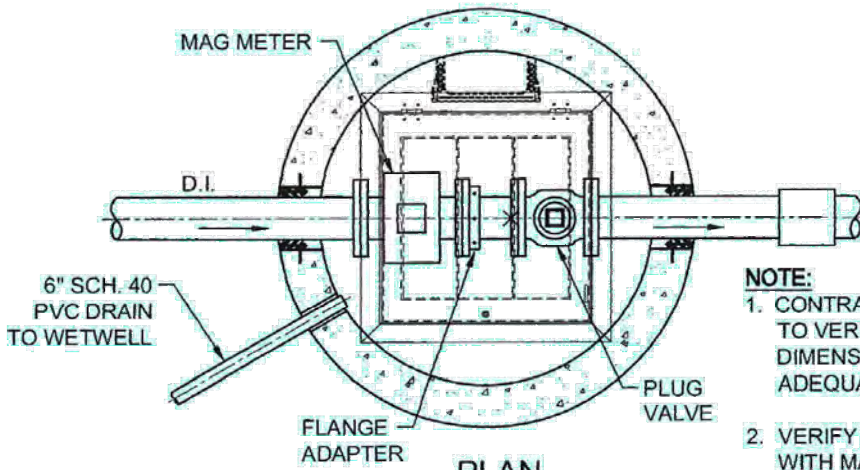
PUMP STATION
PROCESS & INSTRUMENTATION DIAGRAM

SCALE: NONE

	REVISIONS	PUMP STATION PROCESS & INSTRUMENTATION DIAGRAM DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-42




SECTION



PLAN

FORCE MAIN METERING MANHOLE DETAIL

- NOTE:**
1. CONTRACTOR IS RESPONSIBLE TO VERIFY EXISTING DIMENSIONS AND PROVIDE FOR ADEQUATE WORKING SPACE.
 2. VERIFY METER CONFIGURATION WITH MANUFACTURER.

	REVISIONS	FORCE MAIN METERING MANHOLE DETAIL	
		PENNSYLVANIA AMERICAN WATER	
		Company Name Company Address Company Address	 PENNSYLVANIA AMERICAN WATER
		DRAWN BY PROJECT ENG'R APPROVED	DATE PROJECT USE DIMENSIONS ONLY SCALE NO SCALE
		USE APPROVED DRAWINGS ONLY FOR CONSTRUCTION PURPOSES	SD-43