BOROUGH OF ORWIGSBURG

SCHUYLKILL COUNTY, PENNSYLVANIA

SEWER SYSTEM RULES AND REGULATIONS

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COPIES OF RULES: These Rules and Regulations are available for review at the Borough's office at all times during regular business hours and are available for purchase for $25.00 per copy. These Rules and Regulations will be revised as conditions dictate. Please contact the Borough for latest revisions.

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SECTION 1 GENERAL PROVISIONS

The Orwigsburg Municipal Authority owns the Orwigsburg Sewer System. Orwigsburg Borough (Borough) administers and operates the Orwigsburg Sewer System. For the purposes of this document, reference to these two entities are interchangeable.

These Rules and Regulations set forth uniform requirements for users of the Borough of Orwigsburg Sewer System and help enable the Borough to comply with applicable State and Federal Laws, Regulations, and Permits. The Borough will furnish Sewer Service only in accordance with these Rules and Regulations.

These Rules and Regulations are made part of every application, contract, agreement or license entered into between the Owner of any Improved Property and the Borough. These Rules and Regulations are applicable to all sewered areas within and adjoining the Borough. No connection, through which sanitary sewage or industrial wastewater does or may enter the sewer system, shall be constructed, altered, repaired, or allowed to exist, which does not comply with these Rules and Regulations.

Except as otherwise provided herein, the Borough shall administer, implement, and enforce the provisions of these Rules and Regulations, in accordance with the purposes, policies, and objectives as set forth herein.

The Borough does hereby reserve the right to alter, amend, and/or repeal these Rules and Regulations, which when altered and amended shall become and thereafter be a part of every such application, contract, agreement or license for sewer service in effect at the time of such alteration, amendment and/or adoption.

These Rules and Regulations are not intended to conflict with any local, state or federal legislation and/or regulation. Any provisions that are found to be in direct conflict with such legislation or regulation shall not be applicable.

In the event any provision, section, sentence, clause or part of the Rules and Regulations shall be held to be invalid, such invalidity shall not affect or impair any remaining provision, section, sentence, clause or part of these Rules and Regulations, it being the intent of the Borough that such remainder shall be and shall remain in full force and effect.

SECTION 2 SEWER SERVICE REQUIREMENTS

2.1 CONNECTION: The Owners of any Improved Property located within 150 feet of the Borough's Sewer Main is required, at the Owner's expense, to connect to the Borough's Sewer System, in accordance with the provisions of the Connection Ordinance for the municipality in which the improved property is located.

Upon connection, all Sanitary Sewage and permitted Industrial Wastes must be discharged into the Sewer System, including but not limited to water from toilets, showers, sinks and washing machines.

No Person shall connect any Improved Property with any part of the Sewer System without first making application for and securing a connection permit, in writing, from the Borough. Such application shall be made on a form to be provided by the Borough.

2.2 DISCONNECTION OF SERVICE: No Person shall terminate its Service to the Improved Property or disconnect its facilities from the Sewer System or permit the disconnection or removal of facilities serving the Property without the written consent of the Borough. Breach of this provision shall subject the Person to liability for damage to Borough property, and shall not terminate or suspend Owner's liability for User Charges or other applicable fees, nor shall it stop the accrual of such User Charges and fees.

2.3 DUTY TO NOTIFY BOROUGH OF CHANGES IN "PREMISES": If the use or classification of any Improved Property changes, the Owner of the Improved Property shall be responsible for immediately notifying the Borough, in writing, of any such change.

2.4 SYSTEM ACCESS: By having applied for permission to, and/or having connected to, the Sewer System, the Owner of any Improved Property has given the Borough the right of access at reasonable times to any Improved Property which is served by the Sewer System as shall be required for purposes of inspection, measurement, sampling and testing and for performance of other functions relating to service rendered by the Borough through the Sewer System, and to ensure or enforce compliance with these Rules and Regulations.

2.5 SAMPLING AND TESTING: Sanitary Sewage or Industrial Waste being discharged into the Sewer System shall be subject to periodic sampling, inspection, and testing.

The frequency of such sampling, inspection, and testing shall be as deemed appropriate by the Borough. The Owner of an Improved Property causing such discharge shall be liable for all sampling, inspection, and testing costs.

Laboratory methods used in the analysis of samples of Sanitary Sewage or Industrial Wastes shall be determined in accordance with the latest approved edition of "Standard Methods for Examination of Water and Wastewater", published by the American Public Health Association, Inc. provided; however, that alternate methods for the analysis of samples may be used, subject to mutual agreement between the Borough and the Owner discharging such Sanitary Sewage or Industrial Wastes into the Sewer System.

2.6 REGULATORY DEVICES: The Borough has the right to require the Owner of any Improved Property having large variations in rates of discharge to install suitable regulating devices for equalizing waste flows to the Sewer System.

The average rate of discharge during any twenty-four (24) hour period shall not be exceeded by more than 50% at any time during such twenty-four (24) hour period.

2.7 PRETREATMENT STANDARDS: Upon the promulgation of the Federal Categorical Pretreatment Standards for a particular industrial subcategory, the Federal Standard, if more stringent than limitations imposed by the Borough for sources in that subcategory, shall immediately supersede the limitations imposed by the Borough The Borough shall notify all affected Owners of the applicable reporting requirements under 40 CFR, Section 403.12.

2.8 DILUTION: No Person shall ever increase the use of process water or, in any way; attempt to dilute a discharge as a partial or complete substitution for adequate treatment to achieve compliance with the limitations contained in the Federal Categorical Pretreatment Standards, or in any other pollutant-specific limitation developed by the Borough, EPA or Commonwealth.

2.9 INSPECTION OF DISCHARGES AUTHORIZED BY PERMIT: Whenever an Owner is authorized by the Borough and the appropriate governmental agencies to discharge any polluted water, Sanitary Sewage or Industrial Waste containing any of the substances or possessing any of the characteristics referred to within the “Prohibited Discharge”, such discharge shall be subject to the continuing approval, inspection and review of the Borough.

If, in the opinion of the Borough, such discharges are causing or are likely to cause damage to the Sewer System, the Borough shall order the Owner causing such discharge to cease doing so forthwith, or to take other appropriate action, as may be required by the Borough, to eliminate the harmful discharge. The Owner causing such discharge shall be liable for any inspection and engineering costs accrued by the Borough.

2.10 SEWER INTERCEPTORS AND SEPARATORS: Harmful discharges to the Sewer System are prohibited. Interceptors and separators shall be provided, installed, and maintained by the Owner of an Improved Property, at Owners expense, wherever in the sole judgment of the Borough they are deemed necessary for the proper handling of liquid wastes containing excessive grease, inflammable wastes, sand, or other harmful substances. All interceptors and separators shall be of a type and capacity determined by the Owner using sound engineering practices and shall be approved by the Borough and constructed and installed at a satisfactory location in accordance with plans approved by the Borough prior to installation or commencement of construction.

1. GREASE INTERCEPTORS: A grease interceptor shall be required to receive the grease laden drainage from plumbing fixtures and equipment located in the food preparation areas of commercial and industrial establishments. This includes, but is not limited to, restaurants, bars, schools and food processing facilities. No Sanitary Sewage shall be discharged into the grease interceptor.

2. OIL INTERCEPTORS: An oil interceptor shall be required to receive drainage from work areas of commercial and industrial establishments where the possibility exist that petroleum product could become mixed with wastewater. This includes, but is not limited to, garages and gasoline stations.

3. SPECIAL PURPOSE INTERCEPTORS: Interceptors shall be required at commercial and industrial establishments where the nature of their operation is such that a substance detrimental to the Sewer System could enter the wastewater stream.

4. ACCESSIBILITY AND MAINTENANCE: Each interceptor or separator shall be installed so as to be readily accessible for service and maintenance. Interceptors and separators shall be maintained by periodic removal of accumulated grease, scum, oil, solids, etc. and by disposal of the material in a lawful manner. All interceptors shall be pumped at least every ninety (90) days, or more frequently if the accumulated grease, scum, oil and solids exceed 25 percent of the total volume of the device. Disposal shall be in accordance with appropriate laws.

5. INSPECTION AND RECORDS: Borough shall make periodic inspections of these facilities and review associated records to assure proper installation, maintenance, and disposal procedures are being practiced. Written records, maintained by the Owner or facility management, shall be required for a period of three (3) years to document required maintenance and lawful disposal of all accumulated material. The Borough shall also require the annual submission of this documentation.

If the Borough determines that pumping and/or maintenance is necessary, the required work must be completed by the Owner within 72 hours of written notification.

2.11 SPECIAL AGREEMENT: Nothing contained herein shall be construed as prohibiting any special agreement or arrangement between the Borough and the Owner of an Improved Property or other Person whereby Sanitary Sewage or Industrial Wastes of unusual strength or character is to be admitted into the Sewer System, either before or after preliminary treatment. However, any such agreement or arrangement must be documented within written permission from the Borough.

SECTION 3 APPLICATION FOR SEWER SERVICE

3.1 **GENERAL:** No Person shall uncover, connect with, make any opening into or use, alter or disturb in any manner any part of the Sewer System without first making application for and obtaining a permit, in writing, from the Borough. Application to the Borough for a Sewer Permit required hereunder shall be made by the Owner of the Improved Property to be served, in such form as may be prescribed from time to time by the Borough. The application shall be accompanied by such tapping and/or connection fee as may be required by the Borough from time to time.

3.2 **APPLICATION:** Copies of the Sewer Connection Application shall be made available at the Borough Building. The application is subject to change at the discretion of the Borough. Therefore, applicant shall ensure that they have the latest revision of the application. The application is to be submitted to the Borough by the Owner requiring or desiring connection to the Sewer System.

3.3 **APPROVAL OF APPLICATION:** The application and its acceptance by the Borough shall constitute, from the date of acceptance by the Borough, a contract obligating the Owner to pay rates and charges as established by the Borough from time to time and to comply with the Rules and Regulations which shall be established from time to time.

3.4 **TRANSFERS AND TERMINATION:** Each sewer connection permits validly issued shall, upon conveyance of title to the real estate for which the connection was permitted, pass automatically to the record title owner of such property. Bills for sewer rental shall continue to the title owner of record with the Borough, until such time as the Borough shall receive written notice of the transfer and the name and address of the new record title owner. No sewer connection permit may be transferred to another person other than a new record title owner of the property for which such permit was issued. The holder of any valid sewer permit for a vacant lot, a structure that is unoccupiable, or a separate use no longer separate, may terminate such permit by written notice to the Borough. Upon receipt of such notice, the sewer connection represented by such permit shall revert to, and become the sole property of the Borough, free and clear of any claim or interest of the former holder. No termination of a permit servicing an occupied or occupiable structure shall be permitted until proof satisfactory to the Borough is supplied that the premises has been vacated and that steps have been taken, satisfactory to the Borough, to render it unoccupiable, or in the case of multiple uses in the same structure, that the separateness of the use has been permanently eliminated. Billing for sewer rental shall continue, once commenced, until the permit for which the billing is issued shall be terminated as aforesaid.

SECTION 4 BUILDING SEWERS AND CONNECTIONS

4.1 GENERAL: No connection shall be made to the Sewer System unless the manner in which the connection is made and the materials and workmanship employed in effecting such connection shall comply with the requirements of the Borough's Standard Construction Specifications. It shall also be necessary for all connections to comply with any special requirements imposed by these Rules and Regulations.

4.2 SEPARATE CONNECTIONS: Each Improved Property shall be connected separately and independently to the Sewer System through a Building Sewer. Grouping of more than one Improved Property on one (1) Building Sewer shall not be permitted except under special circumstances and for good sanitary reasons or other good cause shown and then only after special permission by the Borough, in writing, shall have been secured, and subject to such rules, regulations, and conditions as may be prescribed by the Borough. The installation of such separate Building Sewers and Laterals shall be made at the expense of the property Owners.

4.3 CONNECTION NOTICE: No Person shall make or cause to be made a connection of any Improved Property or Premises to the Sewer System until such Person shall have given the Borough at least forty-eight (48) hours' notice of the time when such connection will be made so that the Borough may inspect the work, connection and perform necessary testing. Inspection fees shall be charged to the Owner of the Improved Property in accordance with the rate schedule of the Borough then in effect.

No connection shall be made to the Sewer System or the pipe trench covered or trench backfilled unless and until the Building Sewer installation has been inspected and approved, in writing, by the Borough's representative and all permits, approvals, and inspection forms, if any are required, have been received and provided to the Borough. If any part of the Building Sewer is covered before being inspected, tested, and approved, it shall be uncovered for inspection at the cost and expense of the Owner of the Improved Property.

It is the intention of the Rules and Regulations that the entire connection be inspected at one time; however, if the Owner feels that specials conditions warrant more than one inspection, the Owner may request the same, subject to such additional inspection fees as the Borough shall determine.

4.4 LOCAL and PADOT RIGHT-OF-WAY: If work contemplated requires excavation within Borough or PADOT right-of-way, including but not limited to Borough and PADOT streets and sidewalks, such Person shall have furnished satisfactory evidence to the appropriate representative of the Borough that a permit for the excavation within Borough or PADOT right-of-way has been obtained from subject right-of-way holder.

4.5 MAINTENANCE BY PROPERTY OWNER: Every Building Sewer shall be maintained at all times in a sanitary and safe operating condition by the Owner of an Improved Property. Owner shall comply with all maintenance and discharge rules imposed by the Borough, including those which may be set forth, in writing, separately from these rules from time to time. It shall be the Owner's responsibility to ensure that occupants of the Premises or tenants, if any, comply with all maintenance and discharge rules imposed by the Borough. Further, in the event the Borough determines that the Owner or Customer was responsible for causing blockage or damage in an area which would ordinarily be the responsibility of the Borough, by placing inappropriate material into the Building Sewer, as determined by the Borough, the Owner shall be responsible to reimburse the Borough for all costs incurred, including labor and material, to correct the blockage or repair the damage.

4.6 REPLACEMENT OF BUILDING SEWER: In the event it becomes necessary to replace a Building Sewer, the Owner shall notify the Borough and such a replacement shall be subject to the specifications and inspection provisions of these Rules and Regulations. The Owner shall be responsible for all costs of replacement of the Building Sewer.

4.7 LIABILITY FOR IMPROPER DISCHARGE: Any Person who discharges or permits to discharge any material to the Sewer System except through approved connections will be subject to such charges as the Borough may establish and shall hold harmless and indemnify the Borough from any costs and charges imposed by any governmental agency with jurisdiction, in addition to being subject to any penal provisions imposed by the Borough, PADEP or the Environmental Protection Agency.

4.8 PAYMENT OF COST: All costs and expenses for the construction, connection, and maintenance of a Building Sewer shall be borne by the Owner of an Improved Property; and such Owner shall indemnify and save harmless the Borough from all loss or damage which may be occasioned, directly or indirectly, as a result of construction, connection, and maintenance of a Building Sewer, as well as from an action, cause of action, claim or judgment, including any costs and reasonable attorney fees incurred in defending such action, cause of action, claim or judgment, as a result of construction, connection, and maintenance of a Building Sewer.

If required for Service to a Property, the Borough, at the expense of the Owner, may construct the Building Sewer. The Borough shall have the right to repair a damaged Building Sewer at the Owner's expense; and such Owner shall indemnify and save harmless the Borough from all loss or damage which may be occasioned, directly or indirectly, as a result of the repair of a Building Sewer.

4.9 SPECIAL REQUIREMENTS: Whenever, in the opinion of the Borough, special conditions require additional safeguards or more stringent specifications to be observed, then the Borough specifically reserves the right to refuse to permit a connection to be made to its Sewer System until such special requirements or specifications as may be stipulated by the Borough have been satisfied.

SECTION 5 SEWER MAIN EXTENSIONS

5.1 GENERAL: Where an Owner desires to extend Sewer Service to an Improved Property or properties, they may do so after having met all of the conditions of these Rules and Regulations. All extensions so constructed shall include, without limitation, all Sewer Mains, Building Sewers, pumping stations, Sewer force mains, connections, and other necessary appurtenances.

A Sewer Main Extension shall be required by the Borough in any or all of the following circumstances:

1. For the furnishing of Sewer Service to an individual Premise whose front property line does not abut a Sewer Main installed in a public right-of-way and owned by the Borough.

2. For the furnishing of Sewer Service to a group of individual Premises whose front property line does not abut a Sewer Main installed in a public right-of-way and owned by the Borough.

3. For the furnishing of Sewer Service to a group of Premises located within the limits of a recorded plan of lots where the Developer of the plan is desirous of obtaining such service for the lots.

4. Such other similar circumstances.

5.2 PAYMENT OF COST: The entire cost of the requested sewer Main extensions shall be borne by the Owner requesting or requiring the extension. The Borough shall be subject to no cost.

The Owner shall deposit with the Borough, prior to the execution of any work, a sum of money sufficient to pay all of the Borough's estimated costs associated with the proposed extension, including but not limited to engineering, legal, inspection, testing, observation, and administrative costs, as determined by the Borough in its reasonable discretion, the deposit to be made upon the execution of an agreement between the Borough and the Owner. The amount of deposit shall be determined by the Borough from time to time, and a minimum balance must be maintained in the escrow account. If the balance of the account falls below the minimum established by the Borough, the Borough may demand additional deposits from time to time at its sole discretion.

1. The Owner shall provide construction security (form of security to be determined by the Borough) in the full amount to cover the total estimated cost of Sewer Main Extension construction, including contingences. The Borough reserves the right to use the construction security to complete the installation of the Sewer Main Extension in the event of default by the Owner, or their Contractor. The construction security shall be delivered to the Borough prior to the execution of the Sewer Main Extension Agreement.

2. If it is the intent for the Borough to undertake the installation of the Sewer Main Extension, the Owner shall deposit with the Borough, prior to the execution of any work, a sum of money sufficient to pay the estimated costs of the Sewer Main Extension, as determined in accordance with the procedures set forth herein. The deposit shall be made upon the execution of the Sewer Main Extension Agreement between the Borough and the Owner.

5.3 AGREEMENT: The Owner shall enter into a written agreement with the Borough, prior to the execution of any work, in a form satisfactory to the Borough. The agreement to contain such pertinent conditions which include, but are not limited to, the following:

1. The Streets in which the extension is to be located must be dedicated to public use, the lines and grades thereof established and the rough grading completed. Where a line is located in a private right-of-way, an Easement shall be dedicated to the Borough for its use and benefit, in a form acceptable to the Borough.

2. The Ownership title to all installations shall be conveyed to and vested in the Borough, when approved by the Borough.

3. The Owner and its Contractor, where applicable, shall be required to provide the Borough with performance and payment bonds in the full amount of the work construction cost in accordance with applicable laws and the agreement required to be entered into between Owner and Borough.

4. The Owner's Contractor shall provide the Borough with certificates of insurance in the amounts specified by the Borough, with the Borough and the Borough's Engineer names as additionally insured on liability policies.

5. The Owner shall be responsible for maintenance of any sewer Main facilities for a period of Eighteen (18) months following acceptance and dedication of such improvements by the Borough. The Owner shall be responsible for maintaining cash security, on deposit with the Borough or under a letter of credit acceptable in form and substance to the Borough of an amount equal to Fifteen (15%) percent of the construction costs as security for Owner's maintenance responsibilities for such Eighteen (18) month period.

6. The Borough shall have the right to make further extensions beyond or laterally from the extensions, such extensions not to be considered as connections subject to any refund.

7. The payment of refunds to the Owner for additional new Customers connecting by way of a Lateral to the extension to be subject to such conditions as set forth in the agreement, and to limiting number of years, not to exceed 10 years, for the payment of refunds. No refunds are to be made unless the collection part of the tapping fee is received from the new Customers for the privilege of obtaining direct Service from the extension, through a service line connection or sewer lateral. There is no refund for new Customers connecting to subsequent extensions of the initial extension.

8. The Sewer Main Extension agreement, together with all its terms and conditions, shall be binding upon an insure to the benefit of the respective successors or assigns or personal representatives of the parties thereto, as the case may be, but the agreement, other than the right to receive such payments as may be due there under, may not be assigned by the Owner without the prior written consent of the Borough.

9. Such other related requirements.

5.4 DESIGN: It is the policy of the Borough that the use of conventional gravity sewage collection facilities, wherever technically practical, is required. Grinder pump units and other alternative sewer systems shall only be allowed for Premises that cannot be feasibly served by conventional gravity sewage collection facilities. Final determination on whether the Premises cannot be served by conventional gravity sewage collection facilities will be made by the Borough and whether an alternative sewer system will be acceptable.

Sewer Main extensions shall be designed by the Owner subject to Borough approval, and shall comply with the following conditions:

1. The Owner must secure the services of a Registered Professional Engineer and a Registered Professional Surveyor to prepare the necessary plans and specifications, which shall be subject to approval by the Borough. Any revisions in the design considered necessary in the opinion of the Borough's Engineer shall be made at the expense of the Owner. Such plans so prepared shall be signed and sealed by the Registered Professional Engineer and Registered Professional Surveyor.

2. The plans shall include the proposed location of the extensions, the layout of the streets and roads, the layout of existing and proposed plans of lots, existing utilities, and other pertinent data, such plans to be in sufficient detail, including but not limited to plan and profile views.

3. All extensions shall be located in dedicated streets or within rights-of-way dedicated for public use. Where required sewer line easements have not been recorded, the Borough shall be provided with a written easement suitable for recording. The easement shall be a minimum width of 20 feet and to the extent possible the easement shall be uniform in shape, and parallel to property lines with the sewer line placed in the middle area of the right-of-way. The entire post-construction easement shall be accessible for maintenance. The easement document shall be accompanied by individual legal descriptions and plots for each lot on which the easement is located, as well as an overall easement location plan for the entire project. Such descriptions and plots shall be in a form acceptable to the Borough.

4. All extensions shall be designed in such a manner as will permit future extensions thereof with the dedication of the easement, whenever applicable, providing for future extensions.

5.5 LOCAL and PADOT RIGHT-OF-WAY: If work contemplated requires excavation within Borough or PADOT right-of-way, including but not limited to Borough and PADOT streets and sidewalks, such Person shall have furnished satisfactory evidence to the appropriate representative of the Borough that a permit for the excavation within Borough or PADOT right-of-way has been obtained from subject right-of-way holder.

5.6 CONSTRUCTION: No construction of any sewer Main intended to be connected to the Borough Sewer System shall be undertaken until such plans and specifications are approved by the Borough and all necessary permits are secured.

All construction shall be done in accordance with the Standard Construction Specifications and approved plans and specifications and in accordance with applicable federal, state, and local statues, ordinances, and regulations. All construction is subject to inspection, testing, observation, and approval by the Borough and its designated representatives.

The construction shall be observed on a full-time basis by the Borough's representative and the Owner is to be responsible for the payment of all observation costs.

5.7 DEDICATION: All extensions shall be connected to Sewer System owned by the Borough, and shall be dedicated to and becomes property of the Borough after inspection and acceptance by the Borough. The Borough will accept dedication of the Sewer Main Extension provided that:

1. The Owner has entered into an agreement with the Borough that is suitable to the Borough's Solicitor.

2. The Owner has provided a bill of sale for all appurtenances being dedicated to the Borough;

3. The Sewer System has been properly installed and is in good repair.

If after completion of any Sewer Main Extension installed by a Person or Contractor other than the Borough, and if an acceptable offer of dedication is not received immediately upon completion of the work, at the Borough's option, the Borough may withhold Service, or the Borough may discontinue any Service improperly instituted by the Owner, or the Borough may disconnect Owner's line from the Borough Sewer System with all costs associated therewith to be paid by Owner.

5.8 LIABILITY: The Borough accepts no responsibility or liability and shall be under no obligation to maintain, repair or replace any sewer facilities installed by the Owner, prior to the acceptance and dedication of said facilities.

1. Until conveyed to another person, the Owner and their assigns will be responsible for payment of all charges for Sewer Service to each Improved Property.

5.9 LIMIT OF SEWER MAIN EXTENSION: The extension of a Sewer Main shall include the entire quantity of pipe line and appurtenant facilities required to conduct the discharge of wastewater from the entire frontage of the last property for which the Owner has requested sewer service to the end of the existing Borough Sewer System.

5.10 SIZE OF MAINS:

1. The Borough shall determine whether a Sewer Main Extension is required in order to extend Sewer Service. In no case shall the Sewer Main be less than 8-inches, except to dead ends where it may be 6-inches at the sole discretion of the Borough.

2. If the Borough increases the size of a Sewer Main Extension beyond that normally required to provide local service, as determined by the Borough, the Borough may bear the increased cost based on cost data furnished by the Applicant and approved by the Borough.

5.11 SEWER MAIN EXTENSION ALIGNMENT:

1. The layout and alignment of all Sewer Main Extensions and appurtenances shall be reviewed and approved by the Borough, or it's Engineer.

5.12 PRECEDENTS: The granting of a particular application or an exception to these Rules and Regulations shall not operate as a precedent in any other case. The Borough may through special action grant an exception or exceptions to any rule, regulation or charge.

SECTION 6 SEWER USE CHARGES AND FEES

6.1 GENERAL: This Borough hereby does impose fees against Owners who desire to or are required to connect to the Sewer System. The fees shall be based on the duly adopted rate schedule which is in effect at the time of payment and shall be made payable at the time set by the Borough or at a time to which the Property Owner and Borough agree.

The Owner, in all instances, rather than tenant(s), shall be liable for the payment of all Sewer charges and fees for services provided by the Borough, and all costs and fees incurred in the collection thereof. All accounts shall be in the name of the Owner only.

6.2 OWNER SUPPLIED INFORMATION: The Owner of any Improved Property discharging Sanitary Sewage and/or Industrial Wastes into the Sewer System shall furnish to the Borough, including by way of the application for permit, all information deemed essential or appropriate by the Borough for the determination of all applicable User Charges and surcharges. The costs of obtaining such information shall be borne by such Owner of the Improved Property.

In the event of the failure of the Owner to provide adequate information, the Borough shall estimate the applicable User Charges and surcharges based upon available information, until such time as adequate information is received. There shall be no rebate of past payments if the Owner's refusal to provide such information results in overpayment.

6.3 CALCULATION OF FEES: All such fees payable by the Owner shall be calculated by multiplying the amounts of the various fees times the number of Equivalent Dwelling Units (EDUs) assigned for the property's use. The Borough, in its sole discretion, shall determine the appropriate number of Equivalent Dwelling Units to be assigned to a particular property, taking into consideration data supplied by the Owner, all Department of Environmental Protection Regulations, Industry reference publications and its own experience.

6.4 MULTIPLE USE PROPERTY: Each EDU located in a Multiple Use Property shall be billed as a separate entity as though such EDU was in a separate structure and had a direct and separate Building Sewer to the Sewer System.

6.5 TAPPING FEES: A Tapping Fee is hereby imposed upon the Owner of any Improved Property to be served by the Sewer System, which actually connects or is required to be connected pursuant to the Connection Ordinance then in effect requiring such connection.

The fees charged by the Borough include charges for connection to the Sewer System including Connection Fees, Consumer Facilities Fees and Tapping Fees and such other fees as may be authorized by Act 57 of 2003, as amended, or such other Act of the Commonwealth of Pennsylvania or its agencies and adopted by the Borough.

6.6 CALCULATION OF TAPPING FEES: Calculation and itemization of the maximum allowable Tapping Fee is on file and available for review at the Borough Offices.

The actual Tapping Fee payable by the Owner of an Improved Property shall be the product of the number of EDUs, constituting such Improved Property, times the adopted Tapping Fee, as noted within the Rate Schedule of the Borough then in effect.

In the event an Improved Property, or use thereof (including number of occupants), changes in a manner that causes the number of EDUs applicable to such Improved Property calculated hereunder to increase, an additional Tapping Fee based on such additional EDUs shall be immediately due and payable.

The Borough reserves the right to update the Tapping Fee Report and adopt a revised Tapping Fee as may be authorized by Act 57 of 2003, as amended, or such other Act of the Commonwealth of Pennsylvania or its agencies and adopted by the Borough.

6.7 USER CHARGES: A User Charge is hereby imposed upon the Owner of any Improved Property which is or shall be connected to the Sewer System, for use of the Sewer System, whether such use is direct or indirect, and for services rendered by the Borough in connection therewith, and shall be payable as provided herein.

At the discretion of the Borough, such User Charges may be imposed upon the Owner of an Improved Property who fails or refuses to properly connect such Improved Property to the Sewer System, as compensation for the availability of service by the Borough in connection with the Sewer System.

6.8 CALCULATION OF USER CHARGES: User Charges for service applicable to any Improved Property, Premises, or Connection Unit constituting a Residential Establishment, a Commercial Establishment, an Educational Establishment, an Industrial Establishment, an Institutional Establishment or any combination thereof, shall be calculated, imposed and collected on the basis of one of the following methods, at the sole discretion of the Borough:

1. **Flat Rate Basis:** Each Property billed on a flat rate basis shall be charged based on the number of Billing Units represented by the Property using a specific charge per EDU applicable to such Property, which specific amount shall be determined, from time to time, by the Borough.

   If the use or classification of any Improved Property changes during a billing period, the User Charge shall be prorated by the Borough. The appropriate credit or charge shall appear on the statement for the next succeeding billing period. The annual Flat Rate User Charge payable per Billing Unit shall be determined by Resolution of the Borough from time to time and reflected in the Rate Schedule.

   The Borough reserves the right, from time to time, to establish additional flat rate classifications and to establish monthly rates therefore; and the Borough further reserves the right, from time to time, to alter, modify, revise and/or amend flat rate classifications and the monthly rate.

   The number of EDUs applicable to Commercial and Industrial Establishments shall be computed on the basis of the average daily number of full and part-time employees (including the owner(s) or employee(s) for the calendar month following the date of the monthly billing). The Owners of such facilities shall be responsible for advising the Borough in writing of the number of employees upon connection to the Sewer System, a change in the number of employees, and upon request of the Borough.

The number of EDUs applicable to Educational and Institutional Establishments shall be computed on the highest monthly average daily attendance of occupants, pupils, faculty, administrators and staff for the twelve (12) months preceding the date of the billing. The Owners of such facilities shall be responsible for advising the Borough in writing of the number of pupils, faculty, administrators and staff in attendance as an average daily figure upon connection to the Sewer System, a change in the number of occupants, pupils, faculty, administrators and staff, and upon request of the Borough.

If the use or classification of any Improved Property changes, the Owner of the Improved Property shall be responsible for advising the Borough in writing of any such change affecting the User Charge payable. The appropriate credit or additional charge shall appear on the statement for the next succeeding billing period.

2. **Metered Rate Basis:** User Charges for any Property, at the discretion of the Borough, may be determined on a Metered Rate Basis calculated according to:

   - Metered volume of potable water usage by the non-residential Improved Property, adjusted, if appropriate, by the Borough, or
   - Actual metered volume of wastewater discharged by the non-residential Improved Property into the Sewer System.

   In either of the foregoing cases, such User Charges on a metered basis shall be computed on the basis of one (1) EDU per each 350 gallons or portion thereof of water consumed or sewage discharged monthly. In no case shall the Borough utilize a meter based User Charge for any User which shall result in a rate below the minimum rates established for billing units in this section.

   The meters or other measuring devices which shall be required or permitted for use in determining volume of discharge or water consumed shall be furnished and installed by the Owner of the Improved Property at their expense, shall be under the control of the Borough and may be tested, inspected, or repaired by the Borough whenever it deems necessary. The Owner of the Improved Property upon which such meter or other measuring device shall be installed shall be responsible for its maintenance and safekeeping and all repairs thereto shall be made at the expense of the Owner, whether such repairs shall be necessary by ordinary wear and tear or other causes. Bills for such repair, if made by the Borough, shall be due and payable immediately upon completion of such repairs and shall be collected in the same manner as monthly bills for sewer rentals or charges.

3. **Estimated Rate Basis:** User Charges may also be based upon the Borough's estimate of potable water consumed by any Improved Property per billing period and billed in accordance with the Metered Rate Schedule adopted by Resolution of the Borough from time to time.

6.9 SURCHARGES: Surcharges shall be paid in addition to all User Charges computed in accordance with the Rules and Regulations, as amended, and shall be computed on such basis, and payable at such times, as the Borough may from time to time adopt, including provisions of any agreements to which this Borough is a party governing the treatment of Domestic Sanitary Sewage or Industrial Wastes.

Surcharges will be calculated independently on a case-by-case basis on the duration and degree of severity of the discharge, the actual cost to remedy and/or treat the discharge and shall be assessed separately.

6.10 CALCULATION OF SURCHARGES: In the event that the Borough shall consent, in writing, under separate agreement to accept Domestic Sanitary Sewage and/or Industrial Wastes for discharge into the Sewer System from any establishment having concentrations higher than that described in the prohibited waste, the Borough shall at its discretion impose additional charges for such waste.

The strength of Domestic Sanitary Sewage and/or Industrial Wastes to be used for establishing the amount of surcharge shall be determined at intervals at the discretion of the Borough or as may be required by a particular establishment. The collection and analysis of waste samples for determination shall be made or under the direct supervision of a registered professional engineer approved by the Borough.

For establishing waste strengths for surcharge purposes, sampling and analysis shall be made in accordance with the latest approved edition of “Standard Methods for Examination of Water and Wastewater”, published by the American Public Health Association, Inc. All costs for waste sampling and collection shall be paid by the Owner of Improved Property, which entered into separate agreement with Borough to accept such Domestic Sanitary Sewage and/or Industrial Wastes.

The Owner of any Improved Property which shall discharge Domestic Sanitary Sewage and/or Industrial Wastes to the Sewer System in concentrations greater than typical Domestic Sanitary Sewage including but not limited to having a BOD content greater than 250 mg/l, a Suspended Solids content greater than 250 mg/l, a Total Phosphorus as P content greater than 8mg/l, or a Total Nitrogen as N content greater that 40 mg/l shall, at the discretion of the Borough, pay a strength of waste surcharge, in addition to applicable User Charges. Actual charges for strength of waste surcharge will be reviewed and determined by the Borough based upon direct and indirect additional treatment charges above and beyond typical Domestic Sanitary Sewage.

6.11 SPECIAL AGREEMENT: Nothing contained herein shall be construed as prohibiting any special agreement or arrangement between the Borough and the Owner of an Improved Property with respect to terms and conditions upon which Sanitary Sewage and/or Industrial Wastes may be discharged into the Sewer System and with respect to payments to be made to the Borough in connection therewith. In such event, such service and payments with respect thereto shall be governed by terms and conditions of such special agreement.

SECTION 7 BILLS, PAYMENTS, AND TERMINATION OF SERVICE

7.1 GENERAL: All bills for services furnished by the Borough will be based on the rate schedule of the Borough then in effect.

Each Owner of an Improved Property, which is connected to the Sewer System, initially shall provide the Borough with and thereafter shall keep the Borough advised of their correct address. Failure of any Person to receive any bill for User Fees shall not be considered an excuse for nonpayment or an abatement of penalties, nor shall such failure result in an extension of the period of time during which the net bill shall be payable.

Every Owner of Improved Property shall remain liable for the payment of all bills, including but not limited to User Charges and surcharges, until the later of:

1. The receipt by the Borough of written notice by such Owner that the property has been sold, containing the correct name and mailing address of the new Owner, or

2. The date on which title to the Improved Property is transferred to a new Owner. Failure to provide notice renders an Owner continuously liable for any charges that may accrue until such time as the Borough has been properly notified of any change in Ownership.

7.2 BILLS RENDERED AND DUE:

1. At the option of the Borough, all bills will be rendered monthly for service during the previous month.

2. All payments on account must be sent to 209 North Warren Street, Orwigsburg PA 17961 and postmarked on or before the due date printed on the bill.

3. For special or estimated charges, bills will be rendered upon application, before service is granted.

4. Charges for connections, temporary uses, and special service shall be payable on demand.

5. The Borough reserves the right to take any legal action it deems necessary, including imposing a lien on the property, in order to recover amounts due and payable.

Owners of an Improved Property that are first connected to the Sewer System during any monthly period shall pay a pro-rata User Charge for service for the balance of the billing period and shall be billed in conjunction with the next regular billing period or by a special billing, as the Borough may determine.

7.3 DELINQUENT ACCOUNT PROCEDURES: If any User Charge or applicable surcharge is not paid by applicable billing date, an additional sum of ten percent (10%) penalty shall be added to such bill. If not paid within thirty (30) days from the date of the bill, an additional one and a half percent (1.5%) penalty will be charged for every additional month of fraction thereof.

Payment made or mailed and postmarked on or before the due date shall constitute payment within such period. If the due date shall fall on a legal holiday or a Sunday, then payment made on or mailed and postmarked on the next succeeding business, which is not a legal holiday, shall constitute payment for that period.

If service is discontinued, it will not be restored until all unpaid bills and charges, including the charge for restoring service, are paid or satisfactory arrangements have been made for payment.

Any and all payments received on delinquent accounts shall be applied first to any penalty and processing fee and then to the oldest outstanding balance.

7.4 **NON-PAYMENT:** Payment of any User Charge or applicable surcharge not paid within a timely manner, as determined by the Borough, may be referred to an attorney for collection of delinquent accounts. Attorney fees shall be paid in accordance with Title 53 P.S. Section 7106.

The Borough reserves to itself the following remedies in the event of non-payment, which it may exercise separately or in any combination or in combination with the procedures set forth in Title 53 P.S. Section 7106, in its sole discretion:

1. First Notice is sent first class mail ten (10) days after the due date and the penalties have been added to all customers who have not paid their current bill.

2. Second Notice is sent first class mail and certified mail ten (10) days after the first notice to the customers who have not made a payment in thirty (30) days, have a balance over sixty (60) days past due or a balance due of over $100.00. A processing fee will also be added to the account.

3. Third Notice is a door posting on the main entrance of the property, seven (7) days after the certified letter second notice is sent, stating water service to the property shall be shut off. The water shut off shall be scheduled for noon ten (10) days after the door posting. If payment is still not received, a water shut off notice is posted on the door the day of the shut off.

4. If no payment after water shut off, then charges are filed with the magistrate. The Borough also reserves the right to exercise any other legal remedy to collect past due amounts by appropriate action and/or to pursue equitable relief to prohibit further use of water by the Owner. The Borough may also (i) file delinquent accounts in accordance with law with appropriate credit agencies, and (ii) exercise any other legal remedy to collect past due amounts by appropriate action and/or to pursue equitable relief to prohibit further introduction of sewage or any other objectionable material into the sewer system by the Owner.

5. Where Owner does not reside at the Improved Property where the past due bill is incurred, notices of the delinquency as provided in this section will be sent to both the Owner and tenant.

7.5 COLLECTION: All charges and fees shall be collected in the manner of a municipal lien filed against the Property or by any other process authorized by law by the Borough, together with any costs of collection, including reasonable attorney fees.

1. Water meters are read at the end of March, June, September & December for sewer customers on a metered rate basis.
2. Utility bills are mailed on or about the 15th of January, April, July, October.
3. Utility bills are due thirty (30) days after the billing date.
4. If not paid, seven (7) days after the due date, a letter is mailed requesting payment.
5. If still not paid, ten (10) days after the date of the first letter, a second certified letter is mailed informing the customer their service may be shut-off if not paid within seven (7) days of the date of the second letter.
6. Delinquent accounts that are two (2) quarters behind will be posted with a Shut Off Notice. Customers have ten (10) days after the Shut-Off Notice to pay the delinquent amount before their service will be shut-off. Shut offs will not occur on a Friday, Saturday, or Sunday.
7. Vacant properties will have a lien filed.

7.6 TAPPING FEE: The Tapping Fee shall be due and payable the earlier of:

1. The time application is made by an Owner of an Improved Property to make connection to the Sewer System or if applicable the date when the Borough shall connect any such Improved Property to the Sewer System, at the costs and expense of the Owner, when such Owner shall have failed to make such connection as required by the Connection Ordinance in effect requiring such connection.
2. In the case of Improved Properties required to be connected following initial construction of the Sewer System, the date which is sixty (60) days after the date of issuance by the Borough of a written notice to connect.
3. Owners of an Improved Property which is attributed an additional number of EDUs as defined by the Borough rate structure herein shall pay a corresponding additional Tapping Fee at the time of being attributed with the new EDU computation.

All Tapping Fees shall be payable to the officer or employee of the Borough as shall be authorized, from time to time, by the Borough to accept payment thereof.

No Tapping Fees shall be reimbursed by the Borough for subsequent reductions in the number of EDUs constituting a particular Improved Property.

7.7 USER CHARGES AND APPLICABLE SURCHARGES: User Charges shall be due and payable the earlier of:

1. The date of actual physical connection of an Improved Property to the Sewer System.

2. Sixty (60) days from the date of issuance of the notice to connect described in a Connection Ordinance or such other date established by the Borough for commencement of the payment of the User Charge.

3. One (1) year from the date of issuance of a sewer connection permit.

7.8 BILLS OF DOUBTFUL ACCURACY: Any Customer who doubts the accuracy of a bill shall bring or mail the bill, within ten (10) days of receipt, to the Borough office. The Borough will check the bill and either confirm the original billing or issue a corrected bill. The due date will be adjusted by the time required to check and reissue the bill.

7.9 BAD CHECKS: When a check is returned to the Borough by the bank for insufficient funds, the Borough will add a service charge of $25.00 to the bill for each occurrence.

SECTION 8 PROHIBITED DISCHARGE

8.1 GENERAL: No Person shall discharge or shall cause to be discharged into the Sewer System any of the following without first securing written consent to do so from the Borough:

1. Storm water, surface drainage, ground drainage, roof runoff, and subsurface drainage, cooling water, drainage from tile fields, spring water, or unpolluted process waters;

2. Any Industrial Wastes, chemical or other matter exceeding any of the following parameters:

   (a) Having a temperature higher than 140 degrees Fahrenheit or less than 32 degrees Fahrenheit;

   (b) Containing more than 50 parts per million, by weight, of fat, oil or grease;

   (c) Containing a Biochemical Oxygen Demand (BOD) of more than 250 milligrams per liter;

   (d) Any liquids, solids or gases which by reason of their nature or quantity are, or may be, sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious in any other way to the Treatment Plant or to the operation of the Treatment Plant, including but not limited to, waste streams with a closed-cup flashpoint of less than 140 degrees Fahrenheit using methods in 40 CFR 261.21. At no time shall two (2) successive readings on an explosion hazard meter, at any point of discharge into the system (or at any point in the system), be more than 5% nor any reading over 10% of the Lower Explosive Limits (LEL) of the meter. Prohibited materials include, but are not limited to, gasoline, kerosene, benzene, naphtha, toluene, xylene, ethers, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides and sulfides, fuel oil, or other flammable or explosive liquids, solids, or gas which the Borough, EPA, or PADEP has notified the User is a fire hazard or a hazard to the Sewer System;

   (e) Containing any solid wastes with particles greater than ½-inch in any dimension, resulting from the preparation, cooking and dispensing of food and from handling, storage, and sale of produce, which wastes are commonly known as garbage, which have not been ground by household type garbage disposal units or suitable garbage grinders;

   (f) Having a pH of not lower than 6.0 or higher than 9.0 or having another corrosive property capable of causing damage or hazard to structures, equipment or personnel of the Treatment Plant or the Sewer System;

   (g) Containing total solids of such character or in such quantity that unusual attention or expense is required to handle such materials at the Treatment Plant or a suspended solids content of more than 300 milligrams per liter;

(h) Containing septic tank effluent, unless otherwise permitted, authorized or approved by the Borough and the Department of Environmental Protection;

(i) Being harmful or deleterious to any part of the Sewer System;

(j) Being inhibitory or toxic to the treatment process at the Treatment Plant;

(k) Containing any noxious or malodorous gas or substance, which, either singly or by interaction with other wastes, is capable of creating a public nuisance or hazard to life or preventing safe entry into the Sewer System for maintenance and repair;

(l) Containing any ashes, cinders, sand, spent lime, stone or marble dust, mud, straw, shavings, metal, glass, animal guts or tissues, bones, hides or fleshing, feathers, entrails, rags, feathers, tar, plastic, wood, paunch manure, grass clippings, spent grains, spent hops, waste paper, strings, gas, asphalt residues, residues from refining or processing of fuel or lubricating oil, glass grinding or polishing, dental floss, wood or other fibers, whole blood, bentonite, lye, building materials, rubber, hair, leather, porcelain, china, ceramic wastes or any other solids or viscous substances capable of causing obstruction to the flow in the Sewer System or other interference with the proper operation of the Sewer System or the Treatment Plant;

(m) Containing a toxic or poisonous substance in sufficient quantity to injure or to constitute a hazard to humans or animals or to create any hazard in the receiving stream of the Treatment Plant.

(n) Having any waste containing toxic or poisonous substances in excess of the following limits, measured at the point of discharge to the Sewer System:

SUBSTANCE	MAXIMUM CONCENTRATION (ppm)
Arsenic	0.05
Cadmium (as Cd)	0.1
Chromium (trivalent)	1.0
Chromium (hexavelent)	0.05
Copper (as Cu)	0.5
Cyanides (free CN)	0.05
Lead	0.3
Mercury	0.002
Nickel (as Ni)	2.0
Phenolic Compounds	0.005
Silver	0.05
Zinc (as Zn)	1.0

(o) Containing any radioactive substances and/or isotopes of such half-life or concentration that will result in Treatment Plant effluents exceeding limits in compliance with applicable state or federal regulations;

(p) Containing color from any source that, when diluted 1:10, will have a luminescence of 90% or better and purity of 10% or less, at its dominant wave length by the Tristimulus method;

(q) Having a chlorine demand in excess of 12 mg/l at a detention time of 20 minutes;

(r) Being prohibited by any permit issued by the Commonwealth of Pennsylvania or by the EPA or any of their respective agencies;

(s) Containing wastes which are not amenable to biological treatment or reduction in the Treatment Plant, including but not limited to non-biodegradable complex carbon compounds;

(t) Being at a flow rate and/or pollutant discharge rate, which are taking on the proportions of a Slug so that there is a treatment process upset and subsequent loss of treatment efficiency at the Treatment Plant.

(u) Any substance which may cause the Treatment Plant's effluent or any other produce of the Treatment Plant, such as residue, sludges or scums, to be unsuitable for reclamation and reuse or to interfere with the reclamation process. In no case shall a substance discharged to the Treatment Plant cause the Borough to be in non-compliance with sludge use or disposal criteria, guidelines or regulations affecting sludge use or disposal developed pursuant to the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substances Control Act or Commonwealth criteria applicable to the sludge management method being used;

(v) Containing any substance that will cause interference or pass through at the Treatment Plant and exceed the maximum permitted levels for such substance under the requirements of the EPA, PADEP or other governmental agencies having jurisdiction;

(w) Containing any substance prohibited by resolution, rule, regulation, or agreement of the Borough hereafter enacted or adopted from time to time;

(x) Sludges, screenings or other residues from the pretreatment of industrial wastes;

(y) Medical wastes, except as specifically authorized by the Borough in a wastewater discharge permit;

(z) Wastewater causing, alone or in conjunction with other sources, the Treatment Plant's effluent to fail a toxicity test;

(aa) Detergents, surface-active agents or other substances which may cause excessive foaming in the Treatment Plant; or

(bb) Fats, oil, or grease of animal or vegetable origin in concentrations which will cause interference or pass through.

SECTION 9 ADMISSION OF INDUSTRIAL WASTES INTO SEWER SYSTEM

9.1 GENERAL: Any Owner desiring to make or to use a connection through which Industrial Wastes shall be discharged into the Sewer System shall supply to the Borough pertinent data, including estimated quantities of proposed flow, characteristics and constituents of the proposed discharge.

9.2 CHANGE IN TYPE OF WASTES: Any Industrial Establishment or Owner of an Improved Property who is discharging or permitting to discharge Industrial Wastes into the Sewer System and who contemplates a change in the method of operation which will alter the composition of Industrial Wastes at the time being discharged into the Sewer System shall notify the Borough in writing at least thirty (30) days prior to consummation of such change so that the Borough may sample the Industrial Wastes immediately after such change takes place in order to make the determinations provided for or required herein.

9.3 SAMPLING FLOW, MEASUREMENT, TESTING AND INSPECTION: When required by the Borough, the Owner of any Improved Property serviced by a Building Sewer carrying Industrial Wastes shall provide and install, at Owners expense, a suitable control manhole, together with such necessary meter, or meters, and other appurtenances in the Building Sewer, to facilitate observation, sampling and measurement of the waste flow.

1. All measurements, tests and analysis of the characteristics of waters and wastes to which reference is made herein shall be determined in accordance with the latest approved edition of “Standard Methods for Examination of Water and Wastewater”, published by the American Public Health Association, Inc., and shall be determined by or under the direct supervision of a “qualified analysis” at the control manhole provided, or upon suitable samples taken at such control manhole. In the event that no control manhole has been required, the control manhole shall be considered to be the nearest downstream manhole in the public sewer to the point at which the Building Sewer is connected. Sampling shall be carried out by customarily accepted methods to reflect the effect of constituents upon the Sewer System and to determine the existence of hazards to life, limb, and property. The particular analysis involved will determine whether a twenty four (24)-hour composite of all outfalls of Premises is appropriate or whether a grab sample or samples must be taken.

2. The Borough reserves the right, based upon the pertinent data supplied, to reasonably refuse to permit the introduction of specified Industrial Wastes into the Sewer System, to order as a condition precedent to connection that pretreatment facilities be constructed as hereinafter provided, or if it reasonably believes that the Industrial Wastes cannot be adequately pretreated, to deny the right to connect to the Sewer System.

3. The Borough specifically reserves the right, from time to time, to impose surcharges for Industrial Wastes discharged into the Sewer System, either by agreement with the Owner of the Improved Property or by amendment and/or supplement to these Rules and Regulations which shall establish appropriate surcharge rates and charges.

9.4 SIGNIFICANT INDUSTRIAL USER REPORTS: Ten (10) days prior to the first day of January, April, July and October of each year, each Significant Industrial User shall file with the Borough a report on the quantity and quality of their discharge.

9.5 PRETREATMENT FACILITIES: Whenever an Owner requests permission from the Borough to discharge any Sanitary Sewage or Industrial Waste containing any of the substances or possessing any of the characteristics referred to in the "Prohibited Discharge", the Borough may, in its sole discretion, require as a condition to its granting approval for such discharge, that said Owner provide, at Owners expense, pretreatment of such waters or wastes to reduce or eliminate objectionable substances or characteristics prior to discharge into the Sewer System, or to control the quantities or rates of discharge of such waters or wastes.

Whenever an Owner is required by the Borough to provide pretreatment facilities, no construction of such facilities shall be commenced until: (1) construction drawings, specifications and other pertinent information relating to the proposed facilities are submitted by said Owner to the Borough's Engineer; and (2) the Borough's Engineer gives written approval for the construction of the proposed facilities.

Whenever pretreatment facilities are approved by the Borough, and are placed in operation, said facilities shall be continuously maintained in satisfactory and effective operation by the Owner who installed them, at Owners expense. The Borough or its designated agent shall have the right to inspect said facilities at any reasonable time to insure such are being properly maintained and operated in accordance with the Rules and Regulations of the Borough.

SECTION 10 PENALTIES

10.1 CIVIL FINES: Any Person who fails to comply with any provisions of the Sewer System Rules and Regulations shall be fined not less than Three-Hundred Dollars ($300.00) nor more than Six-Hundred Dollars ($600.00) for each offense. For each offense, each day of which a violation shall occur or continue under this section shall be deemed a separate and distinct offense. In addition to the penalties provided herein, the Borough Rules and Regulations provide for the recovery of reasonable attorney's fees, court costs, court reporter fees and other expenses of litigation by appropriate suit at law against the person found to have violated the orders, rules, regulations, and permits issued hereunder.

10.2 CRIMINAL VIOLATIONS: Any Person who willfully or negligently violates the provision(s) of the Sewer System Rules and Regulations or any order or permits issued hereunder or any state, federal or local regulation shall be subject to criminal penalties and/or imprisonment to the extent such punitive measures are allowable by law.

10.3 FALSIFYING INFORMATION: Any Person who knowingly makes any false statements, representations or certification in any application, record, report, plan or other document filed or required to be maintained, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or other method required under the Sewer System Rules and Regulations, shall, upon conviction, be punished by a fine of not more than One Thousand Dollars ($1,000.00) or by imprisonment to the extent allowed by law, or by both. For each offense, each day of which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided herein, the Borough Ordinances provide for the recovery of reasonable attorney's fees, court costs, court reporter fees and other expenses of litigation by appropriate suit at law against the person found to have violated an Ordinance or the orders, rules, regulations, and permits issued hereunder.

10.4 ABATEMENT OF NUISANCES: In addition to any other remedies provided in this section, any violation of the Sewer System Rules and Regulations deemed to be a nuisance by the Borough may be abated by either seeking appropriate equitable or legal relief from a court of competent jurisdiction.

APPENDIX A

DEFINITIONS

Unless the context specifically and clearly indicates otherwise, the meaning of the following terms and phrases shall be as follows:

Act or **the Act** shall mean the Federal Water Pollution Control Act, also known as the Clean Water Act.

Approval shall mean the legal letter of approval issued by the Borough passed by motion at a legally scheduled meeting and witnessed.

Ammonia Nitrogen as N shall mean ammonia nitrogen as determined pursuant to the procedure set forth in the latest approved edition of Standard Methods for the Examination of Water and Wastewater, as published by the American Public Health Association, Inc.

Biochemical Oxygen Demand or **BOD** shall mean the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedures 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 Wastewater, as published by the American Public Health Association, Inc.

Borough Engineer shall mean an engineer, retained or employed by the Borough including any authorized member of the staff of such engineer.

Building Sewer shall mean the extension from the sewage drainage system of any Improved Property to the Lateral serving such Improved Property at the property line.

Commercial Establishment shall mean any room, group of rooms, building or enclosure, or group thereof, connected, directly or indirectly, to the Sewer System and used or intended for use in the operation of a business enterprise for the sale or distribution of any product, commodity, article or service, which maintains separate toilet, sink or other plumbing facilities in the room or group of rooms utilized for such business enterprise.

Commonwealth shall mean the Commonwealth of Pennsylvania.

Connection Fee shall mean the fee for connection of the property from the Main to the property line.

Connection Ordinance shall mean the Ordinance enacted by the Borough requiring Owners of certain Improved Property located in the Borough to connect to such Sewer and use the same in such manner as this Borough may ordain.

Contractor shall mean any Person, Firm, Partnership, or Corporation who, with approval of the Owner, intends to build, construct, and install a wastewater system project within the Borough.

Customer shall mean the Owner contracting for Sewer Service for their own use or use by a tenant or other occupant of a single Property, Premises, or Connection Unit; and the word “Customers” means all so contracting for Sewer Service.

Customer Facilities Fee shall mean the fee for connection from the property line to the dwelling or building.

Department of Environmental Protection or **DEP** or **PADEP** shall mean the Pennsylvania Department of Environmental Protection.

Domestic Consumer Unit shall mean any room, group of rooms, building or other enclosure connected directly or indirectly to the Sewer System and occupied or intended for occupancy as separate living quarters by a family or other group or persons living together or by a person living alone; and each Domestic Consumer Unit in a double house, in a row of connected houses or in an apartment building shall be billed and shall be considered at a minimum a separate EDU.

Dwelling Unit shall mean any room, group of rooms, house trailer, apartment, condominium, cooperative or other enclosure connected directly or indirectly to the Sewer System and occupied or intended for occupancy as living quarters by an individual, a single family or other discrete group or persons, excluding institutional dormitories.

Domestic Sanitary Sewage shall mean normal water-carried household and toilet wastes discharged from a Residential Establishment. 250 mg/liter BOD_5; 250 mg/liter TSS; 40 mg/liter Total Nitrogen; 8 mg/L Total Phosphorus.

Educational Establishment shall mean any room, group of rooms, building, or other structure, connected, directly or indirectly, to the Sewer System and used or intended for use, in whole or in part, for educational purposes, including both public and private schools or colleges.

Environmental Protection Agency or **EPA** shall mean the Environmental Protection Agency of the United States of America.

Equivalent Dwelling Unit (EDU) shall mean the unit of measure on which User Charges and the Tapping Fee shall be assessed against each Residential Establishment, Commercial Establishment, Industrial Establishment, Institutional Establishment, Educational Establishment, or any combination thereof or any other Property, Premises, or Connection Unit, connected to the Sewer System, as determined in accordance with these Rules and Regulations or in any existing or subsequent resolution of the Borough, and which shall be deemed to constitute an equivalent unit of service provided to the typical single-family dwelling unit.

Improved Property shall mean any property located in the Borough upon which there is erected a structure intended for continuous or periodic habitation, occupancy or use by human beings or animals and from which structure Sanitary Sewage and/or Industrial Wastes shall be or may be discharged. Each side of a double house or row home having a solid vertical partition wall shall be considered a separate Improved Property.

Industrial Establishment shall mean any Improved Property used or intended for use, wholly or in part, for the manufacturing, processing, cleaning, laundering or assembling of any product, commodity, or article, or any other Improved Property from which wastes, in addition to or other than Domestic Sanitary Sewage, shall or may be discharged.

Industrial Wastes shall mean any and all solid, liquid or gaseous substance or waterborne wastes or forms of energy rejected or escaping in the course of any industrial, manufacturing, trade or business process or from the development, recovery or processing of natural resources.

Institutional Establishment shall mean any room, group of rooms, building or other enclosure connected, directly or indirectly, to the Sewer System, including institutional dormitories and Educational Establishments, which do not constitute a Commercial, Residential or Industrial Establishment.

Lateral shall mean that part of the Sewer System extending from a Sewer Main to the dwelling or, if no such Lateral shall be provided, then "Lateral" shall mean that portion of, or place in, a Sewer that is provided for connection of any Building Sewer.

Main or **Mains** shall mean the Borough's collection and/or conveyance pipelines which are generally located in streets, highways, public ways or rights of way or private rights-of-way and which are used to collect and convey wastewater to the Treatment Plant.

Main Extension shall mean any extension of collection pipelines constructed beyond existing facilities excluding Building Sewers.

mg/l is the abbreviation for **milligrams per liter**, a measure of the concentration by weight of a substance per unit volume; in this case the weight in milligrams divided by the volume of the solution in liters, as used to identify concentrations.

Multiple Use Property shall mean any Property upon which there shall exist any combination of Residential Establishment, Commercial Establishment, Industrial Establishment, Educational Establishment, Institutional Establishment or similar establishments.

Owner or **Owners** shall be the title holder of the subdivision parcel or any and all person or persons having an interest as Owner in any Property or Premises.

Person or **Persons** shall mean any individual, partnership, company, association, society, trust, corporation, or other group or entity or any combination thereof.

pH shall mean the logarithm of the reciprocal of the concentration of hydrogen ions, expressed in grams per liter of solution, indicating the degree of acidity or alkalinity of a substance in standard units.

ppm shall mean parts per million parts water, by weight.

Premises shall mean the property or area, including improvements thereto, to which Sewer Service is or will be provided.

Project shall mean the total of the work to be performed under approval granted by the Borough.

Property or **Improved Property** shall mean any property within Sewered Area upon which there is a Premise or other erected structure intended for continuous or periodic habitation, occupancy or use by human beings or animals and from which structure Sanitary Sewage and/or Industrial Wastes shall be or may be discharged. This shall also include a vacant property, which is proposed for development of a structure or structures from which sanitary sewage, and/or industrial wastes shall be discharged.

Residential Establishment shall mean any room, group of rooms, house trailer, building or other enclosure connected, directly or indirectly, to the Sewer System and occupied or intended for occupancy as living quarters by an individual, or family, excluding institutional facilities.

Rules and Regulations shall mean the rules and regulations as adopted by the Borough of Orwigsburg for connection and/or use of the Sewer System.

Sanitary Sewage shall mean normal water-carried household and toilet wastes from any Improved Property, exclusive of storm water runoff, surface water or ground water.

Sewer shall mean any pipe or conduit constituting a part of the Sewer System used or usable for sewage collection purposes.

Sewered Area shall mean the geographic area served by the Sewer System as determined and designated, from time to time, by the Borough.

Sewer Service or **Service** shall mean the availability of the Sewer System or actual collection and disposal of Sanitary Sewage to or from a Premise.

Sewer System shall mean all facilities existing, at any particular time, acquired, constructed, operated, and/or owned by the Borough and the Property Owner connection and installation requirements of the Borough as duly approved, from time to time, by resolution of the Borough.

Significant Industrial User(s) shall mean those whose total estimated or metered discharge volume exceeds 15,000 gallons per day, have in their waste a toxic pollutant or those designated by the Borough as having a potential impact on the Sewer System or the quality of the Treatment Plant's effluent.

Slug shall mean a flow rate and/or pollutant discharge rate designated by the Borough as having a potential impact on the Sewer System or the quality of the Treatment Plant's effluent.

Standard Construction Specifications shall mean the current standard construction and material specifications for sanitary sewer extensions of the Borough and the Property Owner connection and installation requirements of the Borough as duly approved, from time to time, by resolution of the Borough.

Street or **Streets** shall mean and shall include any street, road, lane, court, cul-de-sac, alley, public way or public square, including such streets as are dedicated to public use, and such streets as are owned by private Persons.

Surcharge shall mean the extra charge in addition to the User Fees which is levied on those Persons whose wastes are greater in strength than the concentration values established as representative or normal sewage.

Tapping Fee shall mean a fee against the owner of any Improved Property in the area served by the Sewer System which actually connects or is required to be connected pursuant to the Connection Ordinance then in effect requiring such connection or which otherwise connects to the Sewer System.

Total Nitrogen as N shall mean total nitrogen as determined pursuant to the procedure set forth in the latest approved edition of Standard Methods for the Examination of Water and Wastewater, as published by the American Public Health Association, Inc.

Total Phosphorus as P shall mean total phosphorus as determined pursuant to the procedure set forth in the latest approved edition of Standard Methods for the Examination of Water and Wastewater, as published by the American Public Health Association, Inc.

Total Solids shall mean solids determined by evaporating at 100^{o}C a mixed sample of wastewater as determined pursuant to the procedure set forth in the latest approved edition of Standard Methods for the Examination of Water and Wastewater, as published by the American Public Health Association, Inc. Total solids include floating solids, Suspended Solids, Settleable Solids and Dissolved Solids, as defined below:

> **Suspended Solids** shall mean the solids that can be filtered and shall be determined by latest approved edition of Standard Methods for the Examination of Water and Sewage as published by the American Public Health Association, Inc.

Settleable Solids shall mean solids that settle in an Imhoff cone from a standard sample of waste and shall be determined by latest approved edition of Standard Methods for the Examination of Water and Wastewater, as published by the American Public Health Association, Inc.

Dissolved Solids shall mean solids that are dissolved in the waste and cannot be settled, but can be determined by evaporation and shall be determined by latest approved edition of Standard Methods for the Examination of Water and Wastewater, as published by the American Public Health Association, Inc.

Treatment Plant shall mean the sewage treatment plant and related facilities, including sewage transportation facilities, owned by the Borough of Orwigsburg and to which Sanitary Sewage and/or Industrial Wastes are discharged from the Sewer System for ultimate treatment and disposal.

User shall mean any Person who contributes, causes, or permits the contribution of wastewater into the Sewer System or the Treatment Plant from an Improved Property.

User Charges or **User Fees** shall mean the monthly rental or charge imposed by the Borough, as amended from time to time, for use or availability of use of the Sewer System as established by the Borough and set forth on its Rate Schedule attached hereto as Appendix B.

END OF DEFINITIONS

APPENDIX B

RATE SCHEDULE

ORWIGSBURG BOROUGH
ALL FEES ARE NON-REFUNDABLE

WATER RENT PER UNIT - Effective January 1, 2019

First 5,000 gallons (Minimum -occupied or unoccupied)	$90.00
All other gallons	5.40

SEWER RENT PER UNIT - Effective January 1, 2019

First 5,000 gallons (Minimum -occupied or unoccupied)	$110.00
All other gallons	3.00
Flat Rate	150.00

GARBAGE COLLECTION FEES

Per quarter per unit (occupied or unoccupied)	$60.00

LATE PENALTIES FOR WATER, SEWER AND GARBAGE

1.5% will be charged for every additional month or fraction.

PEDDLER'S PERMIT

Per Day	$25.00
Per Week	$100.00
Per Month	$200.00
Per Annum	$400.00

CERTIFICATION BY BOROUGH SECRETARY

$15.00

RESEARCH WORK

Per hour per employee	$20.00

ANNUAL ALARM PERMIT FEE

$15.00

USE OF FAX MACHINE

Outgoing	$3.50 for first page
Additional pages	1.00
Incoming	.50

Revised January 9, 2019

APPENDIX C

APPLICATION FOR SEWER SERVICE / CONNECTION PERMIT

BOROUGH of ORWIGSBURG
209 North Warren Street, Orwigsburg, PA 17961
(570) 366-3103

APPLICATION FOR SEWER SERVICE / CONNECTION PERMIT

GENERAL INFORMATION

Tentative Sewer Connection Permit No: _____ Date: _____

Property Owner: _____

Property Address: _____

Building Type: Residential ___ Commercial ___ Multiple ___ Industrial ___

Billing Mailing Address (if different): _____

_____

_____

CONNECTION FEE CALCULATION

Number of EDUs: _____

Connection Fee per EDU: _____

Total Connection Fee: _____

Connection Fee Received Date: _____ Received By: _____

AGREEMENT

In consideration of granting this permit, the undersigned agrees:

1. To accept and abide by the provisions of the Borough of Orwigsburg's Rules and Regulations dated _____, 20___, and subsequent amendments thereto, and all other Regulations and Requirements of the Borough and other governing authorities, and that I have reviewed, or had an opportunity to review, said Rules and Regulations.

2. To notify the Borough of Orwigsburg at least 48 hours in advance prior to connection of the building sewer to the Borough collection system before any portion of the work is covered, so that the building sewer may be observed by the Authority. Applicant is also to provide an adequate system sketch to the Borough for review and approval during this observation.

Applicant Signature: _____ Date: _____

Applicant Telephone: _____ Applicant Email: _____

INSPECTION SKETCH

APPENDIX D

EDU ALLOCATIONS

EDU's shall be generally assigned as described below or as amended from time to time by the Borough. However, the Borough reserves the right to deviate from the allocations described below at its discretion based upon anticipated use:

CLASSIFICATION	BILLING UNIT
DOMESTIC ESTABLISHMENTS	
Domestic Consumer Unit	1 EDU
COMMERCIAL ESTABLISHMENTS	
Each restaurant, bar room or other Commercial Establishment which regularly dispenses food and/or beverages for consumption on the Premises	1 EDU per 20 seats, which are regularly intended for customer use
Each Retail Store with meat, vegetables, bakery, etc. food preparation facility	1 EDU per food preparation station
Each Car Wash	2 EDUs per Car Wash Bay
Each Laundromat	1 EDU per washer
Each Motel or Hotel (1) - Not containing a kitchen - With kitchen facility	 ½ EDU per bedroom (Rounded up to full EDU) 1 EDU per bedroom
All other establishments not separately classified above, and not constituting a combination Domestic Consumer Unit and Commercial Establishment (2)	1 EDU per public restroom plus 1 EDU per 5 employees or fraction thereof.
COMBINATION DOMESTIC/COMMERCIAL ESTABLISHMENTS	
Combination Domestic Establishment and Commercial Establishment located in one structure and owned, occupied and operated by the same person; provided, however, that this subsection shall not be applicable in those cases where the Commercial Establishment regularly dispenses food and/or beverages for consumption on the premises	2 EDUs (minimum), additional EDUs at the discretion of the Borough based upon actual use

INSTITUTIONAL ESTABLISHMENTS	
School with no cafeteria or showers [3]	1 EDU per 18 students
School with either a cafeteria or showers [3]	1 EDU per 14 students
School with both cafeteria and showers [3]	1 EDU per 12 students
Boarding School [3]	1 EDU per 3 students
Convalescent homes and similar establishments [3]	½ EDU per bed
Fire House or Municipal Building	1 EDU
Church without kitchen facilities	1 EDU
Church with kitchen facilities	1 EDU plus 1 EDU per 20 seats, which are regularly intended for customer use, and/or 1 EDU per food preparation station
Medical Center	3 EDUs per Doctor/Dentist

Notes:

1. Provided, however, that where a business of a restaurant or bar room is conducted in connection with any motel or hotel, and additional and separate sewer rental or charge shall be made payable as defined herein subject to minimum of 1 EDU.

2. This sewer rental or charge shall be computed on the basis of the average daily number of employees for the month immediately preceding the date of the bill.

3. Each school, public or private, per student based upon the daily average number of students enrolled on days when the school was in session during the immediately preceding full school term. Employees shall be classified as students. Please note that the Borough considers day cares, pre-school, and similar establishments to be considered schools as listed within the Institutional Establishments.

APPENDIX E

STANDARD CONSTRUCTION SPECIFICATIONS

Intent of Specifications: The specifications are for the purpose of illustrating the general character and extent of the work and are subject to such modifications as may be found necessary or advisable either before or during the prosecution of the work, and the Owner shall conform to and abide by whatever supplementary drawings and explanations may be required by the Borough for the purpose of illustrating the work. Should any incidental work or materials which are necessary for the proper carrying out of the intent of the specifications, either directly or indirectly, the Owner agrees to perform all such work and furnish and install all such materials as if the same were fully specified.

PROJECT MANUAL

BOROUGH OF ORWIGSBURG
209 N. Warren Street
Orwigsburg, Pennsylvania 17961

STANDARD SPECIFICATIONS
FOR
SEWER MAIN INSTALLATION

Borough of Orwigsburg
Schuylkill County, Pennsylvania

prepared by

Entech Engineering, Inc.
685 South Mountain Boulevard, Suite A
Mountaintop, Pennsylvania 18707
570-868-0275

Entech No. 4169.11

BOROUGH OF ORWIGSBURG

Schuylkill County, Pennsylvania

STANDARD SPECIFICATIONS FOR SEWER MAIN INSTALLATION

TABLE OF CONTENTS

DIVISION 01
GENERAL REQUIREMENTS

SECTION 01010 - INTRODUCTION

PART 1 - GENERAL

1.1 SCOPE

A. These Specifications have been adopted by the Borough of Orwigsburg (Borough) to specify the manner in which water and sewer mains and appurtenances shall be furnished and installed by the Contractor within the Borough service area.

B. The Contractor shall comply with all regulations and requirements of the Borough as established in the Borough's Rules and Regulations, Borough ordinances, these Specifications, plus applicable regulations of the Pennsylvania Department of Environmental Protection, Pennsylvania Department of Transportation, and all other Federal, State and Regulatory Agencies.

C. Before any work is started at the construction site, the Contractor shall notify the Borough, local Police Departments, Public Works Departments, Fire Departments, School District, and the various utility companies serving the Borough and shall schedule a preconstruction meeting with the Borough and the Engineer. At the preconstruction meeting, the escrow amount may be modified as necessary to cover construction and inspection costs based on a bona fide construction proposal.

D. It shall be understood that the Borough, at their discretion, reserves the right to visit the construction site(s) and inspect the installation of the water and sewer mains and require corrective actions to assure compliance with these Standards.

E. All work is subject to the inspection and final acceptance by the Borough's Engineer or designated representatives.

1.2 DEFINITIONS

A. See the Borough's Rules and Regulations.

1.3 INSTALLATION OF MAINS

A. All water and sewer mains shall be installed in accordance with the Standard Specifications of the Borough.

B. The layout and alignment of all water and sewer mains shall be reviewed and approved by the Borough or the Engineer.

C. All water and sewer mains shall not be less than 8-inches, with the possible exception of deadends, where the pipe may be 6-inches in size. Allowance for 6-inch lines on deadends shall be at the discretion of the Borough or the Engineer.

D. All water and sewer mains shall be laid with a minimum depth of cover of 4 feet, properly bedded, backfilled, blocked, subjected to a hydrostatic test for leakage in accordance with these Specifications.

E. Water main deadends shall be minimized by looping all mains whenever practical. Where deadends are necessary, the line shall terminate with a gate valve as the same diameter as the main and a flushing device. A fire hydrant is the preferred flushing device, while blowoffs are permissible at the discretion of the Borough or the Engineer.

1.4 INSTALLATION OF WATER SERVICE LINES

A. General: The service line extending from the curb stop to the premises shall be installed by the customer and subject to the detailed requirements and Standard Specifications of the Borough.

B. Meter pits may be required on all service line extensions of 100 feet in length or greater at the discretion of the Borough. The meter pit shall be in complete accordance with the Standard Specifications of the Borough with respect to such work. All pipe passing through foundation or bearing walls shall be provided with suitable wrought iron sleeves and the annular space between the sleeve and the pipe made watertight.

C. Inspection: The Borough shall be notified when the installation of the service line is completed and prior to backfilling, so that the service line can be tested in the presence of a representative of the Borough and an inspection made of both workmanship and materials. The notice shall include such data as the location, the name of the owner and tenant and the time the work will be ready for inspection.

D. Water will not be supplied through the service line or any related part thereof or through any service or supply line which has not been inspected in the open trench and approved by the Borough. These requirements apply to both original installation and repairs.

1.5 INSTALLATION OF SEWER BUILDING SEWERS AND LATERALS

A. General: The building sewer extending from the property line to the premises shall be installed by the customer and subject to the detailed requirements and Standard Specifications of the Borough.

B. Cleanouts may be required on all building sewers extensions of 100 feet in length or greater at the discretion of the Borough. The cleanout shall be in complete accordance with the Standard Specifications of the Borough with respect to such work. All pipe passing through foundation or bearing walls shall be provided with suitable wrought iron sleeves and the annular space between the sleeve and the pipe made watertight.

C. Inspection: The Borough shall be notified when the installation of the building sewer is completed and prior to backfilling, so that the building sewer can be tested in the presence of a representative of the Borough and an inspection made of both workmanship and materials. The notice shall include such data as the location, the name of the owner and tenant and the time the work will be ready for inspection.

D. Sewage will not be permitted through the building sewer which has not been inspected in the open trench and approved by the Borough. These requirements apply to both original installation and repairs.

PART 2 - REQUIREMENTS

2.1 DOCUMENTS TO BE SUBMITTED TO OBTAIN INITIAL PLAN APPROVAL

A. The Contractor shall, in order to obtain initial approval of plans, submit his proposed plans and data to the Borough with sufficient information to enable the Borough's Engineer and Solicitor to review same for compliance with sound engineering practices and legal requirements and all Borough rules and regulations and these Standard Specifications. The Borough's review of the Contractor's plans is for the purpose of determining general conformance with the Borough's Standard Specifications, requirements and details of the Borough. The Contractor remains responsible for implementation of the Borough's Specifications, requirements and details. The Contractor is also responsible for the accuracy of the Accepted Plans and for the designed facility to function as intended. The Contractor is also responsible for determining the size and location of all existing utilities. The Contractor is hereby notified that any purchase of material and/or equipment etc., prior to the Borough's approval thereof, is at the Contractor’s risk.

B. When the Borough, through its Engineer, indicates its general acceptance of the proposed plans, the Contractor shall provide an estimate of the construction of the proposed facilities in sufficient detail for the Borough's Engineer to establish an escrow amount for the proposed work. Standard estimating procedure shall be used. In general, water and sewer main installation shall be classified by linear footage and pipe size for estimating. An estimate for rock excavation shall also be included. It is preferred that the estimate be done by the Contractor competent in the work to be performed. The Borough’s Engineer will have the right to adjust the estimate to reflect his understanding of the cost to perform this work.

2.2 SUBMITTALS AFTER PLAN APPROVAL

A. Upon general acceptance of the proposed plans, but prior to initiating any work, the Contractor shall submit copies of all required permits and other various requirements as itemized herein.

B. All submittals shall be made in accordance with Section 01300 - Submittals of these Specifications.

C. The Contractor shall, in accordance with the following schedule, transmit to the Borough, two (2) copies or sets of the following data, unless otherwise noted.

1. Two (2) weeks prior to construction:
    a. Three (3) sets of the Accepted Plans signed and sealed by a Professional Engineer licensed to practice in the Commonwealth of Pennsylvania. The drawings shall be clear and legible. The plans prepared utilizing AutoCAD shall be prepared at a scale of not less than 1 inch equals 50 feet. Each drawing shall contain a North arrow. Each drawing shall name the legal Owner of the land on which the construction is to occur and the legal name of the Contractor.
    b. Pennsylvania State Highway Occupancy Permit (when required).
    c. Borough and Township Road Opening Permit (when required).
    d. Erosion and Sediment Control Plan.

e. Any and all other permits that may be required to undertake the installation of the water and sewer facilities.
f. Executed easements or rights-of-way obtained from private landowners (when required) to be conveyed to the Borough upon acceptance of the completed facilities.
g. Shop Drawings of all the materials and systems to be installed under this Work. See Section 01300, Submittals for copies required.
h. Blasting Report, if required.

2. During construction:
   a. Letters of certification as to compliance with the Specifications for:

      (1) Paving material
      (2) Select backfill - Type No. 2A (PennDOT)
      (3) Concrete

3. After construction:
   a. Blasting Records
   b. Record Drawings
   c. Warranties and Guarantees shall be turned over to the Borough
   d. A Maintenance Bond equal to fifteen percent (15%) of the construction cost of the proposed work is required. The Contractor shall also purchase and maintain such insurance as will protect the Borough from any claims. The said insurance shall be as required under the laws of Pennsylvania.

2.3 ROCK EXCAVATION

A. Contractor shall obtain approval from the Borough prior to any blasting. All blasting shall be performed under the supervision of a Professional Engineer licensed to practice in the Commonwealth of Pennsylvania.

2.4 SOILS TESTING

A. All soils testing as described in these Specifications shall be performed by a reputable testing and control firm when required by the Borough.

2.6 ACCESS TO WORK

A. Representatives of the Borough shall have access to the work. The Contractor shall provide proper and safe facilities for such access and observation of the work and also for any inspection or testing thereof by others.

2.7 BOROUGH MAY STOP THE WORK

A. If the work is defective, or the Contractor fails to supply suitable materials, the Borough may order the Contractor to stop the work, or any portion thereof, until the cause for such order has been eliminated.

2.8 WARRANTY AND GUARANTEE

A. The Contractor warrants and guarantees to the Borough that all work will be of good quality and free from faults or defects. All unsatisfactory work, all faulty or defective work, and all

work not conforming to the Accepted Plans and these Specifications shall be considered defective. The Borough will give timely notice of all defects to Contractor. At the option of the Borough, all defective work, whether or not in place, may be rejected or accepted with or without requiring corrections from Contractor.

2.9 TESTS AND INSPECTIONS

A. Where so indicated in these Specifications, or if the laws, ordinances, rules, regulations, or orders of any public Borough having jurisdiction, require any work to specifically be inspected, tested, or approved by some public body, the Contractor shall assume full responsibility thereof, pay all cost in connection therewith, and furnish the Borough the required certificates of inspection, testing, or approval.

B. The Contractor shall give timely notice of readiness of the work for all inspections or approvals.

C. All analysis will be run by an approved commercial or any Borough approved laboratory and paid by the Owner/Contractor. A copy of all the test results to be submitted to the Borough prior to final inspection.

2.10 FINAL INSPECTION

A. Upon written notice from the Contractor that the project is complete, the Borough will make a final inspection with the Contractor and will notify the Contractor in writing of all particulars in which this inspection reveals that the work is incomplete or defective. The Contractor shall take such measures as are necessary to remedy such deficiencies.

2.11 FINAL APPLICATION FOR ACCEPTANCE

A. After the Contractor has completed all such corrections to the satisfaction of the Borough, and delivered all schedules, guarantees, bonds, certificates of inspection, and other documents, the Borough shall issue a letter of final acceptance.

2.12 EIGHTEEN-MONTH CORRECTION PERIOD

A. If after final inspection and prior to the expiration of the eighteen-month (18) Maintenance Bond or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Borough, any work installed by the Contractor is found to be defective, Contractor shall promptly, in accordance with the Borough's written instructions, either correct such defective work, or, if it has been rejected by the Borough, remove it from the site and replace it with non-defective work. If Contractor does not promptly comply with the terms of such instructions, the Borough may have the defective work corrected or the rejected removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation of additional professional services shall be paid by the Owner.

2.13 RECORD DRAWINGS

A. At completion of the Work, Contractor shall provide the Borough with two (2) sets of reproducible plans, in a neat and clean condition showing the "As-Built Conditions."

B. Plans shall be marked "Record Drawings" and maintained at the project site. The Contractor shall record on the prints all deviations from his Accepted Plans and these Specifications, at the time that such deviations are made.

1. Record Drawings for water and sewer mains shall show all vertical and horizontal changes to the water main as shown on the Accepted Plans. The location of all service laterals (lengths and depths) shall be dimensional from the main. Record Drawings shall indicate a profile showing the depths where rock was encountered and all other changes made to his Accepted Plans and these Specifications.

C. A complete file of accepted field sketches, diagrams, and other changes as may become necessary during the progress of the work shall also be maintained and attached to the set of marked-up prints.

D. At completion of the work, the Contractor shall provide, for the information of the Borough, each sheet of marked prints and all accepted field sketches and diagrams.

E. When this data has been reviewed and returned by the Borough, the Contractor shall record all field changes and conditions on the Record Drawings clearly noting all field changes and conditions and providing plots on reproducible mylars. Each sheet shall be clearly marked “Record Drawing” and shall be signed by an officer of the company of the Contractor certifying that each sheet/drawing reflect the actual as-built conditions.

F. Provide one (1) set of printed drawings in addition to the Record Drawings. Deliver printed drawings to the Borough.

END OF SECTION 01010

SECTION 01030 - LOCATIONS OF EXISTING LINES

PART 1 - GENERAL

1.1 SCOPE

A. Construction Requirements:

1. In accordance with the Commonwealth of Pennsylvania Act No. 287, PA One Call System, 1-800-242-1776, the Contractor, prior to performing excavation or demolition work on the job site shall obtain all recorded locations of existing lines as outlined herein.
2. Attention is directed to the fact that there may be other lines in certain locations in addition to the recorded locations.

B. Related Requirements Specified Elsewhere:

1. Act No. 287
2. Excavation, Section 02224 - Trenching, Bedding, and Backfilling

1.2 SUBMITTALS

A. The Contractor shall furnish the Authority a certification listing the names of the Users whom he has contacted prior to starting his work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 GENERAL

A. It is the duty of the Contractor, prior to performing excavation or demolition work at his site within a political subdivision, to ascertain the exact location and type of Users' lines which are located within the limits of his work area.

3.2 OBTAINING LOCATION OF EXISTING USERS' LINES

A. Not less than three (3) working days prior to the day the excavation or demolition work shall begin, the Contractor shall request that each of the Users with facilities within the limits of his work area locate these facilities in the field. Generally, this will include determining and locating the number and horizontal position of all lines. (Also see Paragraph 3.3 of this Section, "Locating Lines.")

B. The following are cooperative steps which the Contractor shall take, either at or off the excavation or demolition site:

1. Before the Contractor starts any demolition work in the area of a particular User's line, the Contractor shall ascertain from the User if the User wants to have a representative present during the work within this area. Additionally, the Contractor shall comply with all standard regulations and necessary precautions as may be required by the User.

2. Inform each operator, employed by him at the site of such work, of the information obtained by him as noted above.

3. Report immediately to the User any break or leak on its lines, or dent, gouge, groove, or other damage to such lines or to their coating or cathodic protection, made or discovered in the course of the excavation or demolition work.

4. Alert immediately the occupants of premises as to any emergency that he may create or discover at or near such premises.

5. The requirements of paragraphs A and B above apply to a User or Contractor performing excavation or demolition work in an emergency.

3.3 LOCATING LINES

A. All recorded or unrecorded lines shall be located on the ground with pipe-locating equipment well ahead of the work at all times. All such locations shall be plainly marked by coded paint symbols on pavement or marked stakes in the ground. Such locations shall be established at least 50 feet in advance of all trench excavation. All such location work shall be provided by the Contractor to the satisfaction of the Authority.

END OF SECTION 01030

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.1 SCHEDULES

A. Before any work is started at the job site, the Contractor shall submit to the Borough's Engineer Shop Drawings in accordance with the following requirements.

B. The Contractor shall be responsible for preparing a Progress or Work Schedule for the entire project.

1.2 SHOP DRAWINGS AND SAMPLES

A. The Contractor shall process the Shop Drawings required by his work to the Borough's Engineer and he shall be responsible for their timely submission in accordance with the Shop Drawing Schedule which is included in the overall Progress or Work Schedule as described in Part 2 of this Section.

B. Revised Shop Drawings submitted for review shall be marked "RESUBMISSION."

PART 2 - SCHEDULE

2.1 PREPARATION

A. The Contractor shall prepare a Progress or Work Schedule for the entire project for any work anticipated to last longer than four weeks.

B. Each activity in the Progress or Work Schedule shall be identified and a time for the performance of such activity indicated. Each activity shall be preceded by all work that must be accomplished prior to that activity. All abbreviations, codes, and/or symbols used shall be described on the Schedule.

2.2 CATALOG SHEETS

A. For standard manufactured items considered by the Borough as not requiring special Shop Drawings, the Contractor shall submit three (3) copies of manufacturer's catalog sheets showing illustrated cuts of the items to be furnished, scale details, sizes, dimensions, performance characteristics, capacities, wiring and control diagrams, and all other pertinent information.

B. The Borough/Borough's Engineer will retain two (2) copies and return remainder to the Contractor.

2.3 SHOP DRAWINGS

A. The Contractor will submit for review three (3) white prints of Shop and Working Drawings of fabricated equipment and materials for which such drawings are specifically requested.

B. Prior to submitting drawings to the Borough's Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter conforms to the

Accepted Plans and Specifications in all respects. Drawings which are correct shall be marked with the date, checker's name, and certification of the Contractor's approval, and then shall be submitted to the Borough. Any Shop Drawings submitted without the Contractor's certification, will be returned without review.

C. The Borough/Borough's Engineer will retain two (2) copies and return remainder to the Contractor.

D. Shop Drawings shall show the principal dimensions, weight, structural and operating features, performance characteristics and wiring diagrams, space required, clearances, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the drawing. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct.

E. When so specified or if considered by the Borough to be acceptable, manufacturer's Specifications, catalog data, descriptive matter, illustrations, etc., may be submitted for review in place of Shop and Working Drawings. In such case the requirements shall be as specified for Shop and Working Drawings, insofar as applicable.

F. The Contractor shall be responsible for the prompt submission of all Shop and Working Drawings in accordance with the Shop Drawing Schedule so that there shall be no delay to the work due to the absence of such drawings.

G. No material shall be purchased or fabricated until the required Shop and Working Drawings have been submitted and reviewed. All materials and work involved in the construction shall then be as represented by said drawings.

H. Only drawings which have been checked and corrected by the fabricator should be submitted to the Contractor by his Subcontractors and vendors. Prior to submitting drawings to the Borough, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the drawings and Specifications in all respects. Drawings which are correct shall be marked with the date, checker's name and indication of the Contractor's approval, and then shall be submitted to the Borough; other drawings shall be returned for correction.

I. The Borough's review of Shop and Working Drawings will follow a general check made to ascertain conformance with the design concept and functional result of the project and compliance with the information given in the Accepted Plans and Specifications. The Contractor is responsible for: details and accuracy; conforming and correlating all quantities and dimensions at the job site; information that pertains solely to the fabrication processes or to techniques of construction; and coordination of the work of all trades.

2.3 SAMPLES

A. When specified, the Contractor shall provide samples in duplicate and identify each sample by an appropriate tag or label listing the names of the project, the Contractor and/or Subcontractor as well as the exact identification of the sample. Tag or label shall be large enough to provide a blank space for review stamps.

B. Samples of items submitted for destruction tests or for use in testing mixture with other materials, will not be returned. Review of these items will be given by letter.

C. When reviewed, one sample of each item, not submitted for destruction, will be returned to the Contractor and shall be kept and maintained in good condition in the submitting Contractor's office at the project site for later use in comparison with material actually delivered for the work. When samples of large fabricated items or of costly items are required, reviewed samples may be installed in the work if the exact location of such samples is recorded on the Borough's set of Accepted Plans.

2.4 CERTIFICATIONS AND TESTS

A. Two (2) copies of certifications and reports of tests when required under the various Sections of the Specifications, shall be submitted to the Borough.

2.5 CONSTRUCTION PHOTOGRAPHS

A. The Contractor shall provide clear, sharp, color progress photographs monthly, starting when the work begins and continuing as long as the work is in progress.

B. The number of views required shall be from three to six, depending on the progress of work. Views shall be provided of the general construction area before any work begins. Photographs shall be 4" x 6" in size and shall be submitted in duplicate.

2.6 VIDEOTAPING

A. A narrated videotape shall be provided by the Contractor prepared describing and showing the condition of adjoining and nearby sidewalks, curbs, roadways, foundations, other utilities, and structures which may be damaged as a result of the blasting. The videotape shall be submitted to the Borough prior to commencing work.

2.7 RECORD DRAWINGS

A. Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for the Engineer's reference during normal working hours.

B. Maintain a clean, undamaged set of blue- or black-line white prints of Accepted Plans and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Accepted Plans. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the work.

2. Mark new information that is important to the Borough but was not shown on Accepted Plans or Shop Drawings (i.e. location, type and depth of adjacent or crossing utilities such as gas, electric, sewer, storm water, telephone, etc.)

3. Note related change order numbers where applicable.

4. Organize Record Drawings sheets into manageable sets. Bind sets with durable paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.

5. Upon completion of the work, submit Record Drawings to the Engineer for review prior to revising the Record Drawing mylars and black-line prints required by the Contractor's Agreement.

PART 3 - EXECUTION

3.1 GENERAL

A. Shop Drawings are defined as drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data prepared by the Contractor or any subcontractor, manufacturer, supplier or distributor, which illustrate how specific portions of the work shall be fabricated and/or installed.

B. Shop Drawings are a supplementary means of communications to assist in the understanding of what the Contractor is providing and doing, and that whatever he puts in speaks for itself and either meets or does not meet the Accepted Plans and Specifications.

C. In the instance of a substituted item, the Contractor shall verify that it will fit into the space allocated to the originally required item giving due to all other trades' requirements. Where modifications to the Accepted Plans and Specifications are proposed, the Contractor must indicate such deviation in writing in his submittal.

3.2 SUBMITTAL PROCEDURES

A. Submit three (3) copies of Schedule to the Borough for review within ten (10) days prior to starting construction. Update and resubmit Schedule monthly thereafter until completion of the work. Updated Schedule shall have completed activities indicated as such. Whenever modifications are made to the project which add or delete activities and/or revise time of completion, Schedule shall be revised and resubmitted to the Borough within ten (10) days after such modification is authorized. When a Schedule is resubmitted to the Borough, the Contractor shall specifically indicate why the Schedule is being resubmitted.

B. All Shop Drawings shall be delivered to the Borough or the representative of the Borough on the project site.

C. The Borough's Engineer will screen Shop Drawing submittals to ensure that the Shop Drawings have been properly certified and identified. If they are submitted properly, he will review the items.

3.3 FIELD DISTRIBUTION

A. The Contractor shall be responsible for the required number of processed drawings or catalog cuts for field distribution.

B. The Contractor shall be responsible for the prompt distribution of processed Shop Drawings.

C. The Contractor shall have the overall responsibility for coordinating the necessary information to properly coordinate the work.

END OF SECTION 01300

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SCOPE

A. The Contractor is referred to conditions and requirements given in various Sections of the Specifications.

1.2 OCCUPYING PRIVATE LAND

A. Written consent from the proper parties shall be obtained by the Contractor to enter or occupy with men, tools, materials or equipment any land other than his property for any purpose related to his performance of the work.

1.3 PROTECTION OF EXISTING UTILITIES

A. The Contractor shall conduct his operations and take all special precautions necessary to protect equipment, utility lines, roadways and subsurface, submerged and overhead facilities which are to remain in place and undisturbed by his operations. The Contractor shall immediately notify the Owner of the facilities or areas which are disturbed, damaged or injured as a result of the Contractor's operations, and determine the proper method of replacing or repairing the affected facilities at least to the conditions which existed prior to the Contractor's operations. The Contractor shall, at his own expense, replace, repair or restore the affected facilities or areas to their original condition or shall reimburse the Owner of said facilities or areas for such expenses as the said Owner may accrue in performing the work.

1.4 STORAGE AND PROTECTION OF MATERIALS

A. Materials stored in the open at the project site shall be stored on planks or other dunnage as necessary to keep materials from contact with the ground and shall be covered with tarpaulins for protection from weather.

B. Care shall be exercised in the installation of material to avoid damage or disfiguration of any kind. All equipment shall be protected from dust and moisture prior to and after installation.

C. Failure of the Contractor to protect material furnished by him, as outlined herein, shall be grounds for rejection of the material.

1.5 INTERFERENCE WITH/AND PROTECTION OF STREETS

A. The Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefore from the proper authorities including the Borough, PADOT, the School District and PA State Police, as appropriate. If any street or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the Authority.

B. Streets, roads, private ways and walks not closed shall be maintained passable by the Contractor at his expense and the Contractor shall assume full responsibility for the adequacy and safety of provisions made.

C. The Contractor shall, no less than 24 and preferably 48 hours in advance of closing any street, notify the appropriate authorities, in writing, with a copy to the Authority. He shall cooperate with the Police Department in the establishment of alternate routes and, at his expense, shall provide adequate, plainly marked detour signs.

D. For control of moderate traffic or when required by a permitting agency, the Contractor shall provide an adequate number of flagmen or uniformed special officers.

E. Whenever and wherever traffic is sufficiently congested or public safety is endangered, the Contractor, as required, shall furnish uniformed special officers to direct traffic and to keep traffic off the highway area affected by his construction operations. Such officers shall be in addition to the watchmen required. Traffic control shall be in accordance with PennDOT Publication 203, Work Zone Traffic Control.

1.6 SAFETY PRECAUTIONS

A. Until final acceptance of the work, the Contractor shall continuously maintain adequate protection of the work and work in progress from damage. He shall adequately protect adjacent private and public property as provided by law and these Specifications.

B. The Contractor shall take all necessary precautions for the safety of employees doing the work, and shall comply with all applicable provisions of federal, state, and local safety laws and building codes to prevent accidents or injury to person on, about or adjacent to the premises where the work is being performed. He shall erect and properly maintain at all times as required by the conditions and progress of the work, all necessary safeguards and barricades for the protection of the work, all necessary safeguards and barricades for the protection of employees on the work and the safety of others employed near the work and public, and shall post danger signs and warning lights warning against the hazards created by such features of the construction as protruding nails, hoists, excavations, scaffolding, stairways and falling materials.

C. The Contractor shall designate a responsible member of its organization on the work, whose duty shall be the prevention of accidents. The name and position of the person so designated shall be reported in writing to the Authority.

D. The Contractor shall immediately report in writing, giving full details, to the Authority all serious accidents which arise out of or in connection with the performance of the work, whether on or adjacent to the site, which cause death, serious personal injury or substantial property damage. In addition, if death or serious injury or substantial property damage is caused, the accident shall be reported immediately by telephone or messenger to the Authority. If a claim is made or suit is filed by anyone against the Contractor, or any Subcontractor on account of any accident, the Contractor shall promptly report the facts in writing to the Authority, giving full details of the claim.

E. The Contractor shall assume all risks of loss or damage of any kind to any vehicles, machinery, equipment, materials or supplies which it shall provide in doing the work.

F. The Contractor shall adequately protect property owned by others from damage by the construction operations.

1.7 DUST AND LITTER CONTROL

A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities so as to minimize the creation and dispersion of dust, litter, and other debris. Proper containers for litter shall be provided, and they shall be emptied when full.

1.8 SANITARY

A. The Contractor shall provide, maintain, and remove when no longer required, an adequate number of temporary, prefabricated, chemical-type toilets with proper enclosures for the use of workmen during construction. When connected to water and sewer, meet all code requirements and take precautions to prevent freezing.

B. Keep toilets clean and supplied with toilet paper at all times. Comply with all local and state health requirements and sanitary regulations.

1.9 HEAT

A. At all times during the placing, curing and setting of concrete, provide sufficient heat to ensure heating of spaces involved to not less than 40 degrees F.

PART 2 PRODUCTS

PART 3 EXECUTION

END OF SECTION 01500

DIVISION 02
SITEWORK

SECTION 02221 - TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Trench Excavation.

B. Bedding and backfilling.

C. Surface Restoration.

1.2 DEFINITIONS

A. Subgrade: Trench bottom prepared as specified to receive pipe bedding, concrete cradle or concrete encasement or the bottom of excavations prepared to receive pipe line structures.

B. Bedding: That stone material placed under the pipe.

C. Haunching: That stone material placed from pipe bottom to the pipe centerline.

D. Initial Backfill: That stone material from the pipe centerline to twelve (12) inches above top of pipe.

E. Engineer: Borough’s Engineer, or designated representative of the Borough who is responsible for observing and accepting the Work.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T99 - Moisture-Density Relations of Soils, Using a 5.5 lb. Rammer and a 12 in. Drop.
2. AASHTO T191 - Standard Method of Test for Density of Soil In-Place by the Sand Cone Method.

B. The "PennDOT Sections" noted herein refer to sections contained in the Commonwealth of Pennsylvania Department of Transportation Specifications Publication 408 latest version. The references pertain only to materials, construction equipment, methods and labor. The payment provisions do not apply to work to be performed under this Contract.

C. All workmanship, materials and contractor's responsibility for all work in and adjacent to PennDOT right-of-way shall be in compliance with PennDOT regulations, specifications and requirements. Where information in the specification is contradictory to current PennDOT requirements, PA requirements shall govern. No additional compensation will be considered for claims of misleading or contradictory requirements.

D. Commonwealth of Pennsylvania Department of Transportation Specifications.

1. PennDOT 408, Section 703 Aggregates.

E. State Code: Commonwealth of Pennsylvania, Pennsylvania Code, Title 67. Transportation, Department of Transportation, Chapter 459, Occupancy of Highways by Utilities, July 1989 (PennDOT Chapter 459).

F. State Publication: Commonwealth of Pennsylvania, Pennsylvania Code, Title 67, Transportation, Department of Transportation, Chapter 203, Work Zone Traffic Control (PennDOT Chapter 203).

PART 2 - PRODUCTS

2.1 MATERIALS

A. Select Backfill: Excavated material free of cinders, ashes, refuse, vegetable or organic material, boulders larger than 6", rocks, stone, or other material which, in the opinion of the Professional, is unsuitable. If the excavated material is found to be unsuitable, the Contractor is required to backfill with suitable material at his expense. The Contractor may use suitable material from other project areas at no additional cost to the Borough.

B. Aggregate Backfill, Bedding and Haunching: Fine aggregates and coarse aggregates conforming to AASHTO and PennDOT requirements, see plan for dimensions.

C. Classification of Backfill, Bedding and Haunching Materials:

1. Aggregate Backfill of trench bottoms over-excavated at direction of Professional to correct unstable trench bottom conditions: PennDOT 2A or as directed.

2. Pipe Bedding and Haunching:

a. AASHTO M43 Gradation No. 7 or 8.

3. Initial Backfill:

a. AASHTO M43 Gradation No. 7 or 8.

4. Final Backfill:

a. Select Backfill: Unless otherwise noted on drawings.

D. Underground Warning Tape:

1. Printed polyethylene tape, three inches minimum width, color coded, one inch minimum lettering, printed with name of utility buried below, and suitable for installation in all soil types.
2. Non-magnetic for ductile iron pipe.
3. Magnetic for PVC and HDPE pipe.

4. Provide for:

    a. Electric Power Lines, Cables, Conduit and Lighting Cables – RED
    b. Gas, Oil, Steam, Petroleum, or Gaseous Materials – YELLOW
    c. Communications, Alarm or Signal Lines, Cables or Conduit – ORANGE
    d. Potable Water – BLUE
    e. Reclaimed Water, irrigation, and Slurry Lines – PURPLE
    f. Sewers and Drain Lines – GREEN
    g. Sludge – BROWN

PART 3 - EXECUTION

3.1 TRENCH PREPARATION AND EXCAVATION

A. The Contractor shall notify PA One Call (1-800-242-1776) in accordance with the regulations of the Act.

B. General: Excavation of every description and of whatever substances encountered shall be performed to the lines and grades indicated on the drawings and specified herein, or as directed by the Professional.

1. Excavation shall be made by open cut, unless written permission to tunnel or bore is given by the Professional or is specifically outlined in the Specifications or shown on the Drawings.
2. Trenches may be excavated and backfilled either by machinery or by hand as the Contractor may elect, provided, however, the Contractor shall use hand excavation where necessary to protect existing structures, utilities, or private or public properties and provided, further, that backfilling shall be done by hand to the extent hereinafter specified.
3. The Contractor shall have no claim for extra compensation due to the fact that hand excavation, instead of machine excavation, may be made necessary from any cause whatsoever.

C. Stripping, Storing and Restoring Surface Items: The Contractor shall remove all topsoil, paving, sub-paving, curbing, gutters, brick, paving block, granite curing, flagging or other similar materials, and grub and clear the surface over the area to be excavated. He shall properly store and preserve such materials that may be required for future use in restoring the surface. The Contractor shall be responsible for any loss or damage to said materials because of careless removal or neglectful or wasteful storage, disposal, or use of the materials. Any excavated materials not required for backfill or restoration shall be disposed of by the Contractor at his expense.

1. All materials which may be removed, including rock, earth and sand taken from the excavation, shall be stored, if practical, in the roadway or right-of-way or such other suitable place and in such manner as the Professional will approve.
2. If more materials are removed from any trench than can be backfilled over the completed pipe or stored in the street, leaving space for traffic, the excess materials shall be removed and stored at a suitable site provided by the Contractor.
3. The Contractor shall, at his own expense, bring back as much of the approved materials so removed as may be required to properly refill the trench or excavation.

4. When directed by the Professional, the Contractor shall furnish such other suitable materials as may be necessary to properly refill the trench at no additional cost to the Borough.
5. The Contractor shall restore all shrubbery, fences, poles or other property and surface structures, removed or disturbed as a part of the Work, to a condition equal to that before the Work began, furnishing all labor and materials incidental thereto, without any additional cost to the Borough.
6. The Professional may mark certain trees, shrubs, or other items that are not to be disturbed or damaged. In the event such items are disturbed or damaged, they shall be replaced or compensated for at the Contractor's expense.
7. Any tree which is approved by the Professional for removal shall be cut into four foot lengths and become the property of the Contractor and shall be removed from the site.

D. The Contractor must work around existing utilities at no additional cost to the Borough for this work. If the Contractor must repair or replace any damaged utilities, he must do so at his own expense.

E. Width of Trench: Pipe trenches shall be sufficiently true in alignment to permit the pipe to be laid in the approximate center of the trench. The trench shall be wide enough to provide a free working space on each side of the pipe.

F. Length of Trench:

1. No trench shall be opened more than 100 feet in advance of the pipe lines laid. Contractor shall provide all safety items such as sheeting, shoring and bracing.
2. The Contractor shall limit all trench openings to a distance commensurate with all rules of safety and the Erosion and Sedimentation Control Plan.
3. If the Work is stopped either totally or partially by his own accord or the direction of others, the Contractor shall refill the trench and temporarily repave or restore over the same at his expense and the trench shall not be opened until he is ready to proceed with the construction of the pipeline.

G. Pumping and Draining: The Contractor shall remove by pumping, draining, or otherwise, any water which may accumulate in the trenches and other excavations and shall build all dams and do all other work necessary to keep the trenches or other excavations as free from water as possible. All pumping operations are subject to Erosion and Sedimentation Control measures.

1. Where it is impractical to completely drain the trench, special pipe of jointing materials may be authorized at no additional expense to the Borough.
2. While the pipelines are being laid, the Contractor shall have sufficient pumping machinery ready for immediate use.
3. All surface waters shall be prevented from entering the open ditches or excavations by proper grading of the surface in the vicinity of the excavation.
4. Sediment laden water will be pumped to an appropriately located “Dirtbag” as shown on Erosion and Sedimentation Control Drawing.

H. Accommodations of Drainage: The Contractor shall keep gutters, sewers, drains and ditches open at all times so that the flow of storm or other waters shall not be obstructed. If the material excavated from the trenches must temporarily extend over gutters or other waterways, it shall be the duty of the Contractor to plank or bridge over the gutters, without extra compensation, so that the flow of water is not impeded.

I. Protection of Utilities, Property and Structures: The existence and location of underground utilities as indicated on the Drawings is presented merely to serve as a notification that such utilities do exist in the general proximity of the work. Any utilities not shown, or not located as shown, shall not be cause of the Contractor to deny responsibility for their protection and/or repair during construction.

1. The Contractor shall notify all utility companies in advance of construction, to include requesting the companies to establish location of their utilities, in accordance with Pennsylvania Act 287/172, as amended. Cooperate with agents of these companies during the progress of the work. Procedures for emergency action and repairs to utilities shall be established with the utility company prior to commencement of the work. During the course of his work, if the Contractor damages any of the aforementioned utilities, he shall immediately follow the procedure of emergency action and repair as established at their own expense. The Contractor shall determine the location of all utility lines on private property, with the assistance of the utility owner when on private property.
2. Whenever the Contractor, during the progress of the excavation, shall uncover service pipes or mains, which because of injury or age are in poor condition, he shall immediately notify the proper Borough in order that steps may be taken for replacement or repair. Locations of repairs, and the procedures of repairs that have been made shall be recorded by the Contractor.
3. The Contractor shall, at his own expense, sustain in their places, and protect from direct or indirect injury, all pipes, conduits, existing sewerage systems, septic tanks, tile fields, and other structures or property in the vicinity of his work, whether above or below the ground, or that may appear in the trench. He shall at all times have a sufficient quantity of repair pipe, timber and plank, chains, ropes, etc., on the ground and shall use them as necessary for sheeting his excavations and for sustaining or supporting any structures that are uncovered, undermined, endangered, threatened, or weakened, whether such structures are or are not shown on the Drawings.
4. Pipes and underground conduits exposed as a result of the Contractor's operations shall be adequately supported along their entire exposed length by timber or planking, installed in such manner that the anchorage of the supporting members will not be disturbed or weakened during the backfilling operation. Backfill of selected material shall be carefully rammed and tamped under and around the supports and all supports shall be left in place as a guard against breakage of the supported structure due to trench settlement. No additional payment will be due to the Contractor for material left in place nor for the labor of installing and maintaining supports.
5. The cost of all work related to utility protection and repair shall be included in the price of pipe installed. No separate payment will be made for utility relocation or repairs.

J. Where mains are to be constructed on rights-of-way or easements in open areas, the maximum width of trench at the top specified hereinbefore may be exceeded only if the construction is kept entirely within the limits of the right-of-way or easements and can be carried on without damage to adjoining property. The angle of slope shall be the angle at which the trench bank will stand without sliding.

K. In locations other than rights-of-way or easements, the Professional may, as warranted by working conditions, and where permitted by the Pennsylvania Department of Labor and Industry requirements, waive the requirements that the maximum width of trench at the top shall not exceed the dimensions specified hereinbefore.

3.2 PIPE BEDDING AND TRENCH BACKFILL

A. Bedding and Haunching: The trench shall be excavated to a depth of six inches below the outside diameter of the pipe barrel, or deeper if so specified. The resultant subgrade shall be undisturbed, or compacted as approved by the Professional if disturbed. The bedding and haunching shall then be prepared by placing thoroughly compacted aggregate, shaped to conform to the bottom portion of the pipe or compacted against the bottom portion of the pipe, to a vertical distance of three inches above the lowest outside surface of the pipe. Contractor is required to properly haunch the pipe before any additional backfilling is allowed.

B. Special Bedding:

1. Concrete Cradle and Concrete Encasement: If concrete cradle and/or encasement is indicated on the Drawings or required by the Professional, the trench shall be excavated to a depth of twelve inches below the outside of the barrel of pipes. All of this excavation may be done by machine.
2. Unstable Subgrade: Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, any type or refuse, vegetable, or other organic material, or large pieces or fragments of inorganic material, which, in the opinion of the Professional, should be removed, the Contractor shall excavate and remove such unsuitable material to the width and depth recommended by the Professional.

    a. Before pipe is laid, the subgrade shall be made by backfilling with aggregate material, as directed by the Professional, in six inch (compacted thickness) layers thoroughly tamped and the bedding prepared as hereinbefore specified.
    b. Aggregate Backfill when used at the direction of the Professional to stabilize trench subgrade will be paid for in accordance with the unit price Bid for Miscellaneous Aggregate Backfill per the actual dimensions of the area backfilled in accordance with Section 02221, exclusive of the pipe bedding.
    c. Additional excavation required to remove unstable material will be paid for in accordance with the applicable unit price Bid for Miscellaneous Unclassified Excavation.

3. Special Foundations: Where the bottom of the trench at the subgrade is found to consist of material which is unstable to such a degree that, in the opinion of the Professional, it cannot be removed and replaced with an approved material thoroughly compacted in place to support the pipe properly, the Contractor shall construct a foundation for the pipe, consisting of piling, timbers or other materials, in accordance with plans prepared by the Professional. Compensation for such additional work shall be in accordance with the General Conditions.

C. Backfilling Methods:

1. General: Backfilling shall not be done in freezing weather except by permission of the Professional, and it shall not be done with frozen material. Do not backfill when the material already in the trench is frozen.

   a. Where Aggregate Backfill is not indicated on the Drawings or specified herein, and in the opinion of the Professional should be used in any part of the Work, the Contractor shall furnish and backfill with aggregate as directed.
   b. Payment will be made in accordance with the unit price Bid for Miscellaneous Aggregate Backfill in lieu of select backfill.

2. In or adjacent to state highways, all backfill shall be in accordance with PennDOT requirements.

D. Initial Backfill: Following placement of bedding and haunching material, initial backfill shall be placed to a depth of twelve (12) inches over the crown of the pipe. Compact the initial backfill in maximum twelve (12) inch (compacted thickness) layers. Use vibratory compactors of such size that will not damage the pipe or manual compaction methods as approved by the Professional. Bring the backfill up both sides of the pipe simultaneously to prevent displacement of the pipe.

E. Aggregate Backfill to Restoration Depth (within State Highway or as directed by the Professional): From six inches above the top of the pipe to Restoration Depth, the trench shall be backfilled by hand or by approved mechanical methods. Backfill in this section of the trench shall be aggregate backfill material subject to limitations specified and consolidated by compacting in six inch layers. Any consolidation method utilizing water such as jetting or puddling will not be permitted. Consolidation shall proceed from the center of the trench to the sides to prevent arching.

F. Select Backfill to Restoration Depth: From twelve (12) inches above the top of the pipe to restoration depth, the trench shall be backfilled by hand or by approved mechanical methods. Backfill in this section of the trench shall be excavated material subject to limitations specified and consolidated by tamping in eight inch layers or other approved mechanical methods. Any consolidation method utilizing water, such as jetting or puddling will not be permitted. Consolidation shall proceed from the center of the trench to the sides to prevent arching. If the backfill contains too much moisture for optimum compaction, the Contractor shall dry the common backfill or provide aggregate backfill at no additional cost to the Borough.

1. Compacted layers may exceed eight (8) inches provided the Contractor can demonstrate that the compaction results as described in the follow sub-section (Compacting and Compaction Tests) are being obtained throughout the lifts of backfill.

G. Underground Warning Tape: For the purpose of early warning and identification of buried pipes during future trenching or other excavation, provide continuous identification tapes in trenches. Install in accordance with printed recommendations of the tape manufacturer, and as modified herein. Bury tape at a depth of 12 inches below grade; in pavements, measure 12 inches down from subgrade of pavement. Tape to be installed along all mains, and laterals.

H. Compacting and Compaction Tests:

1. The Contractor will be required to perform a sample backfilling of a pipe segment early on in the construction, adequately justifying to the Professional that his backfill and compaction operations are adequate to obtain the desired compaction results.
2. Use mechanical tampers to compact backfill materials in trench refill operations to produce a density of backfill in each layer of not less than those specified below as a percentage of maximum standard density determined in accordance with AASHTO T99 or PennDOT requirements.

    a. Areas subject to vehicular traffic: 100%.
    b. Grassed areas: 95%.

3. During the course of backfilling and compacting work, the Professional or Borough may, at any location or depth of trench, require the Contractor to make tests to determine whether the Contractor's compaction operations are sufficient to meet specified requirements, at the Contractor's expense. The Contractor will retain the services of an independent agency approved by the Borough for all compaction tests. Contractor will be required to repair all backfill that does not conform to the compaction requirements at no additional cost to the Borough. The Contractor shall provide ample notice to assure all soil testing is done.

3.3 RESTORATION AND CLEAN-UP OF SURFACE

A. Restoration by Contractor:

1. The Contractor shall restore all driveways, parking lots, sidewalks, curbing, gutters, shrubbery, guiderail, fences, mailboxes, coachlight standards, poles, sod or other property and surface structures removed or disturbed as a part of the Work to a condition equal to that before the Work began, furnishing all labor and materials incidental thereto. Cost of such restoration will be considered part of the price bid and no additional compensation will be made for such work.

B. Clean-up and Maintenance of Surfaces:

1. General: During construction, the surfaces of all areas including, but not limited to, roads, streets, and driveways shall be maintained on a daily basis to produce a safe, desirable, and convenient condition. Streets shall be swept and flushed after backfilling, and recleaned as dust, mud, stones and debris caused by the Work, or related to the Work again accumulates. Failure of the Contractor to perform this work may be cause for the Borough to order the work by others, and backcharge all costs to the Contractor.

    a. All surplus materials furnished by the Contractor and temporary structures shall be removed from the site by the Contractor.
    b. All dirt, rubbish and excess earth from the excavation shall be disposed of by the Contractor in a manner and place acceptable to all governing agencies.
    c. The construction site shall be left clean at the end of each working day to the satisfaction of the Borough and Professional.
    d. All surplus materials furnished and delivered by the Contractor will be removed by the Contractor.

2. Repair or Correction of Unsatisfactory Conditions: All unsatisfactory conditions resulting from the work shall be corrected.

    a. Any hazardous condition caused by the Work, on any surface, shall be repaired or corrected within two hours of observance or notification of its existence. If repairs or corrections are not made within this period, the Borough will have the work completed with the resulting cost subtracted from the Contractor's next monthly Application for Payment. Any such costs shall be deemed a reduction in the total amount due to the Contractor under the Contract and no subsequent reimbursement shall be made to the Contractor by the Borough for these costs.
    b. There will be no additional payment made for maintenance work.

C. Restoration of Meadows and Cultivated Fields:

1. General: Final restoration of all areas shall be performed in accordance with the Specifications for the particular land use as herein defined.

    a. Final restoration shall be performed no later than the start of the next planting season following construction. The planting season shall be as established by the U.S. Agricultural Service for the area of construction for pasture and meadows.
    b. Topsoil shall be free from subsoil, brush, weeds, or other litter, clay lumps and stones, but may contain decaying vegetable matter as is present in good topsoil.
    c. Precautions shall be exercised as necessary to conform with laws relating to erosion and sedimentation control.
    d. Seed shall be labeled for the current growing season. Germination tests of seeds shall be made not more than six months prior to seeding. Seed which has become wet, moldy or otherwise damaged shall not be used.
    e. All seed mixtures formulas shall be submitted to the Professional for approval prior to seeding.
    f. The Contractor shall be responsible to produce a stand of grass in all seeded or sodded areas. Erosion, drought, or any other condition encountered shall not relieve the Contractor of this requirement.

2. Lawns: Finish grade and sodding in accordance with applicable sections of these specifications.

3. Pasture Grass, and Meadow Grass: Prior to construction, the full depth of the existing topsoil, but no less than 12 inches, shall be stripped from all areas anticipated to be disturbed, and shall be stockpiled during construction. Upon completion of the construction, all topsoil removed shall be replaced. As the final class of material is applied, bringing the area to finished grade, the depth of topsoil replaced shall not be less than the depth removed.

    a. The sod and/or seed mixture shall be as stated in other specification sections.
    b. If the topsoil thickness is less than twelve (12) inches, the Contractor shall import suitable topsoil so that a good stand of grass can be established at no additional cost to the Borough.

END OF SECTION 02221

SECTION 02510 - ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. Asphaltic concrete paving to include Superpave Base and Wearing Course.

B. Aggregate base course.

C. Proofrolling of prepared subbase is included in this Section.

D. Installation of Tack Coats.

E. Sealing is included in this Section.

F. The work required by this section includes Borough roadway paving, walkway paving, and installation of line striping and signage.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division I Specification Sections.

B. Material Certificates signed by material producer and contractor, certifying that each material item complies with or exceeds specified requirements.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with Pennsylvania Department of Transportation (PennDOT) Publication 408 latest revision.

B. Obtain materials from same source throughout.

1.5 SITE CONDITIONS

A. Weather Limitations: Apply tack coats and asphalt when ambient temperature is above 50 deg. F and when temperature has not been below 35 deg. F for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture, nor when base is frozen.

B. Construct hot-mixed asphalt surface course when atmospheric temperature is above 40 deg. F and when base is dry. Do not construct asphalt courses between October 31 and April 1.

C. Grade Control: Establish and maintain required lines and elevations.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for paving work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Use locally available materials and gradations that exhibit a satisfactory record of previous installations.

B. Coarse Aggregate: Sound, angular crushed stone, or crushed gravel, complying with (PennDOT) Section 703.2 Type 2A.

C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone, gravel, or combinations thereof, complying with PennDOT Section 703.1

D. Herbicide Treatment: Commercial chemical for weed control, registered by Environmental Protection Agency. Provide granular, liquid, or wettable powder form.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to the following:

a. Ciba-Geigy Corp.
b. Dow Chemical U.S.A.
c. E.I. DuPont de Nemours & Co., Inc.
d. FMC Corp.
e. Thompson-Hayward Chemical Co.
f. U.S. Borax and Chemical Corp.

E. Joint sealant shall conform to PG 64-22.

F. Tack Coat: in accordance with PennDOT Section 460.

G. Superpave 9.5 mm Wearing Course PennDOT Section 409.

H. Superpave 19.0 mm Wearing/Binder Course PennDOT Section 409.

I. Bituminous joint sealing material: CRAFCO Asphalt Rubber Type 2 or CRAFCO Superflex.

J. Superpave 25 mm Base Course PennDOT Section 309.

K. Signage and line striping per PennDOT requirements.

PART 3 - EXECUTION

3.1 MISCELLANEOUS ASPHALTIC CONCRETE GUIDELINES

A. For those paving areas that are to be paved, the following general criteria shall apply:

1. All existing material shall be removed to subgrade elevation. Where the paving is to remain, the edges of the reconstructed areas shall be sawcut.
2. Install paving to indicated thicknesses.
3. Adjust the elevation of all manhole covers, valve tops, catch basin grates and similar structures, so that the top elevation is below the finished paving surface by 1/2-inch.
4. Provide all line striping and symbols on the completed paving.
5. Contractor to seal edges of paving.
6. Reset street signage that was removed for the project. Provide new signage for any signage that was damaged.

3.2 SURFACE PREPARATION

A. Sawcut existing paving as required. Remove and dispose of existing paving down to the aggregate base course level. Paving shall be taken to an approved disposal facility by the Contractor.

B. Remove loose material from compacted subbase surface immediately before applying herbicide treatment.

C. Proof-roll prepared subbase surface to check for unstable areas and areas requiring additional compaction. Remove all soft and yielding subbase and subgrade and replace with new subbase and subgrade.

D. Maintain proper roadway cross sections and an adequate ditch line where applicable. Pull suitable material from the ditch line toward the center of the roadway. Level all high spots and ruts and remove all unsuitable material during this operation.

E. Tack Coat: Apply to contact surfaces of previously constructed asphalt and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at a rate as recommended in PennDOT documents.

F. Allow to dry until at proper condition to receive paving.

G. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

H. Beginning of the installation means acceptance of the subgrade.

3.3 PLACING MIX

A. General: Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. All material shall be placed in accordance with PennDOT Publication 408. Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.

B. Bituminous Placement: Place in strips not less than 10 feet wide, unless otherwise acceptable to Engineer. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.

Complete the Superpave concrete base course for a section before placing wearing course.

C. Immediately correct surface irregularities in course behind paver. Remove excess material forming high spots with shovel.

D. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.

E. Spade bits or saws shall be used to neatly remove existing paving from areas where new paving is to meet existing paving. All such joints shall be butt joints. Feathered joints will not be permitted. Square up existing paving edges to a depth of one and one half inches (1-1/2") and in straight lines where practical, where it abuts new paving.

F. Materials and debris resulting from milling and cutting shall become the contractor's property and shall be hauled by him from the site.

G. Place asphalt courses within 24 hours of applying tack coat.

H. Place Superpave base course to compacted thicknesses as shown on the drawings.

I. Place Superpave wearing course to compacted thickness as shown on the drawings.

J. Splashes of bituminous materials shall be removed from all surfaces exposed to general view, including manhole and valve box covers.

K. Thicknesses of the various paving courses shall be the thickness after compaction. All bituminous paving courses shall be compacted. Heat and roll (iron) seams between adjacent passes of surface course.

L. Slope all finished paving to drain toward gutters, inlets and other storm water facilities. Fill low spots, pot holes, bird baths, etc. Slope paving away from buildings.

M. Do not block downspouts with new paving.

3.4 ROLLING

A. General: Begin rolling when mixture will bear roller weight without excessive displacement.

B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.

D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.

E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained 95 percent laboratory density.

F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot, hot-mixed asphalt. Compact by rolling to specified surface density and smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.5 JOINT SEALING

A. Joints shall be sealed between old and new pavement or successive day's pour and between paving and concrete.

B. Sealant shall be placed 6" each side of joints (12" width).

C. Cover sealant with a coating of sand.

3.6 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10-foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation from True Elevation: Within 1/2 inch.

3.7 PROTECTION OF NEWLY COMPLETED SURFACES

A. The contractor shall protect the newly completed bituminous surfaces from vehicular traffic or other damaging loads until adequate stability and adhesion have been attained and the materials have sufficiently cured to prevent distortion, flushing of the bituminous material to the surface or excessive loss of aggregate.

3.8 LINE STRIPING, MARKINGS AND SIGNAGE

A. Install all line striping and traffic markings in accordance with PennDOT Publication 408, Section 962.

END OF SECTION 02510

SECTION 02605 - MANHOLES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Precast concrete manholes.

1.2 RELATED SECTIONS

A. Gravity Wastewater Sewer: Section 02731.

B. Cast-in-Place Concrete: Section 03300.

1.3 REFERENCES

A. American Society for Testing and Materials:

1. ASTM A48 - Gray Iron Castings.
2. ASTM A307 - Carbon Steel Externally Threaded Standard Fasteners.
3. ASTM A615 - Deformed and Plain Billet-steel Bars for Concrete Reinforcement.
4. ASTM C139 - Concrete Masonry Units for Construction of Catch Basins and Manholes.
5. ASTM C270 - Mortar for Unit Masonry.
6. ASTM C361 - Reinforced Concrete Low Head Pressure Pipe.
7. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
8. ASTM C478 - Precast Reinforced Concrete Manhole Sections.
9. ASTM C923 - Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
10. ASTM D2146 - Propylene Plastic Molding and Extrusion Materials.

B. American Association of State Highway and Transportation Officials (AASHTO) Standards as referenced throughout these Specifications.

C. American Water Works Association:

1. AWWA C302, AWWA Standard for Reinforced Concrete Water Pipe-Noncylinder Type, Not Prestressed.

D. Federal Specifications:

1. FS SS-S-210A, Sealing compound, Preformed Plastic, for Expansion Joints and Pipe Joints (Type 1 Rope Form).

1.4 SUBMITTALS

A. Shop Drawings and Product Data:

1. Manufacturer's published detail drawings, modified to suit design conditions if required, and Contractor prepared drawings as applicable.
2. Manufacturer's descriptive literature and specifications covering the product specified. Include installation information.

B. Certificates:

1. Manufacturer's certification that components and products will be manufactured in accordance with specified reference standards for components and products.

1.5 QUALITY ASSURANCE

A. Shop Inspection:

1. All materials furnished by the Contractor shall be certified by the supplier for compliance with the pertinent specifications. Shop inspections and testing may be required. The cost of shop testing shall be borne by the supplier or the Contractor.

B. Field Inspection:

1. All materials shall be furnished and installed and tested for defects in material and/or workmanship in the manner specified and in the presence of and as approved by the Engineer.

C. Source Quality Control:

1. Maintain uniform quality of products and component compatibility by using the products of one manufacturer in the case of precast reinforced concrete manholes.
2. Obtain certificate of construction compliance with ASTM C478 from the precast reinforced concrete manhole manufacturer. Submit same certificate as part of required submittals.

D. Initial Manholes: Construct first manhole in the Project to demonstrate the following, and serve as the minimum acceptable conditions of construction through the Project. No additional compensation allowed for initial manhole requirement.

1. Demonstrate manhole base construction methods.
2. Demonstrate manhole component sealing in the case of precast reinforced concrete manholes.
3. Demonstrate manhole stop alignment.
4. Demonstrate pipe opening sealing.
5. Demonstrate method of adjustment of manhole frame and cover to grade and manhole frame and cover attachment.
6. Demonstrate successful manhole acceptance test.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Transport and handle precast reinforced concrete manhole components and other products specified herein in a manner recommended by this respective manufacturers of such to prevent damage and defects. Through-wall lifting holes are not permitted in manhole component construction.

B. Store precast reinforced concrete manhole components in accordance with manufacturer's recommendations to prevent joint damage and contamination. Exercise such care in storage of other specified products as recommended by the respective manufacturers.

1.7 SITE CONDITIONS

A. Environmental Requirements: In no instance, set or construct manhole base on subgrade containing frost.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS

A. Cast-in-Place Concrete: Meet requirements of Section 03300.

B. Waterproofed Mortar: Material composition meeting requirements of ASTM C270, Type M with waterproofing admixture included.

C. Concrete Masonry Units for Manholes: Commercially manufactured solid precast segmental concrete masonry units meeting requirements of ASTM C139.

D. Manhole Steps:

1. Material: Aluminum alloy 6061-T6, with standard mill finish or, polypropylene coated.
2. Type: Drop-front design with non-slip serrated step surface.
3. Coating: Coat portion of step which will be embedded in concrete with high-build bituminous paint.

E. Manhole Frame and Cover: Gray iron castings conforming to ASTM A48, Class No. 30, designed for AASHTO Highway Loading Class HS-20. Provide castings of uniform quality, free from blowholes, porosity, hard spots, shrinkage distortion or other defects. Covers to be self-sealing. Frame and cover design, dimensions and weight equal to MHR 701 as manufactured by Quirin.

1. Finish: Bearing surfaces machined to prevent rocking and rattling under traffic. Casting surfaces shotblast cleaned and coated with asphalt paint, non-tacky drying.
2. Identification: Cast the word DANGER SEWER – DO NOT REMOVE COVER integrally on cover in two inch size raised letters.
3. Frame hold-down bolts: ASTM A307.
4. Anchor Bolts: J or L shape with standard coarse thread ends, ASTM A307.

F. Watertight Manhole Frame and Cover: Gray iron castings conforming to previously specified requirements for Manhole Frame and Cover and equal to MHR 701 I.C. as manufactured by Quirin. The cover shall have a built in O-ring and a non-penetrating pickhole.

G. Preformed Plastic Sealing Compound: FS SS-S-210A, type 1, Rope Form, of either bitumastic base compound or butyl rubber base compound, and shipped protected in a removable two piece wrapper. Size cross-section of rope form to provide squeeze-out of material around entire interior and exterior circumference when joint is completed.

H. PVC Waterstop for Cast-in-Place Base: Gasket Type waterstop composed of virgin polyvinyl chloride (PVC) such as manufactured by Fernco Joint Sealer Co.; CMA Concrete Manhole Adapter.

I. Manhole Inserts: HDPE construction as manufactured by Parson.

J. Heat Shrinkable Wrap: Wrap to cover riser rings and joints in their entirety as equal to wrapid seal as manufactured by CANUSA.

2.2 PRECAST REINFORCED CONCRETE MANHOLE COMPONENTS

A. Materials and Construction: Conforming to requirements specified in ASTM C478 except as follows:

1. Concrete: Composition and compressive strength conforming to ASTM C478 except use Type II or Type III cement in manhole components and increase compressive strength to 4500 psi (at 28 days) in precast bases.
2. Casting and Curing: Wet cast and steam curing process in accordance with Section 3.6.11 and 3.7.2 of AWWA C302.
3. Manhole Steps: Factory installed in manhole components, prealigned vertically, spaced on equal centers, and located the minimum distance from ends of risers and top sections as indicated on drawings.
4. Manhole Component Seals: Manhole component joints factory formed for self-centering concrete to concrete bearing employing either a rubber compression gasket or preformed plastic sealing compound.

    a. Rubber Compression Gasket: Composition conforming to ASTM C361 or ASTM C443.
    b. Preformed Plastic Sealing Compound: As specified previously.
    c. Heat Shrinkable Wrap: Wrap to cover all joints in their entirety as equal to Wrapid Seal as manufactured by CANUSA.

5. Manhole Component Design: Base, tapered and straight riser section, and top section dimensions and diameters, not consistent with ASTM C478, are as indicated on drawings.

B. Pipe Openings: Custom preformed during manufacturing in each base and riser section requiring such, to accommodate type of pipe and pipe opening seal provided.

1. Pipe Opening Seals: Resilient gasket type, cast integrally with manhole component conforming to requirements specified in ASTM C923 and of the following acceptable pipe seals:

a. A-LOK Products Corporation; A-LOK Manhole Pipe Seal.
b. Scales Manufacturing Corporation; RES-SEAL.
c. Thunderline Corporation; LOCK-SEAL Modular Wall and Casing Seal.
d. Dual Seal Gaskets, Inc.; DUAL SEAL II.

C. Precast Top Sections: Of materials and construction as specified previously except additional and differing requirements as follows:

1. Hold Down Bolt Inserts: Factory cast in top section no less than two 3/4 inch threaded inserts or slotted inserts to accommodate manhole frame hold down bolts. Threaded inserts of three inches depth. Both insert types designed for an ultimate load in tension of 12,500 pounds. Inserts factory plugged for shipping. Coordinate insert location with manhole component manufacturer to assure proper location in top sections.
2. Flat Slab Tops: Tops factory formed to properly accept and support required manhole frame and cover and formed to join riser section in a matching joint.
3. Eccentric Cone Tops: Manufacture to same minimum wall thickness and with same area of circumferential steel reinforcement as riser sections.

D. Precast Grade Rings: Leveling and adjusting units of three inches or four inches thickness of materials and constructions as specified previously. Factory cast grade rings with hold down bolt holes matching location of same in manhole frame. Design must provide for full bearing of manhole frame.

E. Coatings:

1. Prepare surfaces to be coated in accordance with the written instructions of the coating manufacturer, including cleaning, sandblasting or acid etching as necessary.
2. Factory coat entire exterior of precast manhole components with two coats of Pennsbury 32-B-4 PENNOXY-TAR, or equal, to dry film thickness of 7 or 8 mils per coat, coating to be repaired in the field as warranted.

PART 3 - EXECUTION

3.1 LOCATING & INSPECTION

A. All manholes will be field located and verified for depth and alignment by the Contractor and Engineer. **No manholes shall be ordered until the actual location of such is determined in the field.**

B. Inspect precast reinforced concrete manhole components in accordance with requirements of ASTM C478 regarding repairable defects and defects subject to rejection by the Engineer.

C. All material found during the progress of the work, either before or after installation, to have cracks, flaws or other defects will be rejected by the Engineer. All defective materials furnished by the Contractor shall be promptly removed from the site.

D. Unless noted on the drawings or otherwise directed by the Engineer, all manholes shall be set such that top of rim is flush with existing or final grade.

3.2 PREPARATION

A. Keep pipe and manhole interiors cleared of debris as construction progresses.

3.3 MANHOLE CONSTRUCTION METHODS

A. Cast-In-Place Concrete Manhole Base (if required)

1. Form and pour concrete in accordance with requirements of Section 03300. Additional requirements as follows:

   a. Vibrate poured concrete using mechanical vibrator of a type and design approved by Engineer. Use vibrators of type capable of transmitting vibration to concrete in frequencies of not less than five thousand impulses per minute.
   b. Form and pour joint monolithically in manhole base top to match joint of adjoining precast riser section. Use template as obtained from precast concrete manhole component manufacturer of manhole components used in the Project.
   c. Do not place precast riser sections on cast-in-place bases for a minimum of 48 hours after pour.

2. Install sewer piping in cast-in-place manhole bases prior to pouring the concrete. Install PVC Waterstop on pipes entering and leaving manhole base prior to pouring concrete. Install PVC Waterstop in accordance with manufacturer's written instructions.
3. Use 4,500 psi concrete as specified in Section 03300.
4. Coat bases in accordance with the requirements for precast manhole components.

B. Precast Concrete Bases: Install bases on a six inch deep compacted layer of same material used for pipe bedding.

1. When using prefabricated pipe opening seals for connecting pipes into manhole, and such seals create an annular space on interior and exterior of manhole wall after pipe connection is made, fill such annular spaces with preformed plastic sealing compound.

   a. Tightly caulk sealing compound into annual spaces, completely filling the spaces, and render the installation watertight.
   b. Following sealing compound installation, trowel compound surface smooth and flush with interior face of manhole.

C. Concrete Channel Fill: Field pour concrete channel fill for each manhole base or provide and install precast channels:

1. Form inverts directly in concrete channel fill.
2. Accurately shape invert to a semi-circular bottom conforming to inside of connecting pipes, and steel trowel finish to a smooth dense surface.
3. Make changes in size and grade gradually.
4. Make changes in direction of entering sewer and branches to a true curve of as large a radius as manhole size will permit.
5. Make slopes gradual outside the invert channels.
6. Use 3,000 psi concrete as specified in Section 03300.

D. Manhole Wall Erection: Provide precast reinforced concrete straight riser, tapered riser and top sections necessary to construct complete manholes. Fit the different manhole components together to permit watertight jointing and true vertical alignment of manhole steps.

1. If rubber compression gaskets are used between sections, install gaskets and join sections in accordance with written instructions of manhole component manufacturer.
2. Preformed plastic sealing compound must be used between all sections, installed in accordance with manufacturer's recommendations, and join sections also in accordance with written instructions of manhole component manufacturer.

    a. Prime joint surfaces if required by preformed sealing compound manufacturer.
    b. If sealing compound is installed in advance of section joining, leave exposed half of two piece protective wrapper in place until just prior to section joining.
    c. Use preformed sealing compound as the sole element utilized in sealing section joints from internal and external hydrostatic pressure.
    d. Following manhole section installation, trowel sealing compound surface smooth and flush with interior face of manhole.
    e. Make pipe connections into manhole walls as specified previously for pipes connecting into manhole bases.

E. Lifting Hole Sealing: Seal with properly designed tapered rubber plugs. Drive plugs into holes in such a manner to render holes completely water and air tight. Sealing of lifting holes with grout not permitted.

F. Frame and Cover Installation: Where required, make final adjustment of frame to elevation using the following materials:

1. Precast Grade Rings:

    a. Set precast grade rings in Water-Proof Mortar. Mortar thickness is not to exceed 3/4 inch maximum and 3/8 inch minimum. Wet, but do not saturate precast grade rings immediately before laying.

b. Pre-set grade rings to proper plane and elevation using wedges or blocks of cementitious material not exceeding one square inch wide on all sides. No more than four wedges or blocks per grade ring is permitted. Incorporate wedges or blocks in fresh mortar in a manner to completely encase each. Crown fresh mortar to produce squeeze-out between grade rings. Tool exposed joints with appropriately shaped tool and compact mortar edge into joints. Clean off excess mortar prior to initial mortar set.

2. Concrete Masonry Leveling Units: Lay segmental concrete masonry units to line and in radial course with completely filled mortar joints. Flush cut exposed horizontal and vertical joints on manhole interior and exterior. Leave exterior surface ready for parging.
3. Use concrete masonry units upon written approval of Engineer. Primary leveling unit shall be precast grade rings.
4. Parge the outside of finished concrete masonry leveling units with a minimum of 1/2 inch thick waterproof mortar.
5. Bolt manhole frames in place on manhole top section, or on leveling units if required, after installing 1/2 inch thick preformed plastic sealing compound on bearing surface of manhole frame. Remove excess sealing compound squeeze-out after manhole frame is bolted in place.
6. Use bolts of sufficient length to properly pass through leveling units, if any, engage full depth of manhole top section inverts and allow enough threaded end to pass through manhole frame to properly tighten nut and washer. Tighten manhole frame bolts after mortar has cured.

G. Plugging Pipe Openings: Plug pipe openings in manholes where such openings are required for future pipe connections.

1. Use masonry units and waterproofed mortar laid up to prevent deterioration.
2. Install such materials to meet exfiltration limits and to allow future removal without damage to manhole.

H. Manhole Insert: The manhole frame rim shall be clean from all debris. Once insert is installed and manhole cover is re-installed, there shall be a flush surface from frame lip to cover.

1. Adjustments of inserts shall be the Contractor’s responsibility.

I. Heat Shrinkable Wrap: As per manufacturer’s instructions.

3.4 TESTING MANHOLES

A. General

1. Conduct tests in presence of and to complete satisfaction of the Engineer.
2. Should a manhole not satisfactorily pass testing, discontinue manhole construction in the Project until such manhole does test satisfactorily.

3. Provide tools, materials (including water), equipment and instruments necessary to conduct manhole testing specified herein.

    a. Vacuum Testing Equipment:

        1) Use vacuum apparatus equipped with necessary piping, control valves and gauges to control air removal rate from manhole and to monitor vacuum.
        2) Provide an extra vacuum gauge of known accuracy to frequently checktest equipment and apparatus.
        3) Vacuum testing equipment and associated testing apparatus subject to Engineer's approval.
        4) Provide seal plate with vacuum piping connections.

4. Prior to testing clean manholes thoroughly and seal openings, both to the complete satisfaction of the Engineer. Seal openings using properly sized plugs.
5. Perform testing with frames installed. Include the joint between the manhole and manhole frame in the test.
6. The Contractor may elect to make a test for his own purposes prior to backfilling. However, conduct tests of the manholes for acceptance, only after the backfilling has been completed.

B. Vacuum Test Procedure:

1. Perform vacuum testing in accordance with the testing equipment manufacturer's written instructions.
2. Draw a vacuum of ten inches of mercury and close the valves.
3. Consider manhole acceptable when vacuum does not drop below nine inches of mercury for the following manhole sizes and times:

    a. Four foot diameter - 60 seconds
    b. Five foot diameter - 75 seconds
    c. Six foot diameter - 90 seconds

C. Exfiltration Test Procedure:

1. Completely fill manhole to top of frame with water.
2. Allow water filled manhole to stand four hours prior to testing to allow absorbing in materials.
3. At commencement of test, fill manhole to top lip of manhole frame.
4. During a consecutive four hour period, keep an accurate record of the amount of water to be added because of exfiltration.
5. Consider manhole acceptable when exfiltration rate does not exceed a rate of 0.038 gallons a day per inch of manhole diameter per vertical foot of manhole.

D. Repair and Retest: Determine source or sources of leaks in manholes failing acceptable limits.

1. Repair or replace defective materials and workmanship, as is the case, before conducting such additional Manhole Acceptance Tests and such subsequent repairs and retesting as required until manholes meet test requirements.
2. Materials and methods used to make manhole repairs must meet with Engineer's approval prior to use.
3. Make repairs, replacements and retests at no additional expense to Owner.

END OF SECTION 02605

SECTION 02606 - PRE-CAST VAULTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 STIPULATIONS

A. The Specifications Sections “General Conditions”, “Special Requirements”, and “General Requirements” form a part of this Section by this reference thereto and shall have the same force and effect as if printed herewith in full.

1.3 REFERENCES

A. American Society for Testing and Materials:

1.	ASTM A307	Carbon Steel Externally Threaded Standard Fasteners
2.	ASTM A615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
3.	ASTM C139	Concrete Masonry Units for Construction of Catch Basins and Manholes
4.	ASTM C361	Reinforced Concrete Low Head Pressure Pipe
5.	ASTM C478	Precast Reinforced Concrete Manhole Sections
6.	ASTM C923	Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes

B. American Association of State Highway and Transportation Officials (AASHTO) Standards as referenced throughout these Specifications.

C. Federal Specifications:

1.	FS SS-S-210A	Sealing compound, Preformed Plastic, for Expansion Joints and Pipe Joints (Type 1 Rope Form).

1.4 SUBMITTALS

A. Submit detailed drawings modified to suite site conditions.

1.5 QUALITY ASSURANCE

A. Shop Inspection:

1. All materials furnished by the Contractor shall be certified by the supplier for compliance with the pertinent Specifications. Shop inspections and testing may be required. The cost of shop testing shall be borne by the supplier or the Contractor.

B. Field Inspection:

1. All materials shall be furnished and installed and tested for defects in material and/or workmanship in the manner specified and in the presence of and as approved by the Engineer.

C. Source Quality Control:

1. Maintain uniform quality of products and component compatibility by using the products of one manufacturer in the case of precast reinforced concrete valve vaults.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Transport and handle precast reinforced concrete vaults and other products specified herein in a manner recommended by the respective manufacturers of such to prevent damage and defects.

1.7 SITE CONDITIONS

A. Environmental Requirements: In no instance set or construct vaults on subgrade containing frost.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS

A. Cast-in-Place Concrete: Meet requirements of Section 03300.

B. Waterproofed Mortar: Material composition meeting requirements of ASTM C270, Type M with waterproofing admixture included.

C. Concrete Masonry Units for Manholes and Vaults: Commercially manufactured solid precast segmental concrete masonry units meeting requirements of ASTM C139.

D. Preformed Plastic Sealing Compound: FS SS-S-210A, Type 1, Rope Form, of either bituminastic-base compound or butyl-rubber base compound (CS-102), and shipped protected in a removable two-piece wrapper. Size cross-section of rope form to provide squeeze-out of material around entire interior and exterior circumference when joint is completed.

2.2 PRECAST REINFORCED CONCRETE VAULT COMPONENTS

A. Materials and Construction: Conforming to requirements specified in ASTM C478 except as follows:

1. Concrete: Composition and compressive strength conforming to ASTM C478 except use Type II or Type III cement in vault components and increase compressive strength to 4,500 psi (at 28 days) in precast bases.
2. Casting and Curing: Wet cast and steam curing process in accordance with Section 3.6.11 and 3.7.2 of AWWA C302.

3. Component Seals: Vault component joints factory formed for self-centering concrete to concrete bearing employing either a rubber compression gasket or preformed plastic sealing compound.

    a. Rubber Compression Gasket: Composition conforming to ASTM C361 or ASTM C443.
    b. Preformed Plastic Sealing Compound: As specified previously.
    c. Heat Shrinkable Wrap: Wrap to cover all joints in their entirety as equal to Wrapid Seal as manufactured by CANUSA.

B. Pipe Openings: Custom preformed during manufacturing in each base and riser section requiring such, to accommodate type of pipe and pipe opening seal provided.

1. Pipe Opening Seals: Resilient gasket type, cast integrally with manhole component conforming to requirements specified in ASTM C923 and of the following acceptable pipe seals:

    a. A-LOK Products Corporation; A-LOK Manhole Pipe Seal.
    b. Scales Manufacturing Corporation; RES-SEAL.
    c. Thunderline Corporation; LOCK-SEAL Modular Wall and Casing Seal.
    d. Dual Seal Gaskets, Inc.; DUAL SEAL II.

C. Vault Coatings:

1. Prepare surfaces to be coated in accordance with the written instructions of the coating manufacturer, including cleaning, sandblasting or acid etching as necessary.
2. Factory coat entire exterior locate below grade of precast manhole components with 2 coats of Pennsbury 32-B-4 PENNOXY-TAR, or equal, to dry-film thickness of 7- or 8-mils per coat, coating to be repaired in the field as warranted.

D. Aluminum Access Hatch: 300#/SF loading, 316 stainless steel hardware with spring assist locking hold open arm, 1.5-inch frame drain coupling, and slam lock. Holliday Series W1S.

E. OSHA Safety Grate: Aluminum “I” bar construction with fusion epoxy orange coating and stainless steel hardware. Haliday Series X

F. Aluminum Access Ladder: Aluminum construction with slip resistant ribbed rungs, flat wall mounting stand-offs. Haliday Series L1B.

G. Aluminum Ladder Extension: Aluminum and stainless steel construction with locking pins Haliday Series L1E.

H. Precast vaults shown with watertight manhole covers shall also meet the frame and cover standards within the “Manholes” section.

PART 3 - EXECUTION

3.1 LOCATING AND INSPECTION

A. All vaults will be field located by the Contractor and Engineer. No vaults shall be ordered until the actual location of such is determined in the field.

B. Inspect precast reinforced concrete vault components in accordance with requirements of ASTM C478 regarding repairable defects and defects subject to rejection by the Engineer.

C. All material found during the progress of the work, either before or after installation, to have cracks, flaws or other defects will be rejected by the Engineer. All defective materials furnished by the Contractor shall be promptly removed from the site.

3.2 CONSTRUCTION METHODS

A. Precast Concrete Bases: Install bases on a 6-inch-deep compacted layer of same material used for pipe bedding.

1. Vault base shall be installed in a level position.
2. When using prefabricated pipe opening seals for connecting pipes into vault, and such seals create an annular space on interior and exterior of vault wall after pipe connection is made, fill such annular spaces with:

    a. Tightly caulk sealing compound into annular spaces, completely filling the spaces, and render the installation watertight.
    b. Following sealing compound installation, trowel compound surface smooth and flush with interior face of manhole.

3. Concrete Fill: Field pour concrete floor for each vault base as indicated.

    a. Accurately shape invert to a semi-circular bottom conforming to inside of connecting pipes, and steel trowel finish to a smooth dense surface.
    b. Make changes in direction of entering sewer and branches to a true curve of as large a radius as vault size will permit.
    c. Make slopes gradual outside the invert channels.
    d. Use 3,000 psi concrete as specified in Section 03300.

B. Lifting Hole Sealing: Seal with properly designed tapered rubber plugs. Drive plugs into holes in such a manner to render holes completely water and air tight. Sealing of lifting holes with grout not permitted.

C. Riser Section: Pre-cast or cast-in-place riser sections shall be constructed and/or installed to match the existing grade. The riser section shall include the hatch, ladder or steps, and ladder-up extension device.

END OF SECTION 02606

SECTION 02731 - GRAVITY WASTEWATER SEWER

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Wastewater Gravity Sewer Pipelines.

B. Service Connection Piping.

C. Pipeline Testing.

1.2 RELATED SECTIONS

A. Trenching, Backfilling, and Compacting: Section 02221.

B. Cast-in-Place Concrete: Section 03300.

1.3 QUALITY ASSURANCE

A. Source Quality Control.

1. Shop Tests and Inspection

a. All material furnished by the Contractor shall be certified by the Contractor for compliance with the pertinent specifications. Shop inspections and testing may be required. The cost of shop testing shall be borne by the Contractor.

B. Disposition of Defective Material: All material found during the progress of the work, either before or after installation, to have cracks, flaws or other defects will be rejected by the Engineer. All defective materials furnished by the Contractor shall be promptly removed by him from the site at his own expense.

1.4 REFERENCES

A. American Society for Testing and Materials.

1. ASTM D2321 - Underground Installation of Flexible Thermoplastic Sewer Pipe.
2. ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
3. ASTM D3212 - Joints for drain and sewer plastic pipes using flexible elastomeric seals.
4. ASTM F477 - Elastomeric seals (Gaskets) for joining plastic pipe.

1.5 SUBMITTALS

A. Shop Drawings and Product Data: Furnish completely dimensioned shop drawings, catalog cuts or other data as required to provide a complete description of piping and piping specialties.

B. Certificates:

1. Certified records or reports of results of shop tests, such records or reports to contain a sworn statement that shop tests have been made as specified.
2. Manufacturer's sworn certification that pipe will be manufactured in accordance with specified reference standards for each pipe type.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Transport, handle and store pipe materials and other products specified herein in a manner recommended by the respective manufacturers to prevent damage and defects.

1.7 SITE CONDITIONS

A. Environmental Requirements

1. Keep trenches dewatered until pipe joints have been made and concrete cradle or encasement, if any, have cured.
2. Under no circumstances lay pipe in water or on bedding containing frost.
3. Do not lay pipe when weather conditions are unsuitable, as determined by the Engineer, for pipe laying work.

PART 2 - PRODUCTS

2.1 SEWER PIPE AND FITTINGS

A. For pipe joints, use rubber gaskets suitable for conveying domestic sewage.

B. Polyvinyl Chloride Pipe (PVC)

1. Pipe: Type PSM SDR-35, ASTM D3034 unless specified otherwise in the Drawings.
2. Fittings: Conforming to same ASTM standard requirements for pipe.
3. Joints: Push-on with elastomeric gasket, ASTM D3212; and ASTM F477 for gasket specifications.

C. Ductile Iron Pipe (DIP)

1. Pipe: ANSI A21.50 and ANSI A 21.51
2. Wall Thickness Class (Buried): Class 50.
3. Fittings: Gray iron or ductile iron ANSI A21.10.
4. Joints:

a. Rubber Gasket Joints (Buried): ANSI A 21.11

1) For buried pipe installation, provide push-on or mechanical joints except where other types of joints are indicated on the Drawings or required by the Specifications.

5. Cement Lining: Ductile Iron pipe and fittings shall be coated inside with double thickness cement mortar lining (1/8") and seal coated, all in conformance with ANSI A21.4 and AWWA C104.
6. Pipe and Fittings Coating: Factory coated inside and out with bituminous material; minimum 1 mil dry thickness. Bituminous material and finished coat conforming to seal coat requirements in ANSI A21.4.

2.2 SERVICE CONNECTION PIPE AND FITTINGS

A. Polyvinyl Chloride Pipe (PVC): As specified for sewer pipe and fittings; six-inch diameter.

B. Pipe Plugs: Designed for permanent installation and removable. Obtain plugs from the pipe manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Earthwork: Perform earthwork for sewer installation as specified in Trenching, Backfilling, and Compacting: Section 02221.

3.2 PIPE LAYING

A. General: All pipe shall be laid to a uniform line and grade between manholes, socket ends upgrade, with a firm and even bearing along the barrel of the pipe, close joints and smooth invert. The spigot end of the pipe is to be centered in, shoved tight and secured against the bell or socket of the previously laid pipe. The interior of each pipe shall be cleaned of all excess joint and foreign material before the next pipe is laid. The pipe shall be laid in the bedding materials as specified in Section 02221. Pipe-laying shall commence at the lowest point and proceed upgrade. At the close of each day's work, and at such other times when pipe is not being laid, the open end of the pipe shall be protected with a close fitting stopper.

B. Joints: Make joints in strict accordance with manufacturer's installation instructions.

C. Laying Specified Types of Plastic Pipe: Installation and joint assembly according to ASTM D 2321.

D. Construction Control

1. The use of laser equipment will be permitted. Cut sheets for all manhole runs as required.
2. Regardless of control used, the Contractor shall provide alternative verification of grade as work progresses. Pipe not laid to proper line and grade will be removed and reconstructed at the Contractor's expense.
3. Provide temporary bench marks for grade verification.

E. Variations: The Engineer reserves the right to vary the line and/or grade from that shown on the drawings for pipe lines and manholes when such changes may be necessary or advantageous. No claims will be allowed for changes in location or grade except as such changes are made after trenching has been done. Payment for all variances shall be in accordance with the unit pricing as indicated in the bid and all excavation shall be unclassified.

F. Sanitary Sewer near Water Mains. The Engineer may vary the location of sanitary sewers in close proximity to water mains. No variations on location will be permitted without approval of the Engineer.

1. Horizontal Separation - Sewers should be laid at least 10 feet horizontally from any existing or proposed water main. Should local conditions prevent a lateral separation of 10 feet, a sewer main may be laid closer to the 10 feet to a water main if (1) it is laid in a separate trench, or if (2) it is laid in the same trench with the water mains located at one side of the bench of undisturbed earth and if in either case the elevation of the crown of the sewer is at least 18 inches below the invert of the water main.
2. Vertical Separation - Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be varied to meet the above requirement, the water main shall be relocated to provide this separation or reconstruct it with mechanical joint pipe for a distance of 10 feet on each side of the sewer. One full length of water main should be centered over the sewer so that joints will be as far from the sewer as possible.

   When it is impossible to obtain proper horizontal and vertical separation as stipulated above, both the water main and sewer shall be constructed of mechanical joint cast iron pipe or ductile iron pipe and shall be pressure tested to assure water tightness; or, the sewer shall be concrete encased for a distance of 10 feet on either side of the water main in accordance with the details shown on the contract drawings or as ordered by the Engineer.

G. Handling of Sewer Line Materials into Trench: Proper implements, tools and facilities satisfactory to the Engineer shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe, fittings, jointing materials, etc. shall be carefully lowered into the trench piece-by-piece by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to sewer line materials and/or workmen. Under no circumstances shall such materials be dropped or dumped into the trench.

H. Pipe Clearance in Rocks: Ledge rock, boulders and large stones shall be removed to provide a clearance of at least six inches below and on each side of all pipe and fittings.

1. The specified minimum clearances are the minimum clear distances which will be permitted between any part of the pipe and/or fitting being laid and any part, projection or point of such rock, boulder or stone.

I. Culverts: Sanitary sewer shall be furnished and installed under culverts to the dimensions shown on the drawings.

J. Concrete Cradle and Encasement:

1. Preparation: Prior to the formation of cradle or encasement, if any, temporary supports consisting of timber wedges and solid concrete bricks or cap blocks shall be used to support the pipe in place. Temporary supports shall have minimum dimensions and shall support the pipe at not more than two locations, one at the bottom of the barrel of the pipe adjacent to the shoulder of the socket and the other near the spigot end.
2. Placing: After jointing of the pipe has been completed, concrete shall be uniformly poured beneath and on both sides of the pipe. Placement shall be done by the use of suitable equipment. The concrete shall be wet enough during placement to permit its flow, without excessive prodding, to all required points around the pipe surface. The width of cradle shall be such as to fill completely the trench width. In case of extremely wide trenches, concrete encasement may be confined above the top of the pipe to a narrower width but in no case shall it be less than the width of trench required for the size of pipe being used. Before depositing concrete, the space within the limits of the pour shall have been cleared of all debris and water. Water shall not be allowed to rise adjacent to, or flow over, concrete deposited for less than 24 hours. Concrete shall be protected from the direct rays of the sun and kept moist, by a method acceptable to the Engineer, for a period of seven days or until backfilling is begun. In no case shall backfilling begin within 24 hours of the time of placing and the Engineer shall have strict control of the rate of backfilling.
3. Concrete: 3000 psi per requirements of Section 03300.

3.3 SERVICE CONNECTIONS

A. Fittings, (Wye branches, risers and bends) and service pipe shall be provided in strict accordance with these specifications and any and all practices and precautions required for the sewer main are equally applicable to the service connections from the sewer to one foot behind the curbline, right-of-way line, or edge of paved surface, or to a location designated by the Engineer. The Contractor shall place a 2" x 2" wooden marker at the end of each sewer lateral. The marker shall be one piece and may not be constructed from two or more smaller pieces. The marker shall extend from the lateral invert to 12" above grade.

B. Service connections are to be installed at a grade of quarter inch per foot from the main line to the termination of the lateral.

C. The Contractor shall submit to the Engineer, on a monthly basis, all as-built information which shall include: manhole run, station, length from centerline of sewer, invert elevation at the termination point of lateral and the address or property owner's name for whom the lateral and the address or property owner's name for whom the lateral is provided.

D. If rock is encountered during the installation of the lateral, the Contractor shall extend the lateral to the required distance as specified elsewhere in these specifications, and he shall provide a minimum "rock-free" distance of one foot beyond the end of the lateral. No lateral shall be "butted" against rock.

E. Plugs: Close free ends of branches and service connections with a carefully fitted plug. Type of plug used and method of installation shall meet Engineer's approval. Installed plugs shall successfully pass line acceptance tests.

F. Install warning tape as described in Section 02221.

3.4 PIPELINE TESTING PREPARATION

A. Backfill trenches in accordance with detail on Drawings.

B. Provide pressure pipeline with concrete reaction support blocking.

C. Flush pipeline to remove debris. Collect and dispose of flushing water and debris.

D. Clean pipelines by propelling a snug fitting rubber ball through the pipeline with water from the upstream manhole to the downstream manhole. Investigate and correct any stoppage of the cleaning ball. Collect and dispose of cleaning water and debris.

E. Lamping:

1. After flushing and cleaning, lamp gravity pipeline in the presence of the Engineer.
2. Assist the Engineer in the lamping operation by shining a light at one end of each pipeline section between manholes. The Engineer will observe the light at the other end. Pipeline that has not been installed with uniform line and grade will be rejected. Remove and re-lay rejected pipeline sections. Reclean and lamp until pipeline section achieves a uniform line and grade to the satisfaction of the Engineer.

F. Plug outlets, wye-branches and laterals. Brace plugs to offset thrust.

G. All testing for pipes and manholes shall be conducted with an Authority/Engineer representative on site.

3.5 TESTING GRAVITY SEWER PIPELINES

A. Low Pressure Air Test:

1. Test each newly installed section of gravity sewer line between manholes.
2. Slowly introduce air pressure to approximately 5.0 psig.
3. Allow pressure to stabilize for at least five minutes. Adjust pressure to 3.5 psig or the increased test pressure as determined below if groundwater is present. Start the test.

4. Test:

   a. Determine the test duration for a sewer section with a single pipe size from the table below:

Nominal Pipe Size	T (Time) Min/100 Ft.	
4	.3	3 minutes minimum
6	.7	3 minutes minimum
8	1.2	4 minutes minimum
10	1.5	4 minutes minimum
12	1.8	4 minutes minimum

   b. Record the drop in pressure during the test period. If the air pressure has dropped more than 1.0 psig during the test period, the line is presumed to have failed. If the 1.0 psig air pressure drop has not occurred during the test period, the test shall be discontinued and the line will be accepted

   c. If the line fails, determine the source of the air leakage, make corrections and retest. The Contractor has the option to test the section in incremental stages until the leaks are isolated. After the leaks are repaired, retest the entire section between manholes.

B. Infiltration Test:

   1. Use only when gravity pipeline is submerged in groundwater. Obtain prior approval of the Engineer.
   2. Maximum Allowable Infiltration: 100-gallons per inch of pipe diameter per mile per day for any one section under test, including the allowances for leakage from manholes.

C. Infiltration:

   1. After the air testing described in the preceding paragraph has been completed by the Contractor, regardless of any indications of the test results made by the Engineer or the Authority, the Engineer and the Authority reserve the right to perform field investigations, prior to final written acceptance of each sewer run by the Authority and/or during the one-year correction period specified elsewhere in the Contract Documents, to establish the leakage of groundwater into the sewer and laterals constructed under this contract. The cost of these investigations shall be borne by the Authority.

2. Should the leakage exceed 100 gallons per day per inch diameter per mile of pipe for any section, the Contractor shall, at the direction of the Engineer or Authority, and at no cost to the Authority, perform any additional testing or corrective work required to reduce the infiltration in each manhole run from those lines installed by the Contractor to less than 100 gallons per day per inch diameter per mile of pipe. This leakage applies to each manhole run separately and should not be construed to mean total leakage in the total system. The scope of this corrective work shall include, but not be limited to, cleaning, televising and testing the sewer and laterals to the limits installed by the Contractor, to include testing and grouting of joints, excavation and replacement of faulty or damaged portions of the work, and all final restoration.

3.6 DEFLECTION TESTING OF PLASTIC SEWER PIPE

A. At the direction of the Engineer, perform vertical ring deflection testing on suspect portions of PVC sewer piping, in the presence of the Engineer, after backfilling has been in place for at least 30 days but not longer than 12 months.

B. The maximum allowable deflection for installed plastic sewer pipe shall be limited to 5% of the original vertical internal diameter.

C. Perform deflection testing with a deflectometer, calibrated television, or a properly sized "Go, No-Go" mandrel. The mandrel(s) shall be constructed at the Contractor's expense and subject to the approval of the Engineer.

D. Pipe exceeding the allowable deflection shall be located, excavated, replaced, and retested at the sole expense of the Contractor.

3.7 TEST REPORTS

A. The Contractor shall submit a written, certified report which includes the detailed testing log with times and results for all pipe segments and manholes.

3.8 ACCEPTANCE

A. Observation of successful testing of manholes, sewers or force mains by the Engineer does not constitute acceptance of the system or any portion thereof. Upon completion of any determined portion of a total system, and successful testing thereof, the Engineer may recommend final acceptance to the Authority. Only upon final inspection by the Authority or Engineer and upon written acceptance for same will the system or portion thereof be considered substantially completed. Upon such acceptance, the one-year correction period as specified for the manholes, sewers or force main will commence.

1. If, during this final inspection, any irregularities are observed, the condition shall be corrected at the Contractor's expense prior to acceptance.

END OF SECTION 02731

SECTION 02732 - FORCE MAINS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Force Main Pipe and Fittings.

B. Site Conditions.

C. Excavation, Bedding & Backfill.

D. Anchorage.

E. Tests.

F. Submittals.

G. Product Delivery, Storage and Handling.

1.2 RELATED SECTIONS

A. Trenching, Backfilling, and Compacting, Section 02221.

B. Cast-in-Place Concrete, Section 03300.

PART 2 - PRODUCTS

2.1 FORCE MAIN PIPE AND FITTINGS

All work shall be in accordance with UNI-B-3-92 "Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Pressure Pipe".

A. Polyvinyl Chloride Pipe (PVC)

1. Polyvinyl Chloride (PVC) Pipe for force mains and pressure lines shall be of the bell and spigot type or the coupling type and shall be manufactured in accordance with ASTM D 2241.
2. The pipe shall be made of PVC compounds having a cell classification of 12454-B (or type 1, grade 1 or type 1120) or 12454-C (or type 1, grade 11, or type 1220) as defined in ASTM D 1784.
3. The joint shall be a rubber ring gasket meeting the requirements of ASTM D 1869, C 361 and C 443, and shall provide an adequate compressive force against the bell and spigot or the coupling to affect a positive seal and to provide for expansion and contraction while preventing displacement. The rubber ring gasket shall be the only element depended upon to make the joint flexible and watertight. Solvent cement joints are not acceptable.

4. PVC pipe shall be furnished in standard lengths of 18-22 feet. All pipe shall be marked clearly at intervals of five feet or less with the manufacturer's name, cell classification, SDR rating, and ASTM Designation D 2241.
5. Pipe shall meet the dimensional requirements of SDR 21 with a pressure rating of not less than 200 psi.
6. Fittings for PVC pipe shall be compatible PVC fittings as recommended by the pipe manufacturers, and of same class as the pipe.

B. Ductile Iron Pipe:

1. ANSI A21.51, Ductile Iron Pipe, Thickness Class 51 for underground installation, Class 53 for Flanged piping.
2. Cement lining - double thickness cement mortar lining (1/8") with seal coat, in conformance with ANSI A21.4 and AWWA C104.
3. Exterior Coating:

   a. bituminous coating, minimum 1.0 mil thickness for underground piping.
   b. shop prime with primer compatible with finish coat for piping inside structures.

4. Joints:

   a. Use rubber gasket joints for pipe and fittings installed underground.

      1. Mechanical Joint: ANSI A21.11
      2. Push-on Joint: ANSI A21.11

   b. Use flanged joints for pipe and fittings installed inside of structures, unless indicated otherwise. Mechanical pipe couplings with self-centering gaskets designed to mechanically engage grooved or shouldered piping and lock in a positive watertight couple may be used in lieu of flanged joints, except where indicated otherwise.

      1. Flanged joint: ANSI A21.15
      2. Mechanical coupling: Victaulic Style 31 or equal.
      3. Gaskets: 1/16 inch thick, one piece cloth insertion rubber gaskets suitable for wastewater service.

C. Stainless Steel Pipe:

1. Type 304 stainless steel pipe

PART 3 - EXECUTION

3.1 SITE CONDITIONS

A. Environmental Requirements

1. Keep trenches dewatered until pipe joints have been made and concrete cradle or encasement, if any, have cured.
2. Under no circumstances lay pipe in water or on bedding containing frost.

3. Do not lay pipe when weather conditions are unsuitable, as determined by the Engineer, for pipe laying work.

3.2 EXCAVATION, BEDDING & BACKFILL

A. Non-metallic force mains to be installed with magnetic underground warning tape.

B. Where force main is benched into a sewer trench, the sewer backfill shall be installed to the elevation of the force main prior to the force main installation and backfill.

3.3 ANCHORAGE

A. Concrete Thrust Blocks: Provide concrete thrust blocks for all fittings, and at all locations where horizontal or vertical deflections are made in the joints of the piping.

1. Reaction Backing: Concrete of a mix not leaner than 1 cement: 2□ sand: 5 stone and having a compressive strength of not less than 2,000 psi, at 28 days. Place backing between solid ground and the fitting to be anchored; the area of bearing on the pipe and on the ground in each instance shall be as indicated on the Drawings or directed by the Engineer. Unless otherwise indicated or directed, place backing so that the pipe and fitting joints will be accessible for repair.
2. Metal Harness: Where indicated, use metal harness of tie rods of adequate strength to prevent movement. Steel rods or clamps shall be galvanized and painted with two coats of asphalt type paint.

B. Anchorage for Bends: Provide thrust restraint system for all bends deflected 11.25 degrees or more on mains six inches in diameter or greater.

1. Use only a thrust block system for PVC pipe.
2. Use metal rods only as indicated on the Drawings or directed by the Engineer.
3. Do not use split retainer flanges on PVC pipe to obtain a restrained joint.

3.4 TESTS

A. Pressure/Leakage Test of Force Mains. Upon completion of the installation and backfilling of each portion of the force main, a formal pressure leakage test will be required of the force mains, valves and fittings in the system constructed (no services 2" in diameter or less). Where any section of a main is provided with concrete thrust blocks, the test shall not be made until at least five (5) days have elapsed after the concrete was installed. If high-early-strength cement is used in the concrete thrust blocks, the test shall not be made until at least two (2) days have elapsed. Prior to the formal test, the main to be tested shall be thoroughly flushed. The force main shall then be tested as per Unibell Standard Test #UNB-3. See standard for leakage requirements.

B. The Engineer shall be furnished a written report of the results of the hydrostatic test that identifies the specified length of pipe testing, the pressures (minimum 1.5 times working pressure), the duration of the test, and the amount of leakage.

C. If any test of pipe laid discloses leakage greater than specified in Unibell UNB-3, the Contractor shall at his own expense locate and repair the defective pipe or joints until the leakage is within the specified allowance.

D. The Contractor shall furnish all labor, materials, tools and equipment necessary for or incidental to satisfactory testing, and shall be responsible for any damage to the pipe line or to adjoining property, due to this work.

3.5 SUBMITTALS

A. Shop Drawings and Product Data: Furnish completely dimensioned shop drawings, catalog cuts or other data as required, to provide a complete description of piping and piping specialties.

B. Certificates

1. Certified records or reports of results of shop tests, such records or reports to contain a sworn statement that shop tests have been made as specified.
2. Manufacturer's sworn certification that pipe will be manufactured in accordance with specified reference standards for each pipe type.

3.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Transport, handle and store pipe materials and other products specified herein in a manner recommended by the respective manufacturers to prevent damage and defects.

END OF SECTION 02732

SECTION 02733 – LOW PRESSURE SEWER PIPE (FORCE MAIN)

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Low Pressure Sewer Pipe and Fittings.

B. Site Conditions.

C. Excavation, Bedding & Backfill.

D. Anchorage.

E. Tests.

F. Submittals.

G. Product Delivery, Storage and Handling.

1.2 RELATED SECTIONS

A. Trenching, Backfilling, and Compacting, Section 02221.

B. Manholes, Section 2605

C. Cast-in-Place Concrete, Section 03300.

PART 2 - PRODUCTS

2.1 HIGH DENSITY POLYETHYLENE PIPE (HDPE)

A. The pipe and fittings shall be made of High Density, Extra High Molecular Weight (EHMW) polyethylene with a standard thermoplastic material designation code of PE3408 and having a cell classification of 345464E per ASTM D3350. The molecular weight category shall be extra high (250,000 to 1,500,000) as per the Gel Permeation Chromatography determination procedure with a typical value of 300,000 to 330,000. The pipe shall be manufactured in accordance with ASTM F714 and/or ASTM D3035.

B. The manufacturer shall provide certification that the stress regression testing has been performed on the specific product in accordance with ASTM D2837 “Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials”. The certification shall also state the specific resin used and its source.

C. HDPE pipe manufactured from materials meeting the specifications of this section shall have an Environmental Stress Crack Resistance of no failures in 10,000 hrs. (ESCR: F_O>10,000) when tested in accordance with ASTM F1248.

D. The pipe and fittings shall have product traceability. The manufacturer shall include a printline on the pipe. This shall notate the manufacturer's name, date of manufacture, the lot and supplier of raw material, plant location, and production shift. The ASTM standard shall also appear as ASTM F714 with the material designation as PE3408.

E. Both pipe and fittings shall carry the same pressure rating. All fittings shall be pressure rated to match the system piping to which they are joined. At the point of fusion, the outside diameter and minimum wall thickness of the fitting shall match the outside diameter and minimum wall thickness specifications of ASTM F714 for the same size pipe. Fittings shall be manufactured by the pipe manufacturers or be compatible fittings as recommended by the pipe manufacturers. Elbows, tees, and wyes shall be manufactured by mitered fabrication. All fittings shall be derated according to the manufacturer's written specifications, and clearly labeled on the fitting as such.

F. Force main and lateral HDPE pipe shall meet the dimensional requirements of SDR 11 and SDR 11.5 with a pressure rating of not less than 160 psi.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with ANSI/ASTM F585, "Standard Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers."

B. The system shall be complete, including special equipment for transport and fusion joining of HDPE pipe. The Contractor shall be familiar with the procedures of installation and joining of pipe sections.

C. Pipe shall be installed in such a way as not to create tension or compression forces in the pipe. Concrete encasement thrust blocking shall be placed at curvatures greater than forty-five degrees, or where pipe movement is likely to occur, at the direction of the Engineer.

3.2 SITE CONDITIONS

A. Environmental Requirements

1. Keep trenches dewatered until pipe joints have been made and concrete cradle or encasement, if any, have cured.
2. Under no circumstances lay pipe in water or on bedding containing frost.
3. Do not lay pipe when weather conditions are unsuitable, as determined by the Engineer, for pipe laying work.

3.3 EXCAVATION, BEDDING & BACKFILL

A. Non-metallic force mains to be installed with magnetic underground warning tape.

B. Where force main is benched into a sewer trench, the sewer backfill shall be installed to the elevation of the force main prior to the force main installation and backfill.

3.4 JOINING

A. Heat Fusion Joining Systems: Pipe and fittings shall be thermal butt fusion, saddle fusion, or socket fusion according to manufacturer recommended procedures.

B. The manufacturer shall provide fusion training. The Contactor (actual installers) and the onsite joint inspector shall be trained by the manufacturer or manufacturer's authorized representative.

C. It will not be permitted to join unlike SDR's to one another. Transition from unlike SDR's shall be accomplished by mechanical couplings capable of identical pressure ratings or machined polyethylene nipples where a thicker wall polyethylene has been matched to the companion pipe wall.

D. Mechanical Joining Systems: HDPE pipe and fittings shall be connected by means of a polyethylene flange adapter and backup ring. The polyethylene flange adapter will be of the same specifications as the LightView except will be made from black plate stock. This method is also approved to join to another piping system or valves. Mechanical compression couplings or full circle encasement clamps may be used depending on the test specification.

E. Mechanical couplings shall be installed in accordance with the mechanical coupling manufacturer's recommended procedures.

F. Equipment: The fusion equipment and operator shall be required to demonstrate successful field experience.

3.5 TESTS

A. Pressure/Leakage Test of Force Mains. Upon completion of the installation and backfilling of each portion of the force main, a formal pressure leakage test will be required of the force mains, valves and fittings in the system constructed. Where any section of a main is provided with concrete thrust blocks, the test shall not be made until at least five (5) days have elapsed after the concrete was installed. If high-early-strength cement is used in the concrete thrust blocks, the test shall not be made until at least two (2) days have elapsed. Prior to the formal test, the main to be tested shall be thoroughly flushed. The force main shall then be tested as per Unibell Standard Test #UNB-3. See standard for leakage requirements.

B. The Engineer shall be furnished a written report of the results of the hydrostatic test that identifies the specified length of pipe testing, the pressures (minimum 1.5 times working pressure), the duration of the test, and the amount of leakage.

C. If any test of pipe laid discloses leakage greater than specified in Unibell UNB-3, the Contractor shall at his own expense locate and repair the defective pipe or joints until the leakage is within the specified allowance.

D. The Contractor shall furnish all labor, materials, tools and equipment necessary for or incidental to satisfactory testing, and shall be responsible for any damage to the pipe line or to adjoining property, due to this work.

3.6 WARRANTY

A. The manufacturer shall provide evidence that their standard Terms and Conditions of Sales for warranty and guarantee have been one year from date of manufacture for a period of at least five years. It will not be permitted for a manufacturer to waive the date for the period of warranty and guarantee for this project to meet this specification. The one year date of manufacture shall be covered under the standard Terms and Conditions of Sale.

3.7 SUBMITTALS

A. Shop Drawings and Product Data: Furnish completely dimensioned shop drawings, catalog cuts or other data as required, to provide a complete description of piping and piping specialties.

B. Certificates

1. Certified records or reports of results of shop tests, such records or reports to contain a sworn statement that shop tests have been made as specified.
2. Manufacturer's sworn certification that pipe will be manufactured in accordance with specified reference standards for each pipe type.

3.8 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Transport, handle and store pipe materials and other products specified herein in a manner recommended by the respective manufacturers to prevent damage and defects.

END OF SECTION 02732

SECTION 02767 – VALVE BOXES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Refer to details.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Type 1: Roadway Style – 5-1/4" inside diameter, cast iron, asphaltic coated 3-piece adjustable valve box, round head, with the word "**SEWER**" printed on top.

1. Manufacturers: Bringham & Taylor, Mueller or Tyler.

B. Type 2: Curb Stop Box: 1" inside diameter upper section, asphaltic coated 2-piece cast iron with operating rod and lid with brass head plug.

1. Manufacturer: Ford Model EA2-40-40-24R or Mueller.

C. Adjustable Pipe Supports: Provide Standon S92 saddle support for 2- and 3-inch pipes and C92 saddle clamp support for 2-inch pipe with ASTM A36 saddle strap, threaded stud, base plate and ASTM A53 collar/base cups with MIG welding and a corrosion resistant galvanized finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install Type 1 valve boxes at every distribution valve, blow-off valve, and hydrant isolation valve.

B. Provide valve box length as required to accommodate valve depth.

C. Provide Type 2 valve boxes with extended rods for curb stops.

D. Support valve boxes in accordance with details.

E. Valve boxes shall be flush with the finish grade.

F. Locate curb stop valve box in concrete sidewalk. If area does not specify for the installation of sidewalk, provide 4" thick concrete pad a minimum of 12" square as noted on the standard details.

END OF SECTION 02767

SECTION 02768 – VALVES AND FLUSHING CONNECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Contractor shall provide the equipment and materials listed herein as part of Contract.

1.2 SUBMITTALS

A. Shop drawings and product data.

1.3 RELATED SECTIONS

A. Precast Concrete Structure, Section 02606.

B. Valve Boxes, Section 02966.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sewage Combination Air Valve: Provide APCO Model 443WA.1 (2-inch inlet and 1-inch outlet) air release valve where shown on the drawings. Valves shall be provided with shutoff valve, blowoff valve, flush valve and minimum 5-feet rubber hose with quick disconnect coupling for back flushing.

B. Ball Valve: Provide Nordstrom poly-water HDPE valves for flushing connections as shown on the Drawings. Valves shall be of drop-light shutoff, multiple elastomeric steam seals, smooth full bore, EPDM seat, flanged ends, and 200 psi rated pressure.

C. Adjustable Pipe Supports: Provide Standon S92 saddle support for 2- and 3-inch pipes and C92 saddle clamp support for 2-inch pipe with ASTM A36 saddle strap, threaded stud, base plate and ASTM A53 collar/base cups with MIG welding and a corrosion resistant galvanized finish.

D. Flushing Hydrants: Provide 2" Flushing hydrants for the intermediate and terminal cleanout assemblies. The 2" flushing hydrants are to be hidden underground within a heavy duty precast concrete junction box with cover. Provide a 2-1/2" brass NSFT discharge with cap and chain on top of the pipe riser and is exposed within the junction well box. Also exposed in the well is the top of the valve stem for the integral bronze body ball valve with automatic weep that allow for the hydrant barrel to drain. Basis of design is Gil Industries or an approved equal. Utilize two (2) 45^{o} elbows in lieu of a 90^{o} elbow. Refer to the drawings for more information.

PART 3 - EXECUTION

3.1 EQUIPMENT

A. Equipment described in this Section to be installed at the location shown on the drawings, as applicable. Where equipment is not shown, or where equipment is a portable item, deliver to Owner prior to completion of Contract.

END OF SECTION 02768

DIVISION 03
CONCRETE

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete materials and mixes for the following:

1. Concrete Cradle and/or Encasement.
2. Reaction Backing (Thrust Blocks).
3. Manhole Base Channel Fill.
4. Manhole Bases.
5. Anti-Flotation Rings.
6. Concrete Footings, Equipment Foundations, Slabs on Grade.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials, AASHTO M182 Burlap cloth made from Jute or Kenaf.

B. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete for Buildings.
2. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
3. ACI 305R - Hot Weather Concreting.
4. ACI 306R - Cold Weather Concreting.
5. ACI 308 - Standard Practice for Curing Concrete.
6. ACI 309 - Standard Practice for Consolidation of Concrete.
7. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. American Society for Testing and Materials:

1. ASTM C33 - Concrete Aggregates.
2. ASTM C39 - Compressive Strength of Cylindrical Concrete Specimens.
3. ASTM C94 - Ready Mixed Concrete.
4. ASTM C143 - Slump of Portland Cement Concrete.
5. ASTM C150 - Portland Cement.
6. ASTM C171 - Sheet Materials for Curing Concrete.
7. ASTM C171 - Sampling Freshly Mixed Concrete.
8. ASTM C173 - Air Content of Freshly Mixed Concrete by the Volumetric Method.
9. ASTM C231 - Air Content of Freshly Mixed Concrete by the Pressure Method.
10. ASTM C260 - Air Entraining Admixtures for Concrete.
11. ASTM C309 - Liquid Membrane - Forming Compounds for Curing Concrete.
12. ASTM C494 - Chemical Admixtures for Concrete.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150 of the following type:

1. For concrete which will be in contact with sewage: Type II, Moderate Sulfate Resistance.
2. For all other uses: Type I, Normal.

B. Aggregates: Meeting requirements of ASTM C33.

C. Water: Potable quality, clean and free of injurious amounts of oil, acid, alkali, organic matter, suspended matter, and other deleterious substances.

D. Concrete Admixtures:

1. Air-Entraining Admixture: Use a product conforming to ASTM C260, certified by manufacturer to be compatible with other required admixtures.
2. Water-Reducing Admixture: ASTM C494, Type A, and containing not more than 0.1 percent chloride ions.
3. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C494, Type F or Type G and containing not more than 0.1 percent chloride ions.
4. Water-Reducing, Non-Chloride Accelerator Admixture: ASTM C494, Type E, and containing not more than 0.1 percent chloride ions.
5. Water-Reducing, Retarding Admixture: ASTM C494, Type D, and containing not more than 0.1 percent chloride ions.
6. Prohibited Admixtures: Calcium chloride thyocyanates or admixtures containing more than 0.1 percent chloride ions are not permitted.

E. Moisture-Retaining Cover: One of the following, complying with ASTM C171.

1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.

F. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ASTM C309, type I, Class A. Moisture loss not more than 0.055 gr/sq cm when applied at 200 sq ft/gal.

1. Acceptable Manufacturers:

a. Masterseal; Master Builders.
b. L&M Cure; L&M Construction Chemicals.
c. Substitutions: Under provisions of Section 01600.

2.2 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301.

B. Compressive Strength:

1. Provide concrete with 28 day compressive strength as specified in other Specification Sections.
2. Where no compressive strength is specified, use 3,000 psi concrete.

C. Admixtures:

1. Use water-reducing admixture or high range water-reducing admixture (super plasticizer) in concrete as required for placement and workability.
2. Use non-chloride accelerating admixture in concrete slabs placed at ambient temperatures below 50°F.
3. Use high-range water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with water/cement ratios below 0.50.
4. Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus-or-minus 1-1/2 percent within following limits:

a. Concrete exposed to freezing and thawing, deicer chemicals, or subjected to hydraulic pressure:

Maximum Aggregate Size (inches)	Air Content (% by Volume)
1/2	5-9
3/4	4-8
1	3.5-6.5
1-1/2	3-6
2	2.5-5.5
3	1.5-4.5

D. Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (W.C.) ratios as follows:

1. Concrete with 28 day compressive strength required to be 3,000 or higher: 0.58 maximum (non air-entrained), 0.40 maximum (air-entrained).

E. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Slump: Not less than 1" nor more than 4", except when super plasticizer is used, slump may be as high as eight inches.

2.3 CONCRETE MIXES

A. Job-Site Mixing: Not Allowed.

B. Ready-Mix Concrete: Comply with requirements of ASTM C94, and as herein specified.

1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.

2. When air temperature is between 85°F and 90°F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90°F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 CONCRETE PLACEMENT

A. General: comply with ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete", and as herein specified.

B. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306.

C. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305.

3.2 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than seven days.
2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least seven days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete by curing and sealing compound, by moist curing, by moisture-retaining cover curing, and by combinations thereof, in accordance with ACI 308.

3.3 FINISHES

A. Provide a steel troweled floor finish on the floors of the generator stations.

3.4 QUALITY CONTROL

A. Sampling and testing for quality control during placement of concrete may include the following, as directed by Engineer.

1. Sampling Fresh Concrete: ASTM C172, except modified for slump to comply with ASTM C94.
2. Slump: ASTM C143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
3. Air Content: ASTM C173, volumetric method; ASTM C231 pressure method; one for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature; Test hourly when air temperature is 40° F and below, and when 80°F and above; and each time a set of compression test specimens made.

5. Compressive Strength Tests: ASTM C39; one set for each day's pour exceeding 5 cubic yards plus additional sets for each 50 cubic yards over and above the first 25 cubic yards of each concrete class placed in any one day; one specimen tested at seven days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required. The average compressive strength for the two 28 day specimens will be used to determine compliance with the compressive strength requirements.

END OF SECTION 03300

DIVISION 11
EQUIPMENT

SECTION 11100 - SEWAGE PUMPING STATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Concrete Wet Well

B. Valve Chamber

C. Submersible Pumps

1. Pump Motor
2. Motor Starter
3. Pump Controls

D. Sewage Grinder

E. Emergency Generator

1.2 RELATED SECTIONS

A. Trenching, Backfilling, and Compacting, Section 02221.

B. Force Mains, Section 2732

C. Valves and Flushing Connections, Section 02967

D. Cast-in-Place Concrete, Section 03300.

1.3 GENERAL GUIDELINES

A. The intent of this section of the specifications is to provide the Developer / Contractor with **General Guidelines** for the design and construction of sewage pumping stations. Each pumping station is unique and will need to be designed and constructed as such.

B. Nothing in these specifications shall preclude the Developer / Contractor from conformance with the PADEP Domestic Wastewater Facilities Manual. Where conflicts occur the more stringent requirement shall govern.

1.4 PERFORMANCE REQUIREMENTS

A. Pressure ratings of sewage pumps and discharge piping components shall be at least 150% of the sewage pump discharge pressure but not less than 150 psig.

B. Force main velocities shall be a minimum of 2 ft/sec with 3 to 3.5 ft/sec preferred. Maximum velocity shall be 6 ft/sec.

1.5 SUBMITTALS

A. Shop Drawings and Product Data:

1. Manufacturer's published detail drawings showing the wiring diagrams, pipe, joints, fittings, connection details, equipment, materials, procedures for fabrication and erection, adapters, appurtenances, procedures for earthwork, shoring, bracing, procedure of dewatering, methods of installation and testing, and other relevant details of the complete installation, modified to suit design conditions if required, and Contractor prepared drawings as applicable.
2. Manufacturer's descriptive literature and specifications covering the product specified. Include installation information.

B. Certificates:

1. Submit test certificates for each consignment or shipment to indicate all materials and equipment required by the Specifications are satisfactorily tested by the manufacturer and found to comply with specified requirements.

C. Design Engineer’s Report:

1. Design Engineer’s report listed pump capacities and detailing pump selection method and calculations. Manufacturer's data on pumps shall include pump characteristic curves showing head, capacity, efficiency, and brake horsepower.

D. Operation and Maintenance Manual:

1. The Developer / Contractor shall furnish for submission with each unit or set of identical mechanical units copies of printed instruction books. These books shall include operation, maintenance and repair information, location and telephone number where spare parts may be ordered, plus a parts list. The parts list shall indicate the various parts by their name, number, and diagram.

1.6 QUALITY ASSURANCE

A. Workmanship and Guarantee:

1. The manufacturer of the pumping station shall have a minimum of five years experience in the design and manufacture of submersible pumping stations and shall guarantee the structure and all equipment to be free from defects in materials and workmanship for a period of up to one year from date of start-up.
2. Warranties and guarantees by the suppliers of various components in lieu of a single-source responsibility by the manufacturer will not be accepted. The manufacturer shall be solely responsible for the guarantee of the station and all components, with the exception of the flow metering and remote monitoring system. These shall be warranted by their respective manufacturers.
3. In the event a component fails to perform as specified or is proven defective in service during the guarantee period, the manufacturer shall provide a replacement part without cost to the Owner. Manufacturer shall further provide, without cost, such labor as may be required to replace, repair, or modify major components such as the pumps, pump motors, and sewage piping manifold.

B. Factory Tests:

1. All components of the pumping station shall be given an operational test of all equipment at the factory to check for excessive vibration, for leaks in all piping or seals, for correct operation of the control systems and all auxiliary equipment. Pumps shall take suction in a manner to simulate actual service conditions. The control panel shall undergo a full operational test with all systems operating.
2. Each pump shall be factory tested by the manufacturer for capacity, power requirements, and efficiency at the specified minimum operating head, rated heat, shut-off head, and at three points as necessary to provide a certified pump performance curves. Certified curves will be provided for each serial number pump being supplied to the project and be performed to Hydraulic Institute test level A standards for engineer's review prior to shipment.

1.7 PRODUCT STORAGE AND HANDLING

A. General:

1. The Contractor shall at all time take necessary steps to protect and preserve all materials, supplies, equipment and all work which has been performed.
2. Should work be suspended temporarily because of inclement weather or other causes, the Contractor shall take such steps as are necessary to protect materials, supplies, equipment and work performed against damage and injury. Any damaged materials, supplies, equipment, or work performed shall be removed and replaced at the expense of the Contractor.

B. Storage and Handling:

1. In all cases, equipment and materials shall be stored per manufacturer instructions so that equipment and materials shall remain undamaged and in suitable condition for installation. Damaged equipment and materials shall be replaced at the expense of the Contractor.
2. All materials shall be so handled that the coating and/or linings shall not be damaged. If any part of the coating or lining is damaged, it shall be repaired or replaced by the Contractor at no cost to the Owner.

PART 2 - PRODUCTS

2.1 DESCRIPTION OF EQUIPMENT

A. The Contractor shall furnish and install a pumping station within a concrete wet well and valve chamber. Each pump shall be capable of handling raw, unscreened domestic sewage consisting of water, fibrous materials, and 3"inch diameter spherical solids. The pump (s) shall be capable of handling liquids with temperatures to 104 degrees F continuous, 160 degrees F intermittent, and shall be capable of running dry for extended periods.

B. The station will be provided with a portable hoist rated to lift the pumps within the station, and remove them from the wet well.

2.2 SEWAGE PUMPS AND MOTOR

A. Pumps General:

1. Furnish and install a minimum of two submersible non clog or grinder type pumps, ITT Flygt Corporation or approved equal, to meet specified operating conditions with at least one pump fitted with the ITT Flygt mix flush valve assembly and the other pump fitted with the mix flush valve adapter only.
2. The pump(s) shall be manufactured by a company regularly engaged in the manufacture and assembly of similar units for a minimum of five (5) years.
3. Pumps, mechanical seals and motor units provided shall be from the same manufacturer in order to achieve standardization of operation, maintenance, spare parts, service and warranty.

B. Pump Construction:

1. Furnish and install a minimum of two submersible non clog or grinder type pumps, ITT Flygt Corporation or approved equal, to meet specified operating conditions with at least one pump fitted with the ITT Flygt mix flush valve assembly and the other pump fitted with the mix flush valve adapter only.
2. The volute, seal plates, impeller and motor housing shall be constructed of high quality ASTM A-48 class 30 cast iron. Pump (s) shall be painted with a water based air dry enamel of 2.0 mil minimum thickness. All exposed hardware shall be 300 series stainless steel. The pump construction shall contain no points of critical clearance nor require periodic adjustment or replacement to maintain operating efficiency. Discharge connection shall be a standard 125 pound 4” inch flange. All gaskets shall be of the compression square ring type eliminating critical slip fits and the possibility of damage during service associated with sliding o-ring sealing arrangements.
3. The impeller shall be of the non-clog design with pump out vanes on the back side. The impeller shall be dynamically balanced to ISO G6.3 specifications. The double mechanical shaft seal shall be of the single spring design operating in an oil-filled seal cavity. Pump-out vanes in the back of the impeller shroud shall develop a radially increasing pressure differential from the impeller hub outward. This pressure differential shall be transmitted by means of a Buna-N elastomer diaphragm to the oil in the seal cavity, thus producing a higher pressure inside the seal cavity than immediately adjacent to the seal face in the pump case forcing the oil in the seal cavity to be the seal face lubricant. The materials of construction shall be silicon carbide for the rotating faces and silicon carbide for the stationary faces, lapped and polished to a tolerance of one light band, 300 series stainless steel hardware, and all elastomer parts to be of Buna-N.
4. The seal shall be commercially available and not a manufacturer’s proprietary design. A moisture sensor detection system consisting of two probes utilized as a positive/negative pole shall be integrated within the oil-filled seal chamber. Units utilizing one probe and grounding through the pump case or a float device are not acceptable.

C. Electric Motor:

1. The motor shall be designed to be non-overloading throughout the entire intended hydraulic operating range. The pump and motor shall be UL Listed with Underwriters Laboratories as Class I, Division I, Groups C & D, explosion proof, for installation in water and sewage. All electrical parts shall be housed in an air filled, cast iron, watertight enclosure. The enclosure shall be sealed by the use of o-rings and shall have rabbit joints with a large overlap. The motor shaft extension and all external hardware shall be stainless steel. The motor windings shall have class F insulation system minimum and a 1.15 service factor. The shaft seals shall be a tandem design and operate in an oil filled enclosure. The shaft sealing system shall run in an oil bath. The lower, primary seal shall consist of one stationary silicone carbide ring and one positively driven (rotating) silicon carbide ring; while the upper seal between the motor and the oil housing shall consist of one stationary stainless steel ring and one positively driven rotating carbon ring. Each interface shall be held in place by its own independent spring system. The seal shall be commercially available and not a manufacturer's proprietary design.

   Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with a thermal switch embedded in the end coil of the stator winding. This shall be used in conjunction with and supplemental to external motor overload protection and wired to the control panel.

   The pump shall be equipped with type 6/4 SOW-A power cable and sensor cable type 18/5 SOW. The cable entry design shall be such that it precludes specific torque requirements to insure a watertight and submersible seal. All incoming lead wires shall be spliced in the motor terminal housing. After splicing, the terminal housing shall be filled with epoxy to seal the outer cable jacket and the individual strands to prevent water from entering the motor housing. A secondary rubber pressure grommet shall be provided as an additional sealing point and strain relief at the point of cable entry. Cable entry designs utilizing terminal boards to connect power cord leads with motor leads shall not be acceptable. The pump cord(s) shall be equipped with a properly sized meltric fitting to connect to pump disconnect box.

2.3 PUMP DISCONNECT PANEL AND STAND

A. An appropriately rated stainless steel junction box shall be provided and mounted on the top slab of the system. The enclosure shall be lockable single door and carry an IP rating of 66 minimum. The disconnect panel shall be mounted on a stainless steel pedestal with stainless steel mesh that provides atmospheric separation per NEC requirements. The wires shall be surrounded by stainless steel wire mesh of which one side can be removed to access the wiring. Meltric fitting sized for pump amperage shall be installed for quick removal and replacement of pump units. The precast concrete slab shall include an aluminum cable trough with bolt down cover to allow pump control wires to reach into disconnect box without any splicing.

2.4 SWITCH RATED PLUGS AND RECEPTACLES

A. Meltric DSN Decontactor Series switch rated plugs and receptacles should be used for connecting the pump power cords into the bottom of the junction box. Hazardous location models suitable for Class 1, Division 2, Group D location shall be provided. The plugs and receptacles shall include the following features.

1. Features:

a. Spring-Loaded Butt Contacts – Butt style contacts ensure a very positive and consistent connection. The spring loading of these contacts, which is accomplished with coil springs, provides a desirably high contact force that remains constant over thousands of operations. In addition, it should automatically compensate for any wear and/or deviations in contact length resulting from manufacturing tolerances.

b. Silver-Nickel Contact Material – Solid silver-nickel (85%/15%) contacts should be used. Brass contacts will not be considered acceptable. The silver-nickel combination is used for the excellent electrical and mechanical properties.

c. Dead Front Construction – When used in submersible pump applications the dead front construction should be used to enhance safety by eliminating unintended access to live parts. Dead front should be able to be opened only by an appropriate mating plug.

d. Enclosed Arc Chambers – The contacts should make and break within enclosed arc chambers. By containing arcing in the chamber, safety is greatly enhanced.

e. Push Button Load Breaking – To disconnect the switch the user needs to depress the pawl, which will cause the circuit to be disconnected and the plug to be ejected to its off position.

f. Automatic Watertightness – The DSN contactor shall have a NEMA 4X rating, while the DS and DB models shall have a NEMA 3R rating.

g. Spring Assisted Terminals – A spring ring shall surround the conductor terminal, which applies constant pressure as the terminal screw is tightened.

h. Stainless Steel Springs & Screws – All hardware shall be made of stainless steel.

i. The DS, DSN, and DB product lines shall be UL, CSA, and IEC switch rated plugs and receptacles.

j. Optional Auxiliary Contacts – Integral pilot contacts shall be an option. These pilot contacts shall be able to control auxiliary equipment, monitor parameters, or communicate alarms through the same plug as the power supply.

B. Pump Retrieval Chain Sling for Each Pump - Stainless steel chain attaches to pump lifting handle and smarty lift grasps chain for pump lifting and installation.

2.5 CORD STRAIN RELIEF

A. Each pump cord shall be fitted with a stainless steel Kellems cord grip to help support the weight of the pump power and control cables. Kellems support grips are used to hold the weight of electrical cable as it hangs in a vertical, sloping or horizontal position. Electrical cable must be supported, or its dead weight can cause excessive strain or pullout at the connections resulting in pump failure.

2.6 WET WELL

A. The wet well shall be as indicated on the drawings with a monolithically poured base and riser section. The unit shall have minimum 8" thick walls and a flotation collar and precast hopper bottom, 4,000 PSI reinforced concrete conforming to ASTM specific C-478. All joints shall be sealed with Ram-Nek sealant. The top cover slab shall be a minimum of 8" thick concrete with a U.S.F. Fabrication lockable aluminum cover inserted to size written in the specifications below. The junction box shall be mounted to a stainless steel frame, and the wires shall be surrounded by stainless steel wire mesh of which one side can be removed to access the wiring. The entire structure shall be mounted to the concrete wet well slab to allow maintenance personnel to disconnect wiring without entering or reaching into the wet well.

1. Manufacturer: AC Miller Concrete Products or approved equal.

B. Piping in the station shall be minimum 4" cement lined ductile iron with threaded flanges. No "uniflanges", slip on flanges, or flexible couplings will be allowed in the pumping station. The station shall also be equipped with an inlet gasket, minimum 2.00" stainless steel guide rails, and a stainless steel level control switch-mounting bracket with a compression grommet that allows for level setting adjustment. A galvanized vent with bird screen of size shown shall be mounted through the top slab of the wet well. The vent shall have a confined space warning sign attached with stainless steel U-bolts.

C. The station shall also be equipped with an inlet gasket(s) as per the station drawing, stainless steel guide rails, pump and control and a level control switch mounting bracket for floats and transducer and a cable rack to hang pump cords with stainless steel Kellems cord support grips.

D. A white epoxy coating shall be applied to the entire interior concrete surface of the wet well. The coating shall consist of minimum two (2) coats, each six (6) mils thick, applied as recommended by the manufacturer under controlled conditions at concrete manufacturer's plant.

1. Manufacturer: Penn-Chem Coating #54-W-23 by MAB Coatings or approved equal.

E. Bitumastic coating shall be applied to the below grade exterior concrete surface of the wet well.

F. Pipe Gaskets:

1. All pipe penetrations in the manhole shall be sealed watertight using flexible rubber gaskets conforming to ASTM C923 specifications. The use of caulking or epoxy type liner systems at the pipe penetrations shall not be acceptable.

a. Manufacturer: Kor-N-Seal as manufactured by NPC, or approved equal.

2.7 VALVES

A. Air Cushioned Swing Check Valve:

1. Horizontal swing check valves, sized as shown on the plans shall be installed in the discharge piping. The swing check valve shall be constructed with heavy cast iron or cast steel body with a bronze or stainless steel seat ring, a non-corrosive shaft for attachment of weight and lever, and complete non-corrosive trim cushion chamber. It shall absolutely prevent the return of water, oil or gas back through the valve when the inlet pressure decreases below the deliver pressure. The valve must be tight seating, and must be cushioned in operation. The seat ring must be renewable. The cushion chamber shall be attached to the side of the valve body externally and so constructed with a piston operating in a chamber that will effectively permit the valve to be operated without any hammering action. The cushion chamber shall be arranged that the closing will be adjustable to meet the service requirements. The valve disc shall be convex and of cast iron or cast steel and shall be suspended from a non-corrosive shaft which will pass through a stuffing box and be connected to the cushion chamber on the outside of the valve. All material and workmanship shall be first class throughout and the purchaser reserves the right to inspect this valve before shipment. The valve shall be the GA Industries, Inc. Fig. No. 250-D, or APCO Series 6004 or approved equal.

B. Resilient Seat Gate Valves:

1. Resilient Seat Gate Valves 12 Inches and Under for Buried Service Installation: Resilient wedge, iron body, bronze trim, resilient seat for zero leakage, mechanical joint ends, non-rising stem, 0-Ring packing, 2-inch operating nut, epoxy coating inside and outside applied before valve assembly. Valves shall meet or exceed AWWA Standard C504, C509 and C550 (current edition). Valves shall be rated for 200 psi minimum with no leakage. Valves shall be line size in accordance with the diameters shown on the drawings. Manufacturer: Mueller A-2360, US Metroseal or equal.

C. Valve Chamber:

1. Provide a separate concrete valve chamber for discharge, gate valves and swing check valves. Valve chambers shall be constructed of concrete as specified for pump station with minimum 6" walls and 10" bottom, white epoxy coating interior, bitumastic coating exterior (below grade only). The top cover slab shall be concrete with a U.S.F. Fabrication lockable aluminum cover inserted to size written in the specifications below. Piping shall be sealed with boot gaskets and waterstops where it penetrates the wall. Aluminum ladder with safety extension shall be provided in the chamber. The valve chamber floor shall be sloped toward the drain line to provide sufficient drainage. A 2 " PVC drain line sloped at 3% with flap valve or Tide Flex valve shall be installed from

valve chamber to wet well. The valve chamber shall incorporate precast concrete piers with stainless steel straps or “Standon” pipe supports to support and stabilize piping.

2. Manufacturer: AC Miller Concrete Products or approved equal.

D. Piping and Valves:

1. The station sewage piping shall be class 53 ductile iron pipe that will extend down through the common base plate terminating in plain ends exterior to the pump chamber. Steel or PVC pipe will not be accepted as an “or equal” substitute to the ductile iron pipe specified. The pipes shall be sealed where they penetrate the concrete with link seal or a gasket to form a gas tight seal between the pump valve chamber and wet well. Each discharge line shall be fitted with a gate valve and check valve as specified herein and sized as shown on the plans. All piping shall be field coated with two coats of gray epoxy to a DFT of 10 – 12 mils. Valve vault piping shall also include an emergency bypass connection.

2.8 PRESSURE GAUGES

A. Provide a filled sleeve pressure sensor assembly on each of the pump discharge lines. Provide ample space for gauge assembly, valve operation and process sampling. Each pressure gauge shall be an all welded assembly. The diaphragm shall be recessed within the all-welded body, and the pressure gauge is back-welded to the seal upper housing to eliminate another potential leak path. No threaded seal fill port should be included to ensure tamper resistant design.

1. Suitable Pressure Ranges: 0 psi to 100 psi
2. Operating Temperature: 0^{o}F to 200^{o}F
3. Ambient Temperature: -40^{o}F to 150^{o}F
4. Dial Size: 2 1/2" process gauge
5. Process Connection: 1/4" NPT female
6. Process materials: Carbon steel body; Class 150 flanges; Neoprene sleeve; ethylene glycol and water fill fluid
7. Manufacturer: Red Valve Series 40 or approved equivalent

2.9 WET WELL HATCH

A. The hatch shall have a clear opening as indicated on the Drawings. Door leaf shall be 1/4 inch thick aluminum diamond plate reinforced for a 300 p.s.f. live load. The frame shall be extruded aluminum channel section with an integral anchor flange on all four (4) sides. The frame shall include an EPDM odor reduction gasket that reduces the amount of odor that escapes from below the door and a 1-1/2 inch threaded drain coupling. The floor access door shall be equipped with a flush drop handle that does not protrude above the cover, and a stainless steel hold open arm with red vinyl grip that automatically locks the cover in the 90 degree open position. The door shall have stainless steel hinges and stainless steel tamper resistant bolts/locknuts. A staple for a padlock shall be supplied for security. All stainless steel components shall be type 316 alloy. An adhesive backed vinyl material that protects the product during shipping and installation shall cover the entire top of the frame and cover. Installation shall be in accordance with the manufacturer's attached instructions. The door shall be manufactured and assembled in the United States. Manufacturer shall guarantee the door against defects in materials and workmanship for a period of ten (10) years.

B. Additional Features:

1. Bituminous Coating – A bituminous coating shall be applied to any part of the aluminum frame that comes in contact with the concrete.
2. Slamlock – The hatch shall be equipped with a watertight stainless steel slamlock with threaded plug, removable outside key, and fixed inside handle. The slamlock must latch onto a stainless steel catch that is bolted to the frame.
3. Hinged on Opposite Short Sides – The doors of the hatch shall be hinged on opposing short sides.
4. Hinged Aluminum Safety Grate – The hatch shall have a fall through prevention system capable of withstanding a load of 300 pounds per square foot. The hatch should not rely on the safety grate to achieve its 300 pounds per square foot. Instead both the hatch and safety grate should independently achieve a rating of 300 pounds per square foot. It will consist of an aluminum grate with 5" x 5" openings that rotates on hinges that are welded to the hatch frame. When the grate is lifted to its open position, it will lock in place and serve as a barrier. The door cannot be closed until the Hinged Aluminum Safety Grate is completely closed. (Will reduce clear opening.)

C. Manufacturer: The floor access door shall be Model TPD as manufactured by U.S.F. Fabrication, Inc. or approved equal.

2.10 VALVE CHAMBER HATCH

A. The hatch shall be as indicated on the Drawings. Door leaf shall be ¼-inch thick aluminum diamond plate reinforced for a 300 p.s.f. live load. The frame shall be extruded aluminum channel section with an integral anchor flange on all four (4) sides. The frame shall include an EPDM odor reduction gasket that reduces the amount of odor that escapes from below the door and a 1-1/2 inch threaded drain coupling. The floor access door shall be equipped with a flush drop handle that does not protrude above the cover, and a stainless steel hold open arm with red vinyl grip that automatically locks the cover in the 90 degree open position. The door shall have stainless steel hinges and stainless steel tamper resistant bolts/locknuts. A staple for a padlock shall be supplied for security. All stainless steel components shall be type 316 alloy. An adhesive backed vinyl material that protects the product during shipping and installation shall cover the entire top of the frame and cover. Installation shall be in accordance with the manufacturer's attached instructions. The door shall be manufactured and assembled in the United States. Manufacturer shall guarantee the door against defects in materials and workmanship for a period of ten (10) years.

B. Additional Features:

1. Bituminous Coating – A bituminous coating shall be applied to any part of the aluminum frame that comes in contact with the concrete.
2. Slamlock – The hatch shall be equipped with a watertight stainless steel slamlock with threaded plug, removable outside key, and fixed inside handle. The slamlock must latch onto a stainless steel catch that is bolted to the frame.

C. Manufacturer: Model TPS as manufactured by U.S.F. Fabrication, Inc. or approved equal.

2.11 PORTABLE HOIST

A. A portable adjustable stainless steel hoist which has an integral base that is mounted to the top slab shall be provided. The hoist shall have a 2000 lb. maximum capacity and shall be capable of lifting the pumps without entering the wet well. The portable hoist shall be manufactured by Thern or approved equal. The hoist base shall be mounted so the hoist can reach both pumps.

2.12 APPURTENANCES

A. Pump Guide Rails: Non-sparking stainless steel.

B. Pump Mounting Plates and Guide Rail Braces: Stainless steel.

C. Guide Rail Supports: Stainless steel.

D. Pump Lifting Cable: Stainless steel (stainless steel lift cable shall incorporate enough length to reach into portable hoist assembly).

E. Fasteners and Hardware: Stainless steel.

F. Pump/Control Cable: Cable shall be supplied by the manufacturer for the entire circuit, starting at the pumps and terminating in the pump control panel. Provide junction boxes and conduit seals as required.

G. Vent Pipes: Provide 4" galvanized iron vents with return bends and No. 8 bronze mesh insect between two flanges. Confined space warning sign should be affixed to wet well vent pipe.

2.13 ELECTRICAL

A. Wiring:

1. All wiring shall be minimum 600 volt (UL) type MTW or AWM and have a current carrying capacity of not less than 125% of the full load current.
2. The conductors shall be in complete conformity with the National Electric Code, state, local and NEMA electrical standards.
3. To ensure the safety of all personnel working with this equipment, as well as providing a simple means of tracing wires when troubleshooting, all wiring shall be color coded in strict accordance with the wiring diagrams furnished by the equipment supplier.

B. UL Approval:

1. The control panel shall be constructed in compliance with Underwriter's Laboratories Industrial Control Panels listing and follow-up service, utilizing UL listed recognized components where applicable.

C. Enclosure:

1. The described equipment shall be housed in appropriate stainless steel enclosure as shown on the drawings. Controls should be mounted on a deadfront door of the enclosure for easy access by operators.
2. All major components and sub-assemblies shall be identified as to function with laminated, engraved Bakelite nameplates or similar approved means.
3. The following described equipment shall be furnished as the control systems required and matched to the specific pumping station equipment.

D. Power Supply and Metering:

1. Main Circuit Breaker: A properly sized molded case circuit breaker shall be provided as the main power disconnecting device for the control panel. The circuit breaker must have a minimum ampere interrupting capacity of 25,000 @ 480 volt symmetrical RMS amps.

E. Lightning Arrestor:

1. A lightning arrestor shall be supplied in the control and connected to each line of the incoming side of the power input terminals. The arrestor shall protect the control against damage due to lightning strikes on the incoming power line.

F. Phase Monitor:

1. A solid state, phase sequence/failure and under voltage release relay shall be provided to ensure additional running protection for the pump motors. The relay shall be complete with an LED to indicate proper phase sequence, all phases in operation and voltage within limits. The relay shall also include an adjustable voltage monitor, be UL and CSA certified and be complete with automatic reset feature.

G. Pump Circuit Breaker:

1. A thermal magnetic circuit breaker shall be supplied as branch circuit protection for each pump motor. The circuit breaker must have a minimum ampere interrupting capacity of 10,000 @ 480 volt symmetrical RMS amps. The circuit breakers shall be operable through the operator's door of the enclosure and include provision for padlocking in open position.
2. The circuit breaker shall be properly sized to protect the control circuit conductors, motor starter and the motor against overcurrent due to short circuit or grounds.

H. Motor Starters (Reduced Voltage Soft Starter):

Provide a microprocessor-controlled starter for three-phase induction motors. As manufactured by Benshaw type RediStart Digital motor starter. An equivalent design by an alternate manufacturer will be considered.

1. Starter shall include the following :

a. NEMA (National Electrical Manufacturers Association) specified frame size.
b. Solid state design.
c. Current limited reduced voltage starting.

d. Closed-loop motor current control.
e. Programmable motor protection.
f. Programmable operating parameters.
g. Programmable metering options.
h. Variable voltage control.
i. 120 VAC Control Voltage

2. Starter shall operate within applied voltage and frequency values of 480VAC and 60Hz.
3. The starter shall be programmed for a motor FLA and the motor service factor. The starter shall continually monitor the amount of current being delivered to the motor.
4. Starter shall include the following standard features:

a. Adjustable ramp time (0 - 120s)
b. Adjustable initial current
c. Adjustable maximum current
d. Adjustable full-voltage kick start (0.1 to 5 seconds or Off)
e. Selectable motor deceleration control for Pumps (0 - 60s)
f. Variable voltage control input (0 to 5 volts, 0 to 10 volts, 4 to 20mA)
g. Extreme current imbalance/line phase loss detection
h. Adjustable line current imbalance protection (5 - 40%)
i. General fault, motor power and up to speed form “C” contacts
j. Line phase sequence sensitivity or insensitivity
k. Phase loss and phase reversal protection
l. Selectable solid state overload class (10, 20, 30, or None)
m. Negative sequence overload biasing
n. Adjustable motor full load amps (1 - 1600A)
o. Adjustable motor service factor (1.00 - 1.40)
p. Adjustable current transformer ratio
q. Adjustable stalled motor detection (0 - 210s)
r. Line frequency tracking (23Hz through 72Hz)
s. 120VAC external trip input (fault detection active on start or UTS)
t. 800% FLA instantaneous overcurrent detection
u. Overcurrent (jam) protection (50 - 400%, 1 to 15 seconds or disabled)
v. Undercurrent protection (25 - 100%, 1 to 15 seconds or disabled)
w. Shorted SCR detection and SCR condition indication
x. 3-digit 7-segment LED Display
y. Programmable metering

5. LED Display - A three character, alphanumeric LED display located on the control card shall display:

a. Starter status information.
b. Operating parameters.
c. Condition codes.
d. Fault codes.
e. Thermal Overload Content.
f. Metering.
g. Remote display active.

6. LED indicators - Each starter shall have indicating LEDs for:

    a. Power On
    b. SCR Condition

7. Control Relays:

    The starter shall have four control relays as follows:

    a. Start/Stop input relay: (This contact shall energize whenever the SCRs are conducting as a direct command from the starter).
    b. Fault output relay: (The relay shall energize any motor or starter fault is detected)
    c. UTS (up to speed) output relay. (The contact shall engage when a true motor Up to Speed condition is achieved)
    d. Motor power output relay.

    Each relay shall provide three Form “C” relay contacts capable of 250VAC, 16A Resistive and 8A Inductive. The fault contact shall be only capable of 125VAC 2A Resistive, 1A Inductive.

I. Receptacle: An inner door mounted ground fault interrupter (GFI) type convenience receptacle rated at 15 amperes shall be supplied for the operating of trouble lights, drill, etc. It shall be protected by a separate 15 ampere trip rated circuit breaker.

J. Condensation Protective Heater: A thermostatically controlled, fan driven heater shall be supplied in the control panel to maintain a stable temperature and protect the electrical and electronic equipment from the harmful effects of condensation, corrosion and low temperatures.

K. Motor Ground Fault: Motor Ground fault protection will be provided for each pump motor to ensure the integrity of the submersible pump cords.

L. Control Breaker – Door Mounted: The panel shall be supplied with a properly sized control power circuit breaker. The breaker shall be operator door mounted and shall supply power to all control wiring within the enclosure.

M. USEMCO "Sentry" or approved equivalent Pump Controller:

1. The control system shall utilize standard "off the shelf" equipment. Job specific, "one-of-a-kind" customized software and hardware components will not be accepted
2. The equipment shall be protected from transient voltages and surges induced into the signal lines. The contractor shall provide a permanent earth ground connection to the panel ground lug in order to insure proper operation of transient protectors.
3. A microprocessor-based automatic pump and alarm control system shall be provided for the pump station incorporating an industrial-grade, 16-bit CMOS microcomputer and associated elements suitable for achieving performance as hereinafter described. The controller shall incorporate the following:

    a. Internal diagnostics.
    b. Real time clock calendar.
    c. Floating-point math.

d. Battery backup.
e. Non-proprietary RTU communication.
f. (4) PID loops.

4. The system shall incorporate UL 508 Industrial Control Panel approved elements as required of all components of the panel and shall be furnished with all necessary hardware and software to accomplish level-responsive pump and alarm operation with software specifically suited to this project.
5. All of the discrete I/O circuitry of the computer-based system shall be built to the IEEE 472 (1974) Surge Withstand Capability Standards. The automatic pump and alarm control system computer shall be the standard product of the control system manufacturer and specifically suited for this type of industrial control panel service. All job connections shall be a UL recognized clamp type barriered screw terminals.
6. The constant speed drive equipment shall be programmed to respond to variations in the wetwell in a manner wherein the hydraulic requirement will be accommodated in the pumping program using simple menu-related operator interface routines.
7. Upon power-up, the Controller shall go through a timing routine, which allows the analog signal and display to stabilize before any control, or alarm outputs are enabled. After the stabilization period, the control circuits of the Controller shall be sequentially enabled on a time-step arrangement. In addition to the time delay upon power-up, the differential-level control circuits shall each be forced to an off condition upon power up so that a level excursion will need to go past their turn-on elevation for them to operate.
8. An alternator shall operate the pumps in a First-on/First-off (FOFO) sequence and can be configured to sequence the pumps every start, every 24 hours, on the lowest run time or manually. The alternator shall be capable of accepting pump failure and/or advance inputs and shall automatically transfer to the next pump sequence when failure condition input is sensed. The alternator shall provide automatic transposing of the operating sequence of the control relays for the pumps on successive starts. The FOFO alternator sequencing shall operate such that the next load turned on is always the one that has had the longest opportunity to rest since its last operation.
9. Microprocessor based, programmable controller and operator interface shall provide all of the above controls and operations. A redundant back up float system shall be incorporated into the controller along with programmable automatic operation. Operator interface shall be a minimum of 3” x 4” LCD.
10. The automatic pump and alarm control shall employ an operator interface having a 240 x 80 pixel STN monochrome liquid crystal display. The operator interface shall have an IEC standard IP65F sealed housing. The display shall be rated for 50,000 hours and include an adjustable sleep mode to increase life. The unit shall support four levels of password protection.
11. The Operations Manual shall be included for the pump controller.

N. Controller Configuration:

1. The pump controller shall operate on a 4-20mA input via a submersible transducer, and shall be capable of being configured at the factory or jobsite to perform operating functions as described below. All configurations shall be password protected and shall be provided as a minimum as follows:

a. Duplex Pump Operation.

1) Clock hours (0-23) and minutes (0-59).
2) Calendar day of week (0-6 for Monday - Sunday).

3) Wetwell transducer rating (1.0-15.0 PSI).
4) Wetwell transducer offset.
5) Wetwell cross sectional area for Flow Monitor.
6) Lag pump disable for non-additive systems.
7) Pump Alternation method.
8) Shut down, Alarm only or Lag pump designation upon Seal fail.
9) On board or Redundant float back up with weekly test feature.
10) Selectable pump fault for Low oil or Bearing overtemperature

b. The pump controller shall include the field adjustable delay timers. All timer settings shall be password protected and shall be provided as follows:

1) Pump 1 start fail delay (0-99 seconds).
2) Pump 2 start fail delay (0-99 seconds).
3) Lead pump start delay (0-99 seconds).
4) Lag pump start delay (0-99 seconds).
5) Lead pump stop delay (0-99 seconds).
6) Lag pump stop delay (0-99 seconds).
7) High Level alarm delay (0-99 seconds).
8) Low Level alarm delay (0-99 seconds).
9) Delay between calls (0.1-9.9 minutes).
10) Back up float pump down timer (1-5 minutes).
11) Back up float lag call timer (0-99 seconds).

c. The pump controller shall include the field adjustable set points. Set points shall be password protected and provided as follows:

1) Lead pump start.
2) Lead pump stop.
3) Lag pump start.
4) Lag pump stop.
5) High Level Alarm.
6) Low Level Alarm.
7) Back up high float.

d. The menu driven screen shall display the following:

1) Wetwell Level.
2) Pump Run time values scaled to hours and tenths.
3) Pump Start counters.
4) Flow Rates.
5) Pumping Rates.
6) Alarm Messages.

O. Alarm Messages:

1. In the event of an alarm condition the operator interface shall display an alarm message. The following list of alarms shall be provided:

a. Low Level.
b. High Level.
c. Pump 1 Fail.

d. Pump 2 Fail.
e. Transducer Fail.
f. Seal 1 Fail.
g. Seal 2 Fail.
h. Motor 1 Overtemp.
i. Motor 2 Overtemp.
j. Pump 1 Fail (Configurable from external device).
k. Pump 2 Fail (Configurable from external device).
l. Backup Float Test Fail.

P. Flow Monitoring:

A flow-monitoring algorithm shall be included in the controller to measure influent flow. This algorithm shall calculate the incoming flow rate during periods of pump inactivity, detecting the change in level and using the configured wetwell area. Pumping rates shall be calculated during periods of pump activity, detecting the change in level and using the configured wetwell area and average incoming flow rate. The controller shall display incoming flow and totalized flow in gallons per minute. It also shall display each pump's rate in gallons per minute.

Q. Pump Seal Fail:

A seal failure relay specifically designed to interface with a contact closure from each of the specified pumps shall be included. A Seal Fail alarm message shall be displayed on the controller. In addition the controller should be configured to shut down the pump or designate it to the lag position until the condition is corrected.

R. Over Temperature Pump Protection:

Over temperature protection relays shall be provided in the control panels to operate in conjunction with the over temperature switch in each pump motor. The controller shall provide an Overtemp Fail alarm message and pump lockout of operation upon occurrence of high temperature. The circuitry shall also include a reset push button on the controller for manual reset capability.

S. Ammeters:

A 3½" ammeter shall be provided for each pump motor. Each meter shall be connected to a current transformer. The meter and current transformer shall be sized such as to provide half scale readings when the pump motors are running at designed conditions. The ammeter shall meet ANSI specifications C-39.1. The ammeter shall be mounted on the operator's door of the control panel.

T. Selector Switches:

A 22 mm oil tight, three-position, "Hand-Off-Automatic" selector switch shall be flush-mounted on the operator's door of the control panel for the operation of each motor starter. This selector switch shall operate the starter when it is in either the "Hand" position or the "Automatic" position, and the automatic control system is calling for the operation of the equipment in the manner as herein described.

U. Status Indicators:

A 22 mm oil tight green "Pump Running" push-to-test pilot light shall be flush-mounted on the operator's door of the control panel. This pilot light shall be operated from a respective starter auxiliary contact. The pilot light shall have a replaceable bulb.

V. Weather Proof Alarm Light:

A weatherproof high water, 100-watt alarm light assembly including a high impact resistant lexan red lens and wire guard with mounting bracket shall be included, for panel or remote mounting. The alarm light will glow at half brilliance during normal operation. During alarm conditions, a solid-state flasher shall be included to strobe the alarm light from full brilliance to off 90 times per minute for any of the specified alarm conditions.

W. Power Fail Alarm:

A 120-Volt DPDT control relay powered from the load side of the control power circuit breaker shall be included.

X. Telemetry Contacts:

Dry contacts rated 10 amps shall be provided, and wired to a numbered terminal strip inside the panel, to interface with remote telemetry or dialing equipment for the following:

1. Motor Heat Sensor(s)
2. High Level Alarm
3. Low Level Alarm
4. Moisture Sensor(s)
5. Power Fail
6. Pump(s) Run
7. Pump Fail
8. Transducer Fail

2.14 SUBMERSIBLE WET WELL LEVEL SENSING TRANSDUCER

A. The submersible transducer shall be a piezoresistive type with optional ranges of 0-100 INWC to 0-100 psi. The device shall require a 10-30 VDC low voltage power supply. The response time of the transducer shall be less than one millisecond. Accuracy of the equipment should be #0.25% of the entire range and the repeatability shall be #0.05% of the entire range. The transducer shall be capable of being used in media from +15ºF to +122ºF, and the storage temperature for the unit shall be -22ºF to 176ºF. Shock resistance per IEC 770 for mechanical shock should be 1000g, and the vibration resistance per IEC 770 for vibration under resonance conditions should be 50g. Protection against reverse polarity, short circuit, and overvoltage should be included in the transducer. The transducer shall carry an IP68 (NEMA 6) rating and shall be submersible up to 350 ft. All wetted parts shall be 316 SS. The transducer shall have a vented polyurethane cable with a tensile strength of 220 lbs.

1. Manufacturer: WIKA model LS-10 or equal.

B. An optional anti-clog attachment shall be included for the above referenced submersible transducer. The anti-clog attachment shall be made of all 316 SS, and shall be silicone liquid filled. The anti-clog attachment shall also include a 2" diaphragm for performance. In case of transducer failure, the anti-clog attachment should be able to be removed and used with a new transducer. Transducers with anti-clog attachments that cannot be removed shall not be acceptable. The anti-clog attachment shall be able to be used with all models of WIKA transducers.

1. Manufacturer: WIKA LS-10 with a LevelGuard™ or equal.

2.15 WET WELL LEVEL SENSING FLOAT SWITCHES

A. The floats shall have a molded polyethylene body, internal redundant polyurethane foam floatation, potted switch/cable connections and fine stranded AWG #18 cable with heavy-duty synthetic rubber jacket in lengths as required to run unspliced to the control panel.

B. The contractor shall furnish, install and wire the float switches as shown on the drawings. The float switches shall be individually suspended in the wetwell with weight kits. The float switch cables shall be suspended from a cable rack mounted to the top of the wetwell.

C. The redundant back-up float controller shall connect to the float switch level sensors through an intrinsically safe module. The module shall provide an intrinsically safe interface for the sensors located in a hazardous area rated Class 1, Group D. The module shall contain an LED indicator providing visible indication of sensor actuation. The intrinsic safety barrier shall be UL listed.

2.16 ALARM DIALER

A. The automatic dialing alarm system shall be microprocessor based and have the capability to monitor from 4-48 dry contact or digital inputs, 8 to 48 analog inputs or energize from 4 to 24 relays in any combination. The dialer shall be field upgradeable to allow for future conditions. Each of these inputs shall monitor a set of dry contacts (normally-closed or normally-open). In addition, the dialer shall monitor the AC power and battery voltage continuously. Upon detecting an alarm on any of its inputs, a low battery condition or detecting loss of its AC power, the dialer shall begin dialing the first of up to 16 user programmed telephone numbers.

B. The dialer shall speak user-recorded messages to the called party describing its location and the alarm conditions that are present. The dialer shall then verbally request that an acknowledgment be given. The called party shall acknowledge the call by momentarily depressing the ‘8’, ‘9’ or ‘*’ key on their telephone keypad. If the dialer is not acknowledged during the call, it shall hang up, wait from 1 to 3600 seconds and then dial the next number in its phone list. If a successful acknowledgment occurs, the dialer shall give a sign-off message, hang up and then wait a user-programmed period of time for the alarm conditions to be corrected. If this period of time elapses and the alarm condition(s) still exist, the dialer shall begin the alarm notification cycle again. The dialer shall have relay outputs that shall remain energized as long as the dialer has any unacknowledged alarms.

This output shall be available to allow for wiring to an external horn, buzzer, light or other local alarm device. Alternatively, the user shall be able to program the dialer to allow remote activation of this relay from a telephone keypad.

C. Construction:

1. Enclosure: Minimum rating should be NEMA 4X
2. Power Requirements: 115 VAC 10% 60 Hz; 25 watts
3. Printer Port: Centronics parallel – DB25 (female)
4. Serial Port: 38.4Kbaud – DB9 (male)
5. Electrical Protection: Transient voltage/surge protection shall be provided on power line, telephone and all input channels. Solid state surge protection provided on digital input, analog input, serial port, parallel port, telephone and AC power circuitry.
6. The alarm dialer shall be mounted in its own enclosure within the pump control panel. Alarm dialer shall have its own surge protection separate from any panel surge protection.

    a. Manufacturer: Antx Elite or RACO Verbatim or Equal

2.17 MAGNETIC FLOWMETER AND TRANSMITTER

A. A 4-inch magnetic flow tube with remote transmitter shall be provided. The flow tube shall be flanged and placed in the valve vault discharge piping. The transmitter shall be mounted remotely in the control building. Provide optional indicator, keypad and configure for totalizing flow.

B. Flow tube: ptfe liner; 316 ss electrodes; Foxboro 9300A.

C. Flow transmitter: Foxboro IMT25, remote mounted.

2.18 PERMANENT AUXILIARY POWER GENERATOR

A. Generator shall be sized to adequately supply starting current and continuous operation for all connected loads. Generator to be located in a separate room within the control building, having adequate ventilation as required by the manufacturer. Engine shall have protective equipment capable of shutting down the unit and activate an alarm under conditions which may damage the engine. Supplier shall recommend amount and type of vibration isolation and anchor bolt necessary to mount the generator to the generator slab. With one pump running and all other loads on, the voltage drop, upon starting the second pump, shall not exceed 35%. Emergency generator shall be manufactured by Cummins/Onan. Generator shall be supplied with natural gas feed from gas distribution system within development, if available. Otherwise, generator to be diesel powered.

B. Automatic Transfer switch (ATS): ATS shall be provided to automatically start the emergency generator when power failures are detected and to switch back over when power is restored. ATS shall be fully rated to protect all types of loads, inductive and resistive, from loss of continuity in power. Adjustable solid state time delays for starting, transfer, retransfer, and stopping the generator shall be provided. A seven day exerciser clock and standard indicating lights shall be provided. ATS shall be manufactured by Cummins/Onan and shall come integral with level 1 power command control with exerciser clock and programmed transition. ATS shall also contain a 2A (integral) battery charger mounted and wired within the ATS.

2.19 CONTROL BUILDING

A. Structure: Building to be of masonry construction and sized to house electric and control panels, emergency generator, and chemical treatment (if needed), all in separate rooms.

B. Chemical Treatment Odor Control:

1. Hydrogen Peroxide - Provide the following:

a. Chemical Metering Pump: one (1) peristaltic chemical metering pump, 3 RPM, gear motor, powered by 120V electrical. Metering pump shall be capable of pumping in a range of 1/z gpm and 5 gpm, or as specified. Chemical metering pump and shall be model SP10, manufactured by Watson/Marlow or approved equal.

1) Polypropylene shelf for pump with stainless steel mounting hardware.
2) Hose and fittings capable of handling chemical.
3) 30 gallon plastic day tank for holding chemical solution.
4) Two (2) stainless steel ejectors one on discharge side of each pump's discharge header.
5) 24-hour timer with 15-minute interval pre-timed control of chemical feed pump.

2. Other suitable methods of odor control shall be considered on a case by case basis.

C. Accessories:

1. Lighting: Provide adequate lighting for each room in the control building.
2. Control Building Space Heater: Provide a unit space heater capable of maintaining the control building at an ambient temperature of 65°F. The space heater shall be ceiling or wall mounted with integral thermostat capable of controlling between 60°F and 90°F, and be manufactured by Chromalox, or approved equal.
3. Ventilation: (In all rooms except the emergency generator room) Exhaust fan shall be manufactured by New York Blower Company, or approved equal, and shall include 8" diameter fan with motor capable of producing 400 CFM of flow at 0" S.P. Fan shall include gravity louvers and shall mount directly in wall. Louvers shall be shielded on the exterior with an insect/bird screen. NOTE: Ventilation for the emergency generator room shall be installed exactly as specified by Cummins/Onan to be adequate for the generator to be used.
4. Hose Bibs: All hose bibs must have backflow protection and must be frost-proof.
5. Hose: Contractor shall furnish a 50-feet length of 3/4" heavy duty rubber hose for connection to the 2" yard hydrant.

2.20 SITE IMPROVEMENTS

A. Chain Link Fence: Nominal 8-foot height with 12-foot wide double section gate. Framework shall be constructed of schedule 40 steel, standard weight, one piece without joints. Fabric shall be 2-inch diamond mesh steel wire, interwoven 9 gage thick, top selvage twisted tight, bottom selvage knuckle end closed.

B. Access Drive: Driveway to be bituminous, minimum 10-foot wide providing access directly adjacent to the wet well, valve vault, and control building. Provide vehicle turnaround and parking area for one vehicle.

C. Exterior Lighting: A single exterior light shall be mounted 12' above ground on an aluminum pole set on a concrete base. Floodlight shall be a heavy-duty aluminum fixture with motion detector and manual override activation switches, impact resistant glass and a 500-watt quartz lamp, Light shall be equipped with manually operated toggle switch to override the motion detector.

D. Freeze-Proof Yard Hydrant: Provide a two-inch automatic draining hydrant with schedule 40 stainless steel casing and operating rod, bury depth of three feet with locking feature. All buried fittings must be constructed of brass. Hydrant shall be equipped with backflow protection. Hydrant seat must be repairable without excavation, manufactured by Woodford Manufacturing Company, or approved equal.

PART 3 – INSTALLATION

3.1 FABRICATION, INSTALLATION, AND FIELD TESTING

A. General: Fabrication and installation of all equipment and materials required for the sewage lift stations and Pumping stations shall be performed by the Contractor as per manufacturer's instructions, drawings, cut sheets, and the Specifications and Drawings. Testing of all equipment and materials after installation shall be considered an integral portion of the construction process. The Contractor shall repair any item not meeting testing criteria at his own expense. The Contractor shall also furnish all necessary labor, equipment, and materials for testing and shall bear all the costs thereof.

B. Fabrication and Installation:

1. All anchorage steel required for the equipment shall be supplied by the equipment manufacturer. The Contractor shall install the anchorages in the concrete structures in accordance with drawings and instructions furnished by the equipment manufacturer. Foundation anchor steel shall be grouted as shown on the plans.
2. The Contractor shall furnish and install all sleeves and adapters in the wall required for process piping. The Contractor shall install all piping and fittings and shall make all joints and connections, including wall sleeves, watertight by means acceptable to the Engineer.

C. Start-Up:

1. Prior to the start-up of any piece of mechanical equipment, the Contractor shall have submitted to the Engineer four copies of printed instructions as specified herein.
2. Start-up of all mechanical equipment shall be conducted by the Contractor, under the direction of the manufacturer's representative, and in the presence of the Engineer. Unless otherwise allowed by the Engineer, in writing, the manufacturer's representative shall be present during the start-up of the equipment.
3. As part of the start-up, the manufacturer's representative shall instruct the operating personnel of the Owner on the proper operation and maintenance of the equipment. Eight (8) hours and two (2) separate visits shall be included in the bid price.

4. The manufacturer's representative shall issue a written start-up report to the Engineer, the Contractor, and the manufacturer containing the following information:

    a. A list of each piece of mechanical equipment which was started up.
    b. The manufacturer of the equipment.
    c. The date of the start-up.
    d. A list of persons present during the start-up.
    e. A list of persons present during the operation and maintenance instructions given by the manufacturer's representative.
    f. Any problems noted during the start-up.
    g. Any recommendations which would improve the operation.
    h. A statement that the equipment is or is not operating properly and why.
    i. The name of the person directing the start-up and the company the person represents.

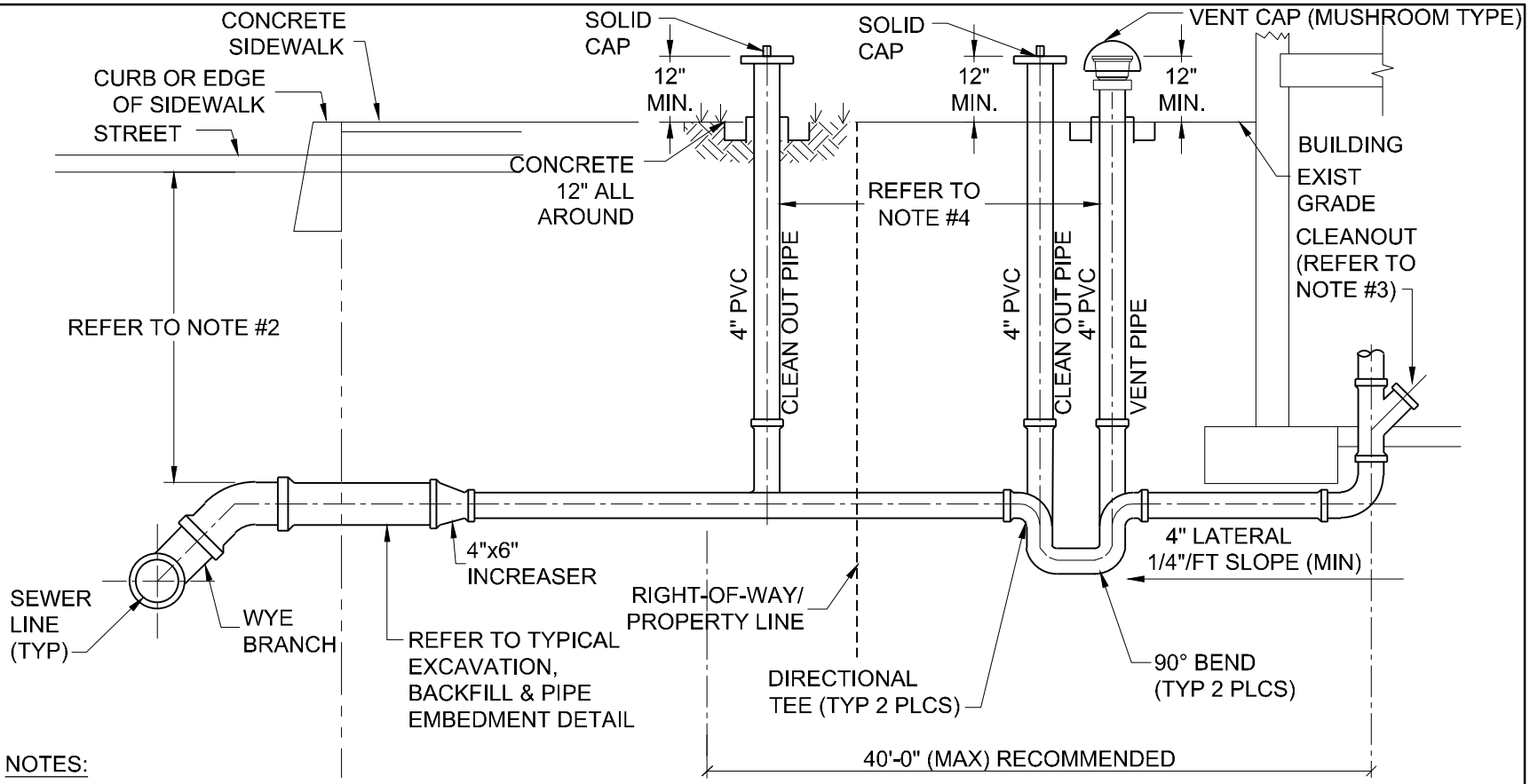
D. The Contractor shall be responsible for coordinating and making the necessary arrangements to schedule the start-up of the equipment. The Contractor shall include all costs relating to equipment start-up in the bid price for the installation of the equipment.

END OF SECTION 11100

APPENDIX F

STANDARD CONSTRUCTION DETAILS

Table of Contents



NOTES:

1. 4" SINGLE RUNNING TRAP WILL BE INSTALLED WITHIN ONE PIPE LENGTH OF THE END OF THE 6" LATERAL.
2. MINIMUM DEPTH OF 4" LATERAL WILL BE 48" BELOW FINISHED GRADE UNLESS APPROVED BY ENGINEER.
3. IF THERE IS NOT A CLEANOUT LOCATED INSIDE OF DWELLING AN ADDITIONAL CLEANOUT SHALL BE INSTALLED IMMEDIATELY OUTSIDE OF THE BUILDING PRIOR TO RUNNING TRAP
4. LOCATE VENT CAP AND CLEANOUT IN LAWN AREA. MUSHROOM CAP SHALL BE USED ON VENT.
5. IN GENERAL, SANITARY SEWERS SHOULD BE LOCATED AT LEAST 100 FEET FROM PUBLIC WATER SUPPLY SOURCES AND 50 FEET FROM PRIVATE WATER SUPPLY SOURCES, UNLESS THE SANITARY LINES ARE ENCASED IN CONCRETE OR APPROVED EQUIVALENT.
6. REFER TO DRAWING S- 3 FOR LATERAL NOTES.

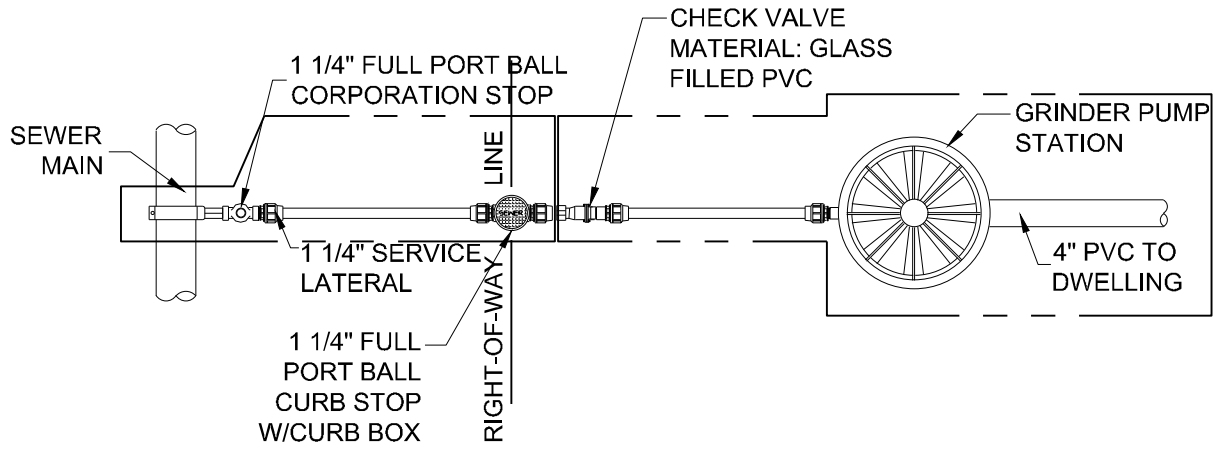
TYPICAL BUILDING SEWER

SCALE: NONE

PREPARED BY: MAH
CHECKED BY: BAK
APPROVED BY: EJP
PROJECT NO.: 4169.11
DATE: 02/05/16
SCALE: NONE
DRAWING NO.: S-1

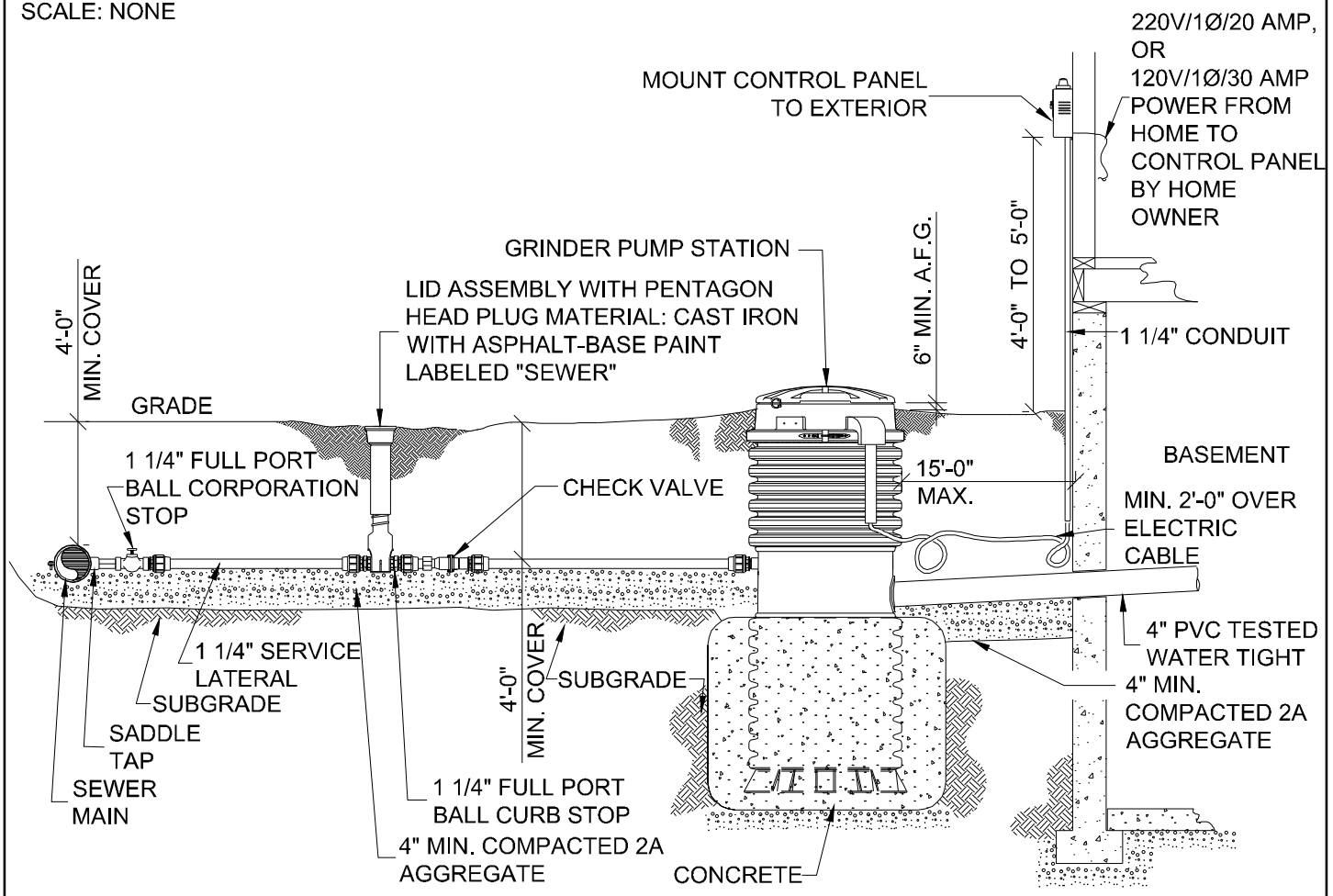
BOROUGH OF ORWIGSBURG
TYPICAL BUILDING SEWER

ENTECH ENGINEERING
Reading (Corporate Office) | 201 Penn Street | P.O. Box 32 | Reading, PA 19603-0032 | p: 610.373.6667 | f: 610.373.7537
Pottsville | p: 570.628.5555
Mountaintop | p: 570.868.0275
Lititz | p: 717.626.6666
Pittsburgh | p: 412.264.2800
1.800.825.1372
www.entecheng.com



TYPICAL GRINDER PUMP LATERAL INSTALLATION - PLAN

SCALE: NONE



TYPICAL GRINDER PUMP INSTALLATION - ELEVATION

SCALE: NONE

NOTES: 1. REFER TO DRAWING S-3 FOR LATERAL NOTES.

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TYPICAL GRINDER PUMP INSTALLATION

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MAH	BAK	EJP	4169.11	02/05/16	S-2
				SCALE: NONE	

LATERAL NOTES:

1. ALL MATERIAL USED FOR LATERAL INSTALLATIONS SHALL BE NEW, FREE FROM DEFECTS AND CONFORM TO ALL STANDARDS SET FORTH BY THE BOROUGH.

2. ALL LATERALS MUST BE INSPECTED BEFORE BACKFILLING. COMPLETED DRAWINGS SHOWING THE EXACT LOCATION AND DEPTH OF LINE SHALL BE SUBMITTED TO THE TOWNSHIP DURING FINAL INSPECTION OR THE LATERAL WILL NOT BE AUTHORIZED TO USE.

3. ALL FEES MUST BE PAID IN PROPER AMOUNT BEFORE A CONNECTION PERMIT WILL BE ISSUED.

MATERIAL ALLOWED BY BOROUGH FOR BUILDING GRAVITY SEWERS

1. PVC BELL AND SPIGOT SEWER PIPE / SDR 35.

2. 4" @ 1/4" / FT. MIN. GRADE
   6" @ 1/8" / FT. MIN. GRADE

LOW PRESSURE:
1. HDPE OR PVC
2. MINIMUM DIAMETER: 1 1/4 INCH

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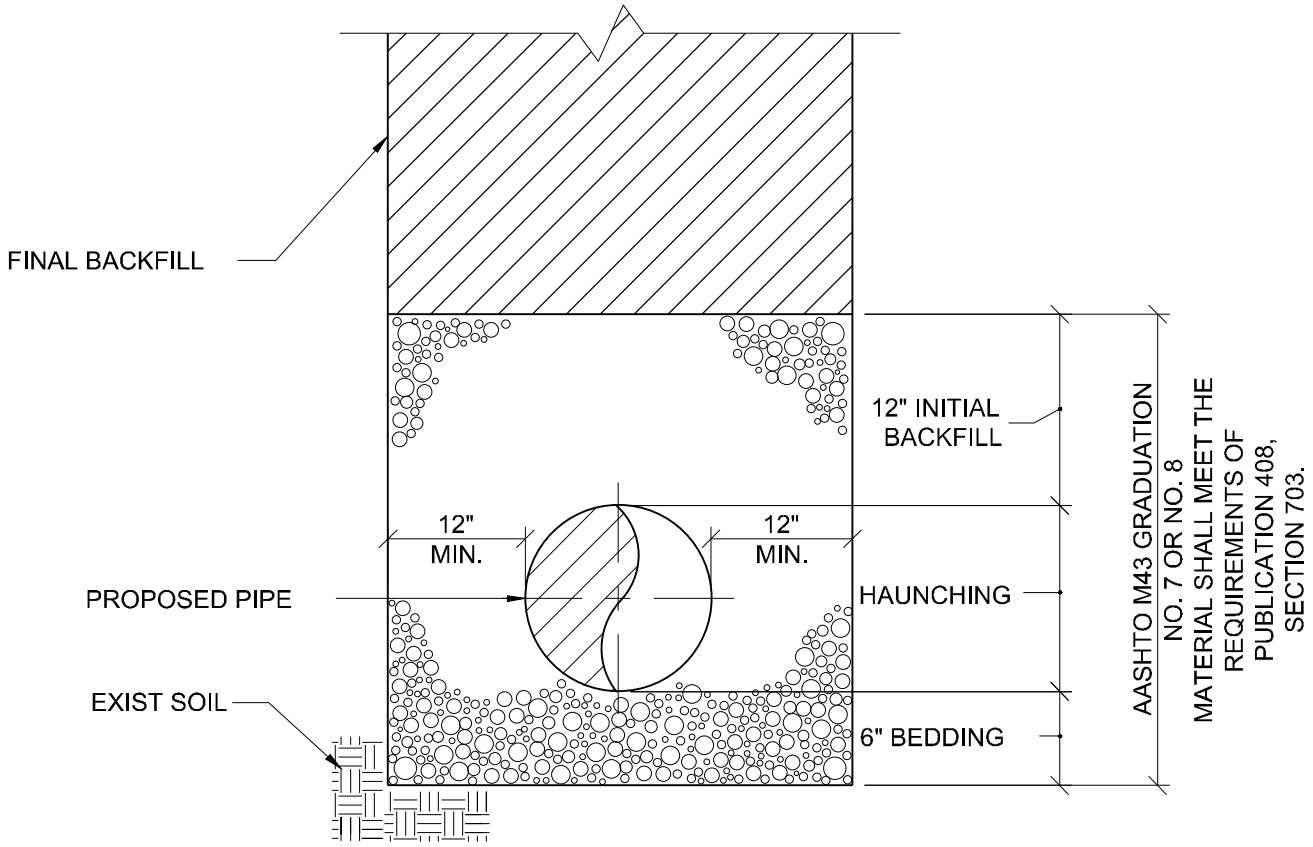
BOROUGH OF ORWIGSBURG
LATERAL NOTES

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-3



TYPICAL EXCAVATION, BACKFILL & PIPE EMBEDMENT DETAIL

SCALE: NONE

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BOROUGH OF ORWIGSBURG
TYPICAL EXCAVATION, BACKFILL & PIPE EMBEDMENT DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	DRAWING NO.
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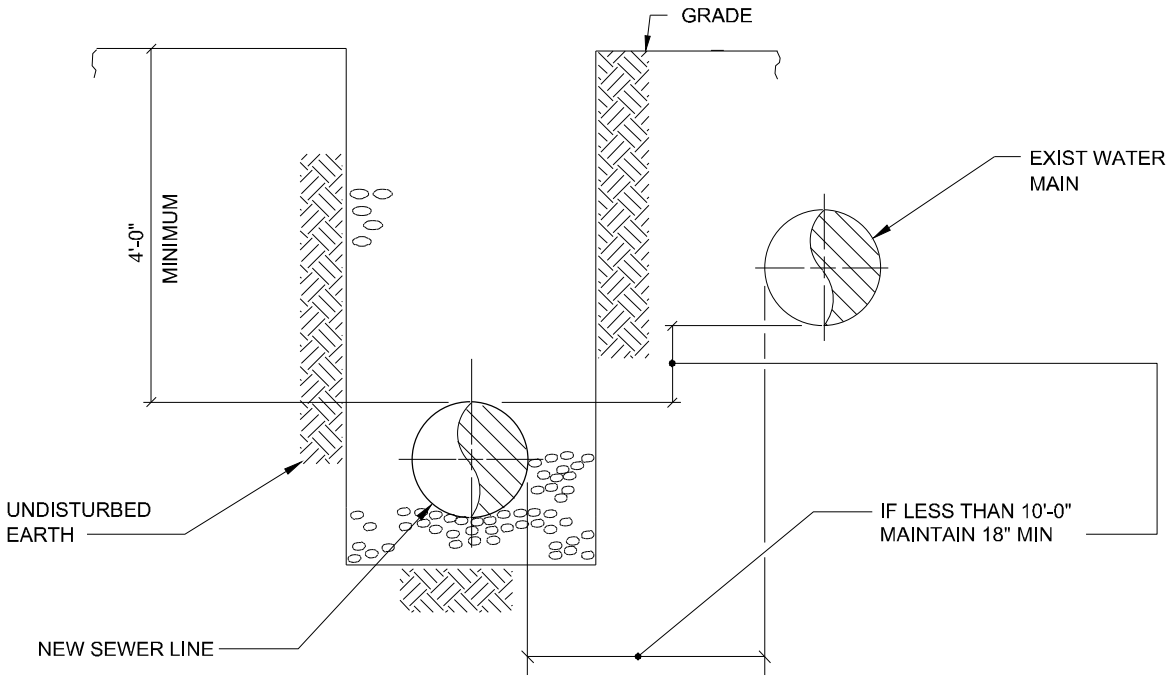
				SCALE: NONE	



NEW SEWER LINE PARALLEL TO EXISTING WATER MAIN DETAIL

SCALE: NONE

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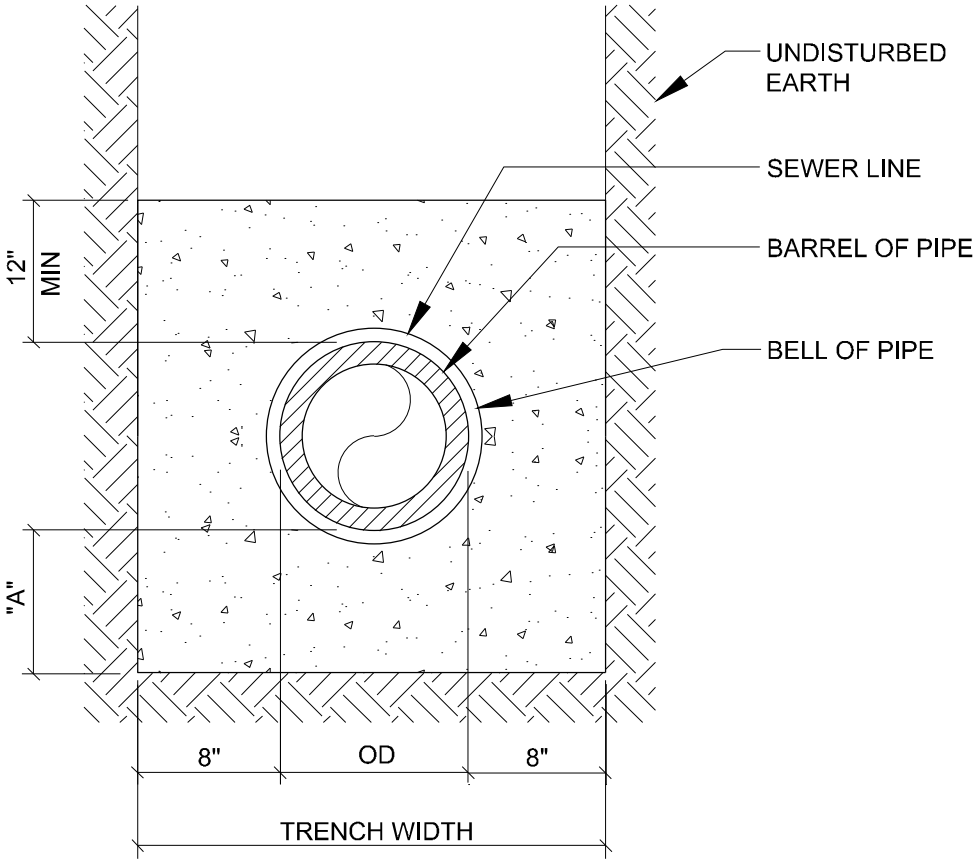
BOROUGH OF ORWIGSBURG
NEW SEWER LINE PARALLEL TO EXISTING WATER MAIN

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

DATE: 02/05/16
SCALE: NONE
DRAWING NO. S-5



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

NOTE: ALL CONCRETE SHALL HAVE MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI AT THE END OF 28 DAYS.

CONCRETE ENCASEMENT DETAIL

SCALE: NONE

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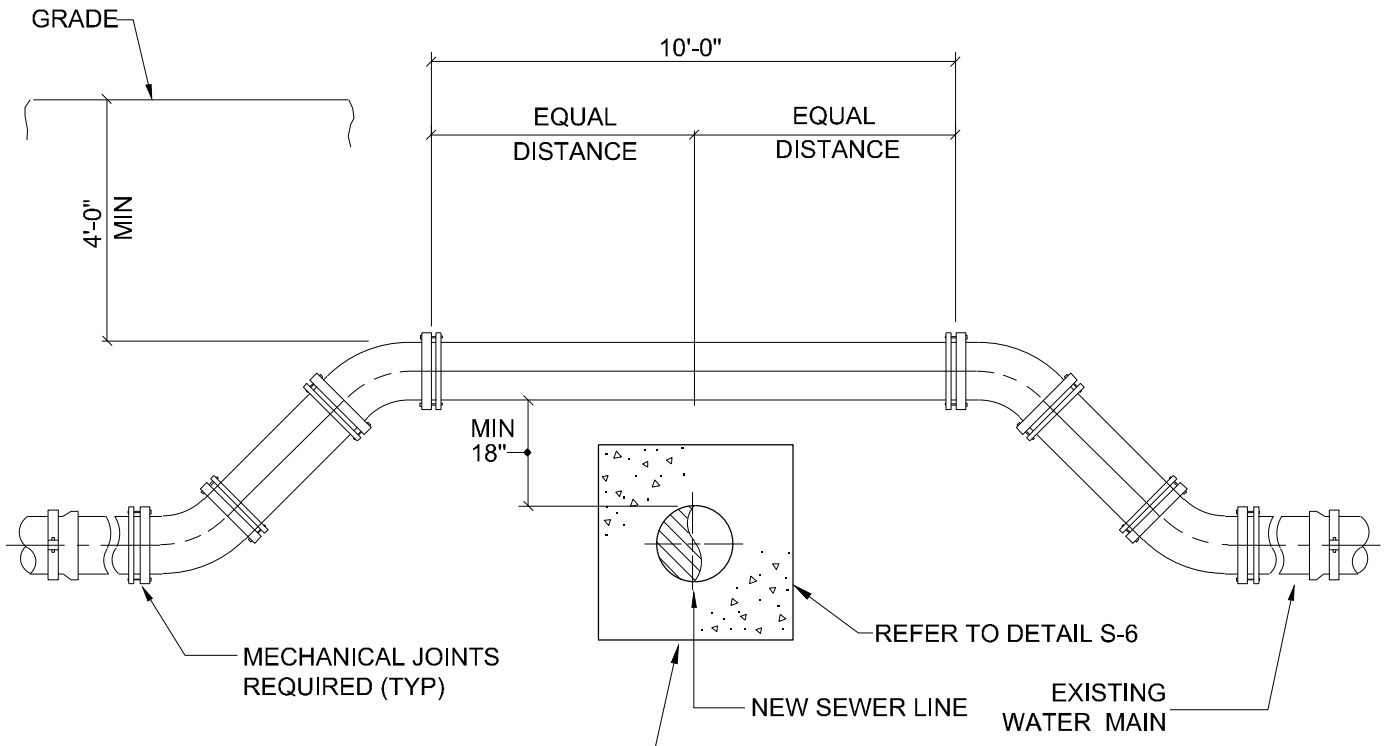
CONCRETE ENCASEMENT DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	S-6
				SCALE: NONE	



WHEN VERTICAL SEPARATION IS LESS THAN 18" PROVIDE CONCRETE ENCASEMENT ON UNDISTURBED GROUND. THE LENGTH OF THE ENCASEMENT SHALL BE EXTENDED A MINIMUM OF 10 FEET BEYOND THE CENTERLINE OF THE WATER MAIN IN BOTH DIRECTIONS.

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

NEW SEWER LINE CROSSING UNDER EXISTING WATER MAIN DETAIL

SCALE: NONE

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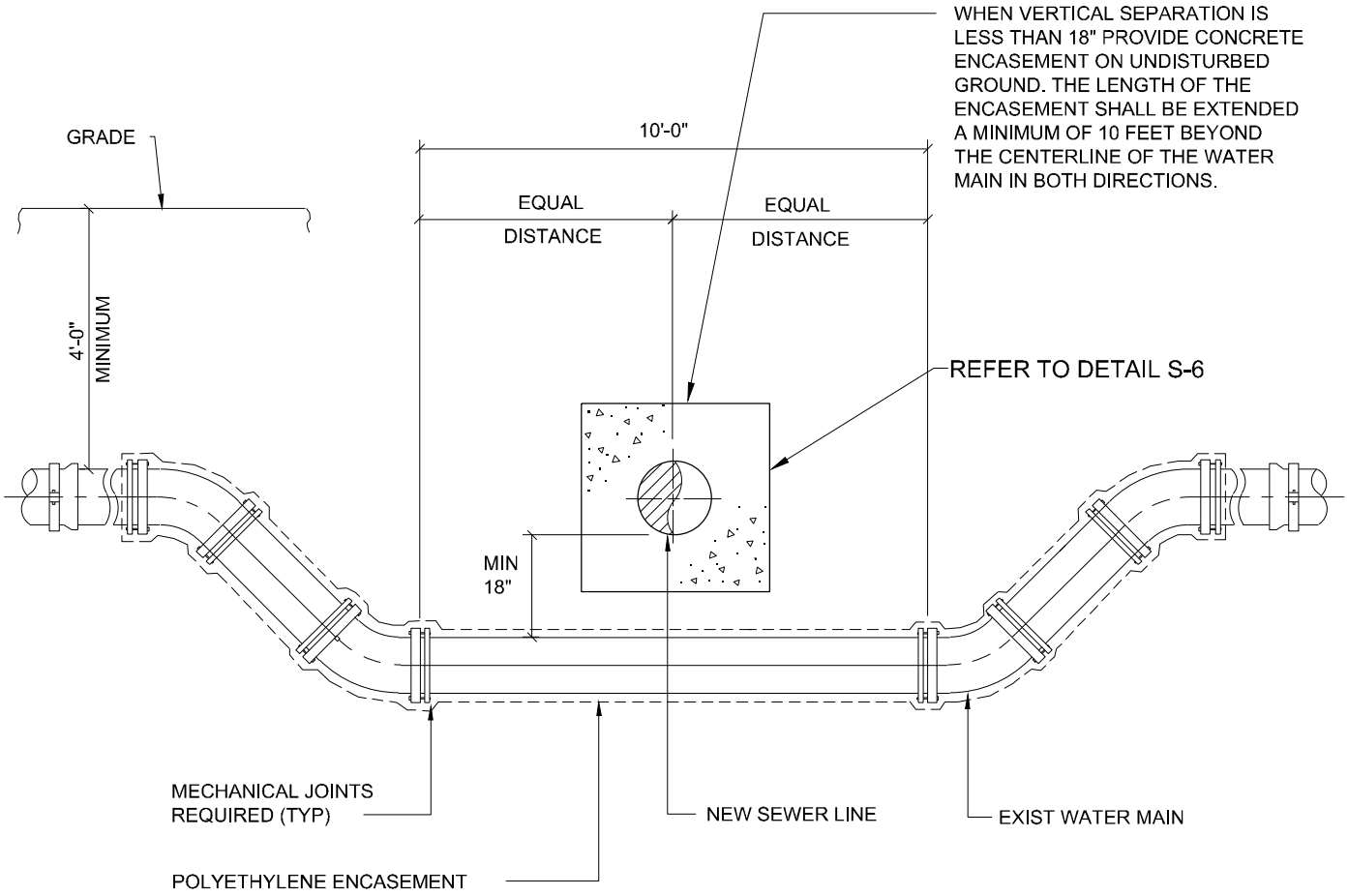
BOROUGH OF ORWIGSBURG
SEWER CROSSING UNDER EXISTING WATER MAIN DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-7



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

NEW SEWER LINE CROSSING OVER EXISTING WATER MAIN DETAIL

SCALE: NONE

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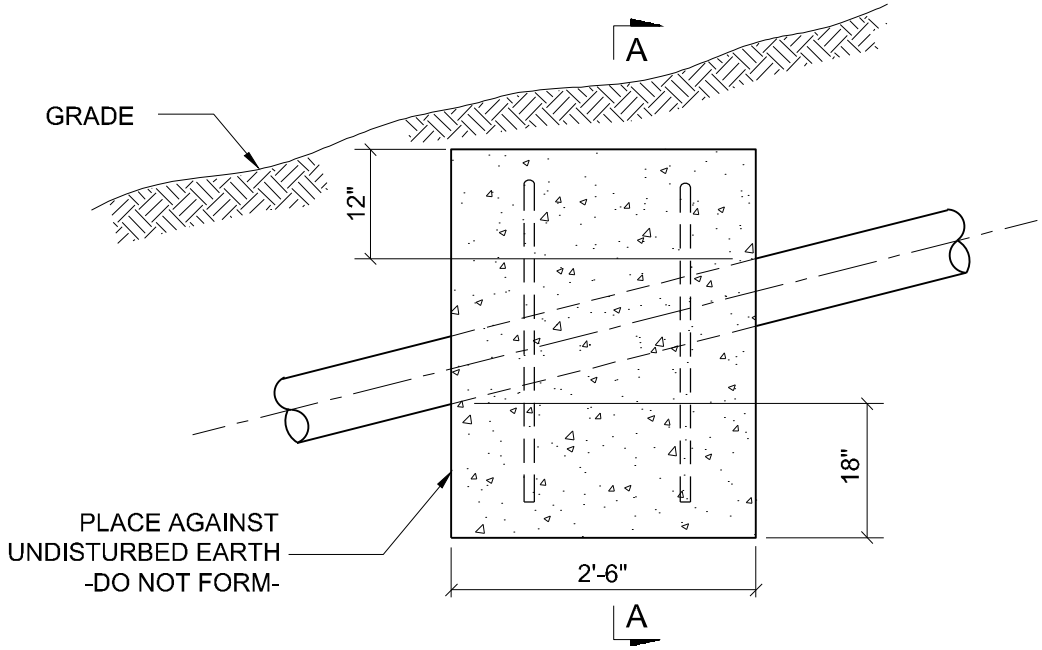
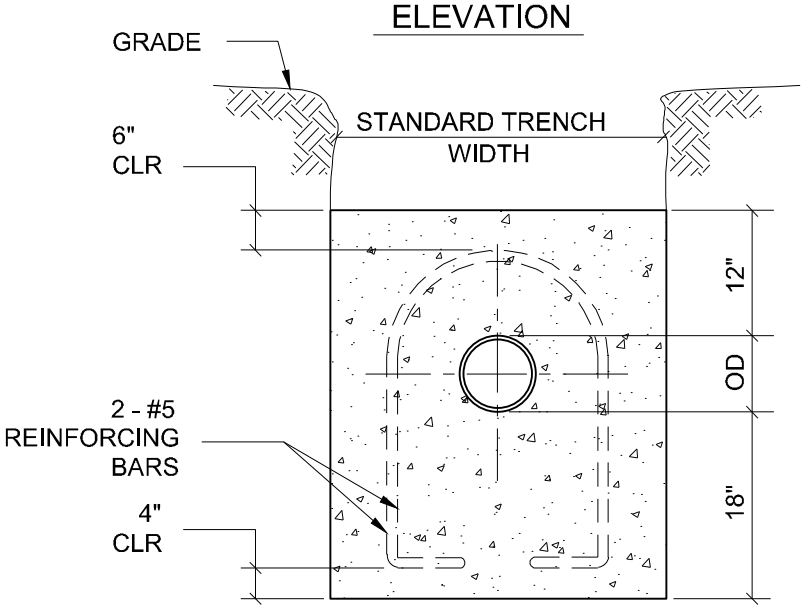
BOROUGH OF ORWIGSBURG
NEW SEWER CROSSING OVER EXISTING WATER MAIN

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

DATE: 02/05/16
SCALE: NONE
DRAWING NO. S-8



ELEVATION



SECTION A-A

CONCRETE ANCHOR NOTES:

1. ANCHORS ARE NOT REQUIRED ON SLOPES LESS THAN 20% UNLESS NOTED ON DRAWINGS.
2. PROVIDE ANCHORS ON 36' CENTERS FOR SLOPES BETWEEN 20% TO 34%.
3. PROVIDE ANCHORS ON 24' CENTERS FOR SLOPES BETWEEN 35% TO 50%.
4. PROVIDE ANCHORS ON 16' CENTERS FOR SLOPES BETWEEN 51% TO 70%.
5. ALL CONCRETE SHALL HAVE MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT THE END OF 28 DAYS.

CONCRETE ANCHORS - SLOPE BREAKERS

SCALE: NONE

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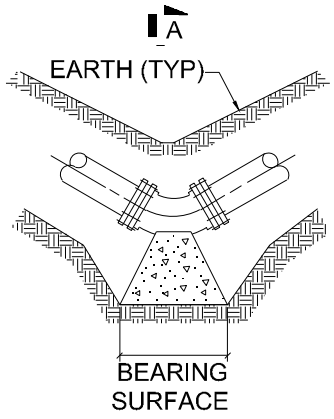
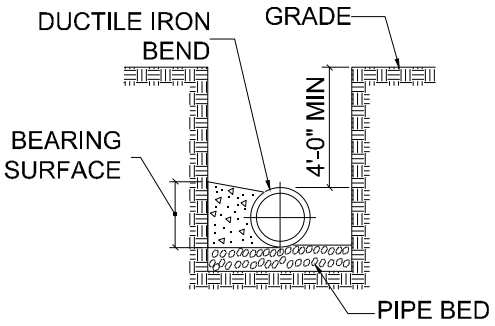
BOROUGH OF ORWIGSBURG
CONCRETE ANCHORS - SLOPE BREAKERS

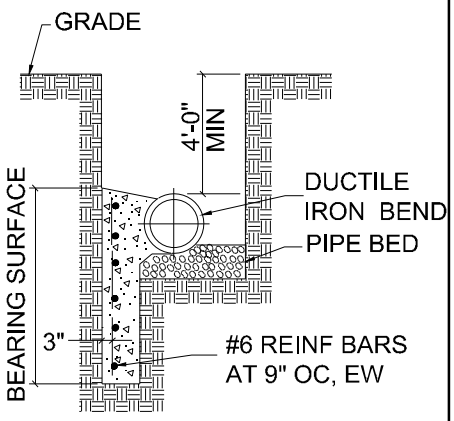
PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-9



PLAN

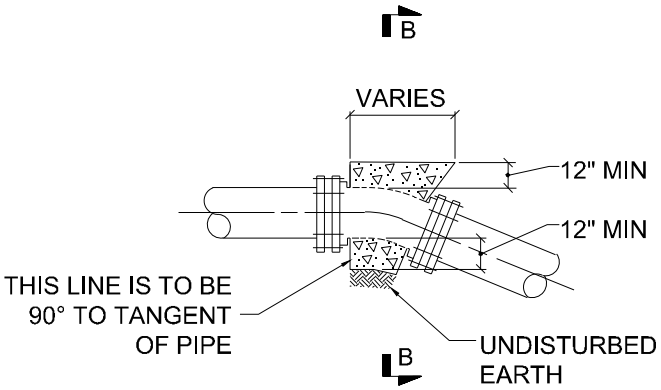


SECTION A-A



ALTERNATE SECTION A-A

THRUST BLOCKING FOR HORIZONTAL BENDS



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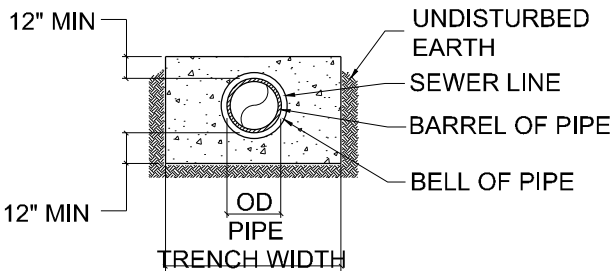

SECTION B-B

THRUST BLOCKING FOR VERTICAL BENDS

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.

THRUST BLOCKING DETAILS

SCALE: NONE

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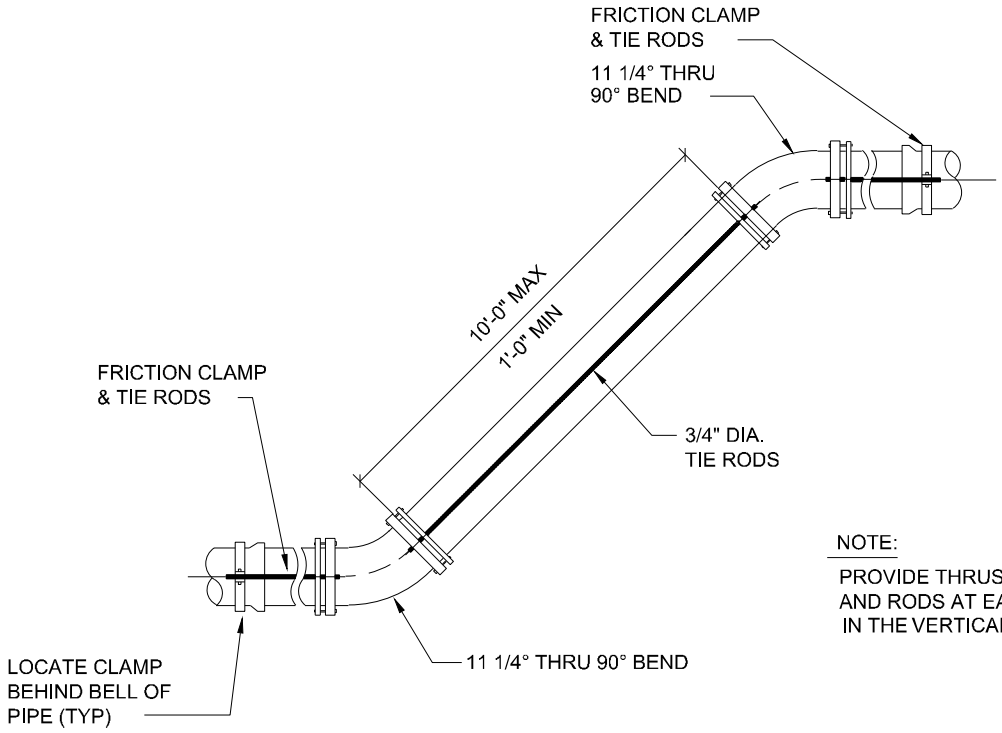
BOROUGH OF ORWIGSBURG
THRUST BLOCKING DETAILS

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	S-10

SCALE: NONE



NOTE:

PROVIDE THRUST CLAMPS WITH LUGS AND RODS AT EACH ELBOW LOCATED IN THE VERTICAL PLANE.

THRUST CLAMPING DETAIL

SCALE: NONE

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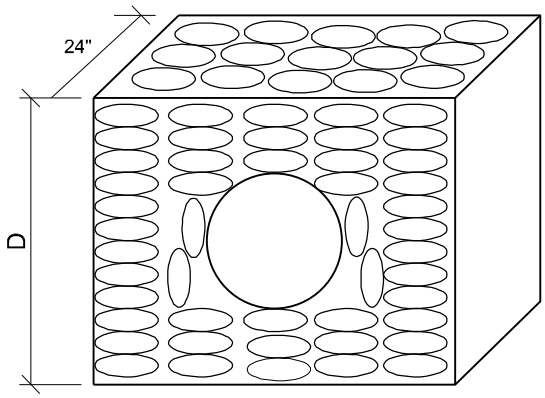
THRUST CLAMPING DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	S-11
				SCALE: NONE	

REQUIRED SPACING AND MATERIALS FOR TRENCH PLUGS		
TRENCH SLOPE (%)	SPACING (FT)	PLUG MATERIAL
< 5	*	*
5-15	500	** EARTH FILLED SACKS
15-25	300	** EARTH FILLED SACKS
25-35	200	** EARTH FILLED SACKS
35-100	100	** EARTH FILLED SACKS
> 100	50	CEMENT FILLED BAGS (WETTED) OR MORTARED STONE

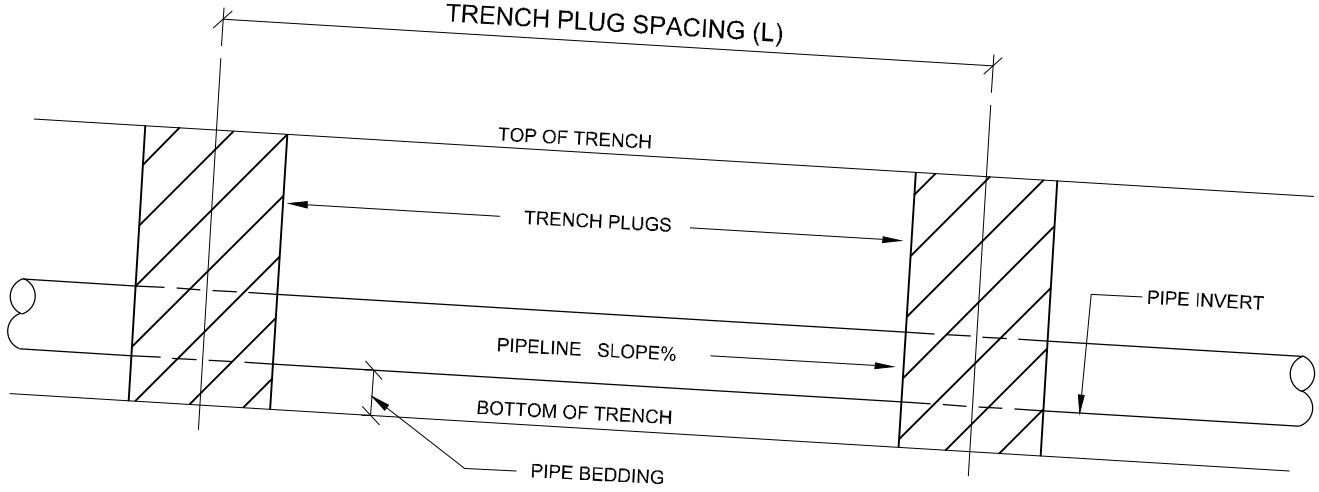
* TRENCH PLUGS ARE REQUIRED AT ALL STREAM, RIVER, OR WATER-BODY CROSSINGS REGARDLESS OF TRENCH SLOPE. OTHERWISE NOT REQUIRED.

** TOPSOIL MAY NOT BE USED TO FILL SACKS.



D = DEPTH TO BOTTOM OF TRENCH

SECTION VIEW



ELEVATION

TRENCH PLUG DETAIL

SCALE: NONE

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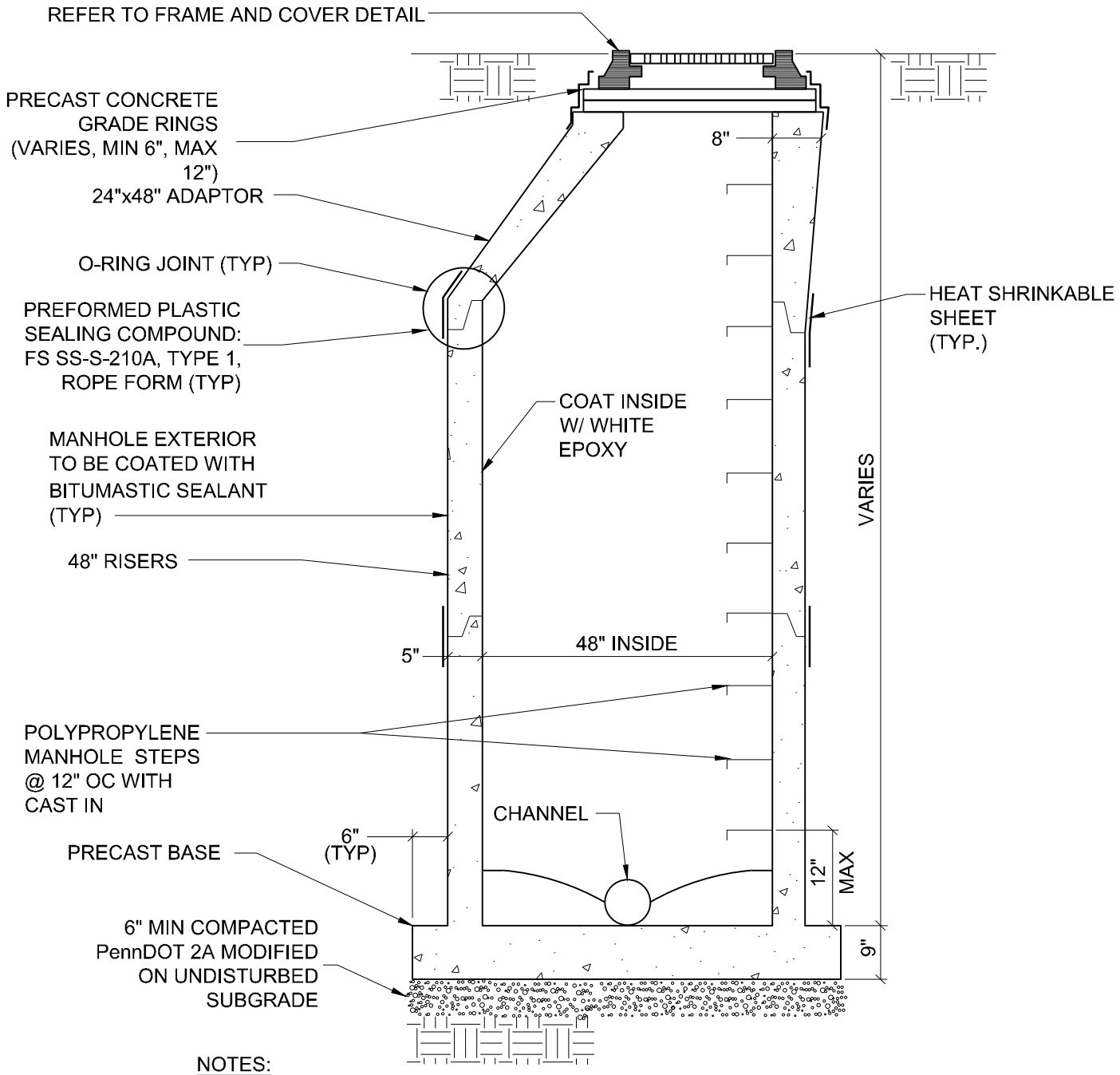
BOROUGH OF ORWIGSBURG
TRENCH PLUG DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	S-12
				SCALE: NONE	



NOTES:

1. ALL PIPE TO MANHOLE CONNECTIONS SHALL BE MADE WITH A CAST-IN-PLACE GASKET. (TYP) (A-LOK OR APPROVED EQUAL)
2. MANHOLES EXCEEDING A DEPTH OF 16 FEET SHALL PROVIDE PRE-CAST LANDING PLATFORM.

TYPICAL MANHOLE DETAIL

SCALE: NONE

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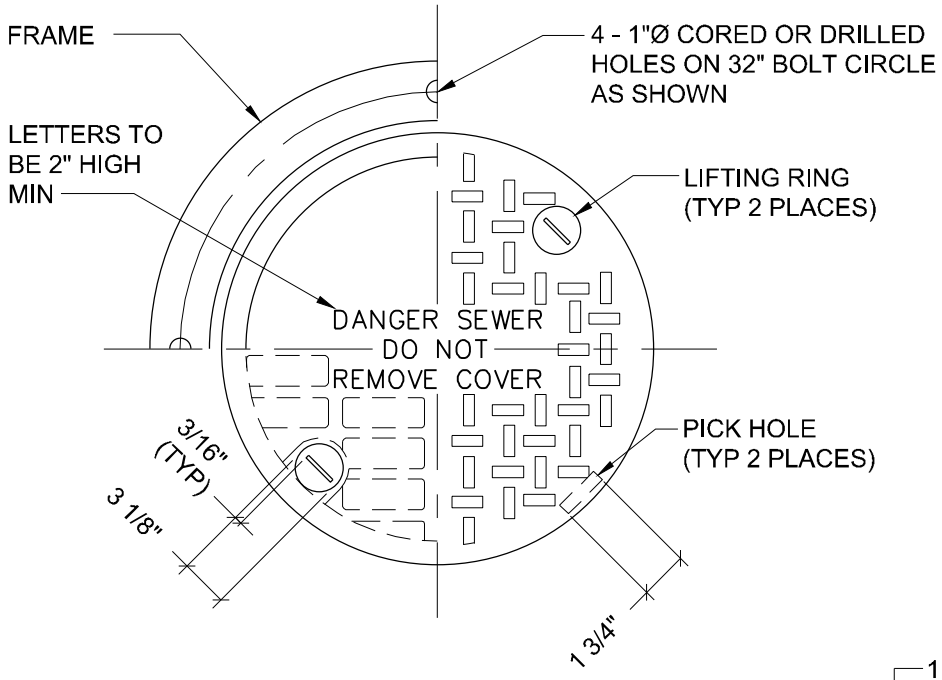
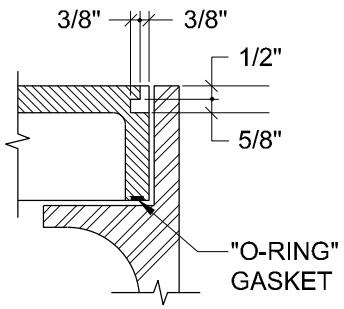
BOROUGH OF ORWIGSBURG
TYPICAL MANHOLE DETAIL

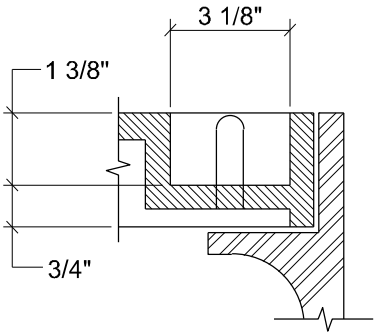
PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-13

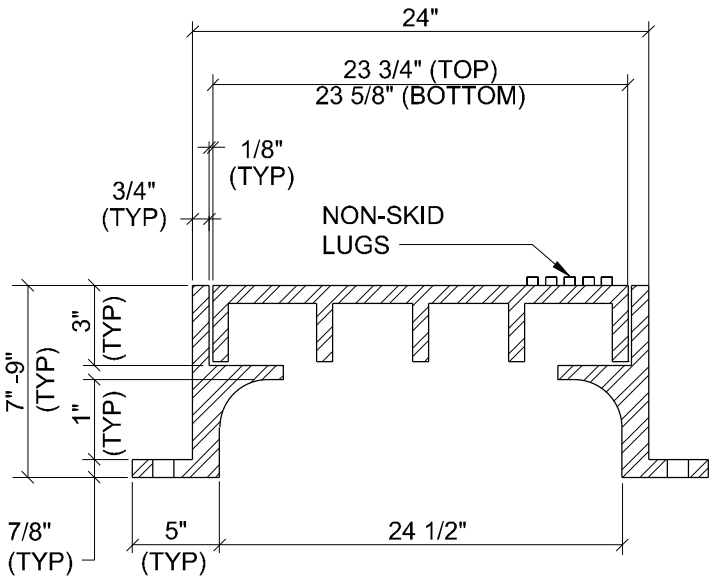


PLAN

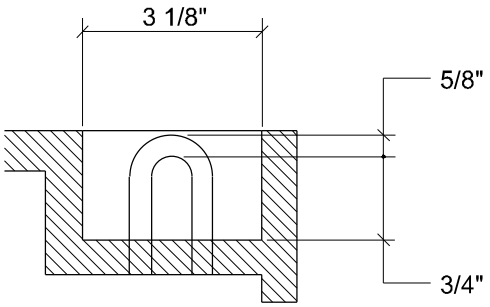


PICK HOLE DETAIL





SECTION



LIFT RING DETAILS

NOTE: APPROXIMATE WEIGHT 500#

CAST IRON REGULAR MANHOLE FRAME & COVER

SCALE: NONE

ENTECH ENGINEERING
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Reading (Corporate Office)
201 Penn Street | P.O Box 32 | Reading, PA 19603-0032
p: 610.373.6667 | f: 610.373.7537
Pottsville p: 570.628.5655 | Mountaintop p: 570.868.0275 | Lititz p: 717.626.6666 | Pittsburgh p: 412.264.2800

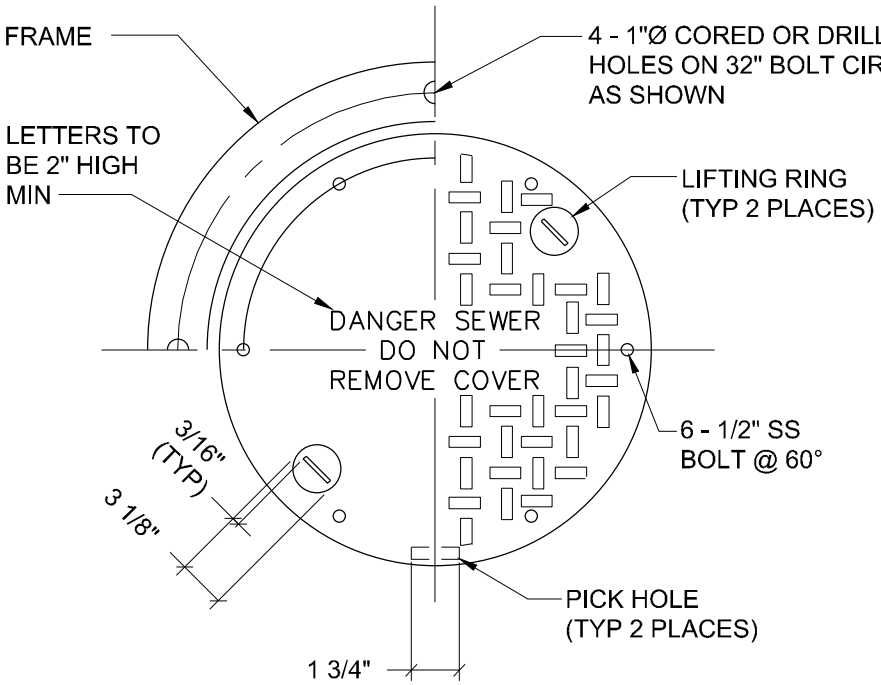
BOROUGH OF ORWIGSBURG
CAST IRON MANHOLE & COVER

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

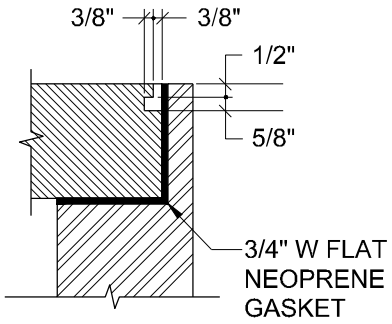
DATE: 02/05/16

SCALE: NONE

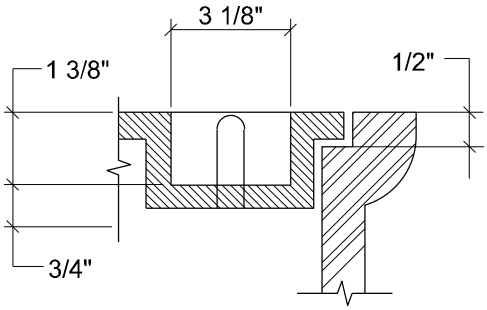
DRAWING NO. **S-14**

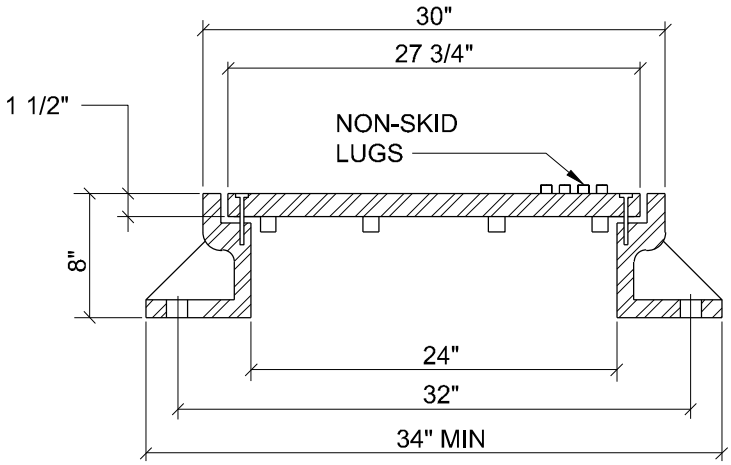


PLAN



PICK HOLE DETAIL





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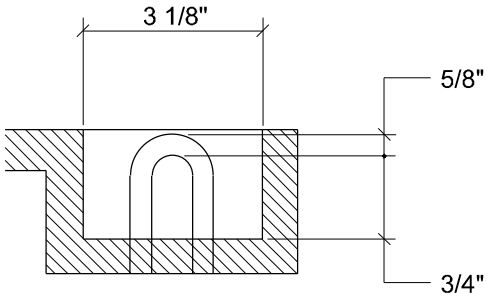

LIFT RING DETAILS

NOTES: CASTING TO BE SUPPLIED WITH BOLTED COVER AND MACHINED BEARING SURFACE.

BRIDGESTATE FOUNDARY CO, HADDONFIELD, NJ (PATTERN NO 1502 - TYPE "A" MODIFIED OR APPROVED EQUAL.

APPROXIMATE WEIGHT 500#

CAST IRON WATERTIGHT MANHOLE FRAME & COVER

SCALE: NONE

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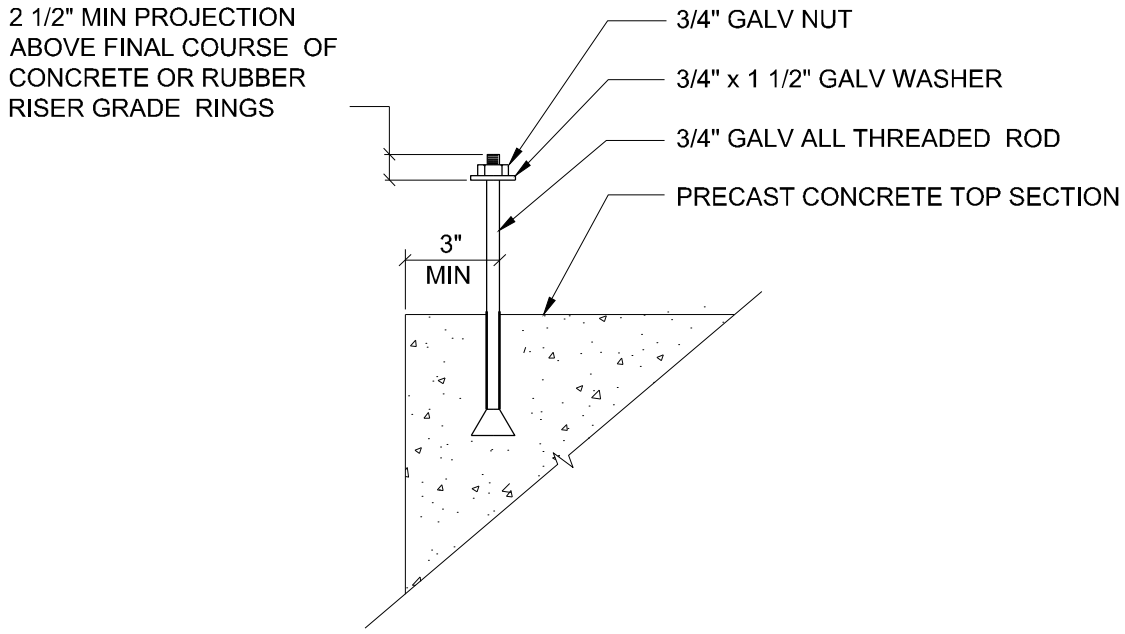
BOROUGH OF ORWIGSBURG
CAST IRON WATERTIGHT MANHOLE FRAME & COVER

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-15



NOTE: FOUR (4) BOLTS REQUIRED PER MANHOLE.

MANHOLE FRAME - ANCHOR BOLT DETAIL

SCALE: NONE

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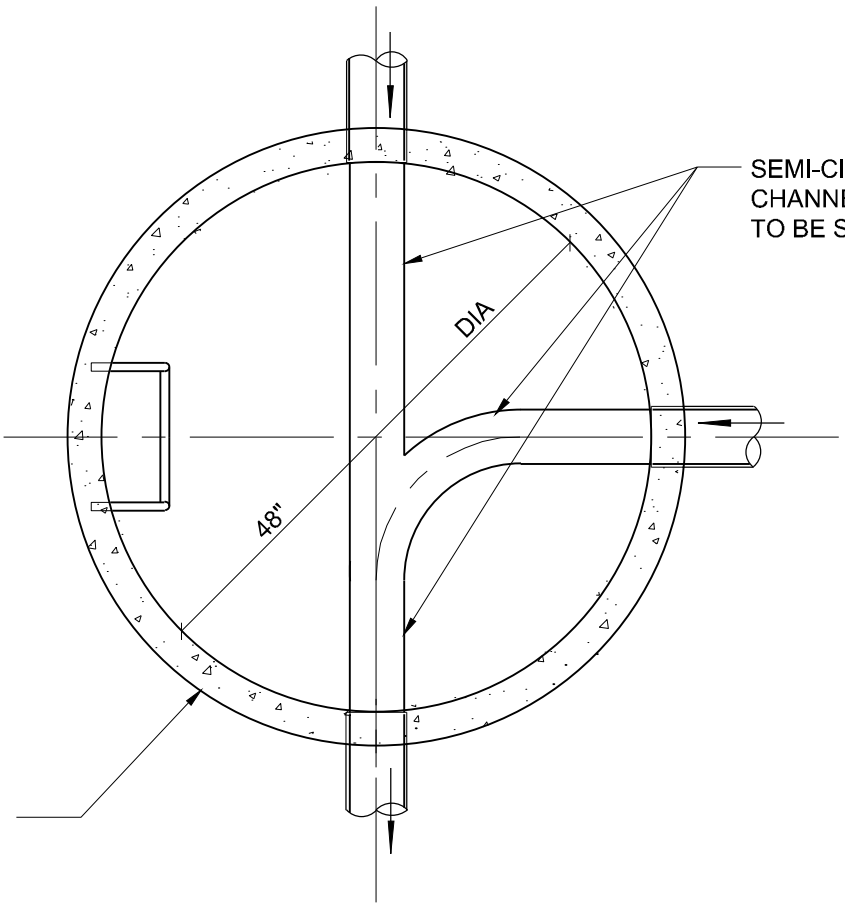
BOROUGH OF ORWIGSBURG
MANHOLE FRAME - ANCHOR BOLT

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

DATE: 02/05/16

SCALE: NONE

DRAWING NO. **S-16**



NOTE:

1. ALL FLOW CHANNELS SHALL BE PRE-CAST BY MANUFACTURER UNLESS AUTHORIZED BY ENGINEER/BOROUGH

MANHOLE BASE
TYPICAL CHANNEL CONFIGURATION

SCALE: NONE

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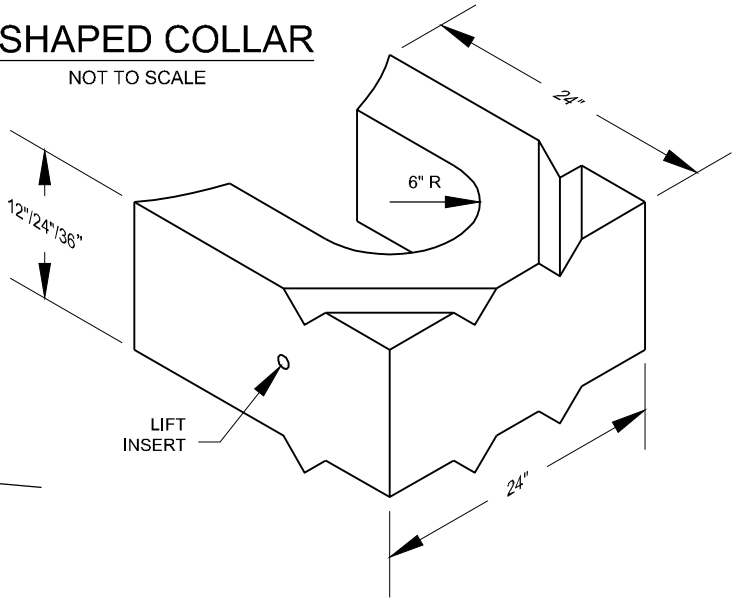
BOROUGH OF ORWIGSBURG
MANHOLE BASE TYPICAL CHANNEL CONFIGURATION

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-17

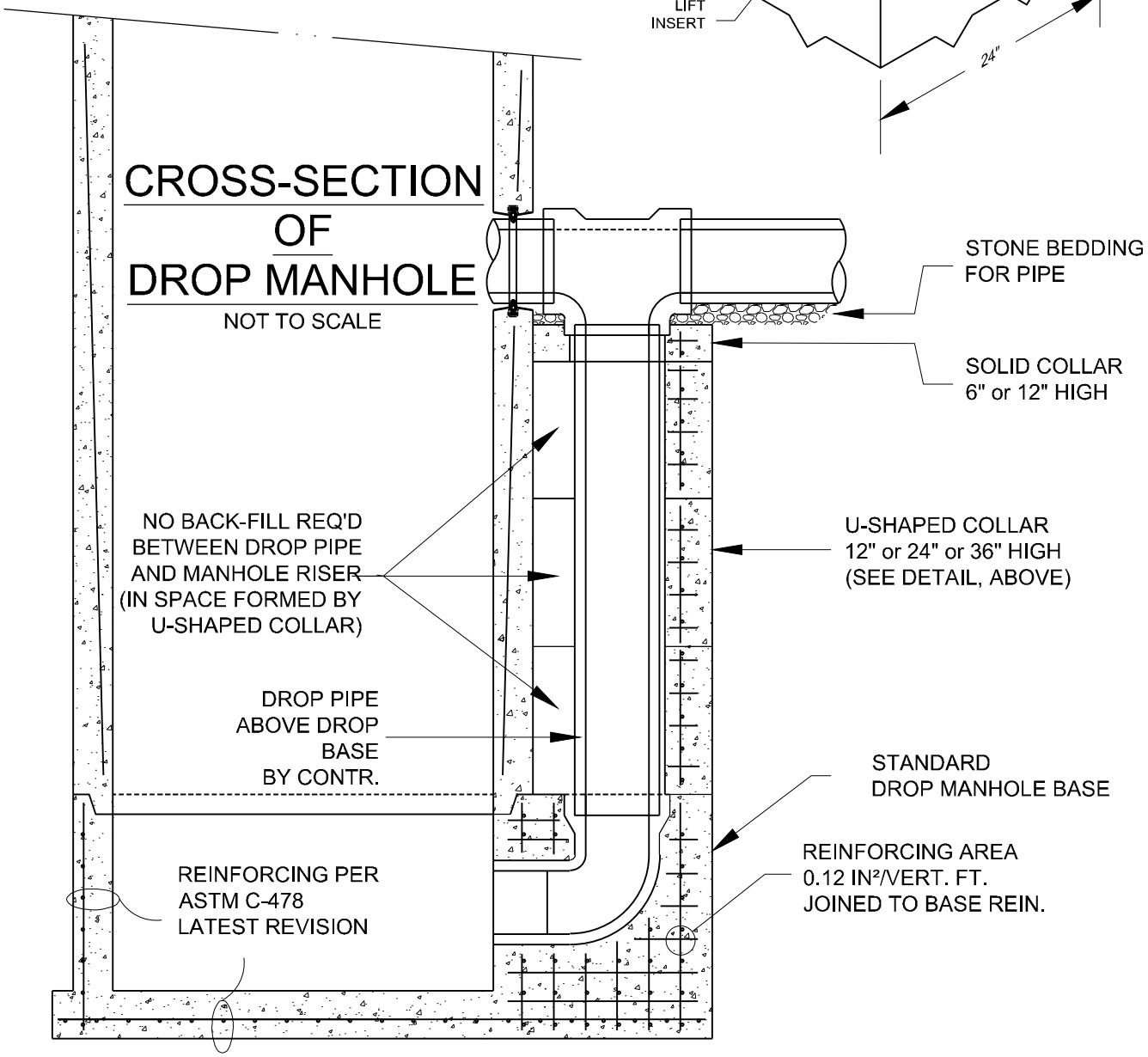
U-SHAPED COLLAR

NOT TO SCALE



CROSS-SECTION OF DROP MANHOLE

NOT TO SCALE



TYPICAL OUTSIDE DROP MANHOLE DETAIL

SCALE: NONE

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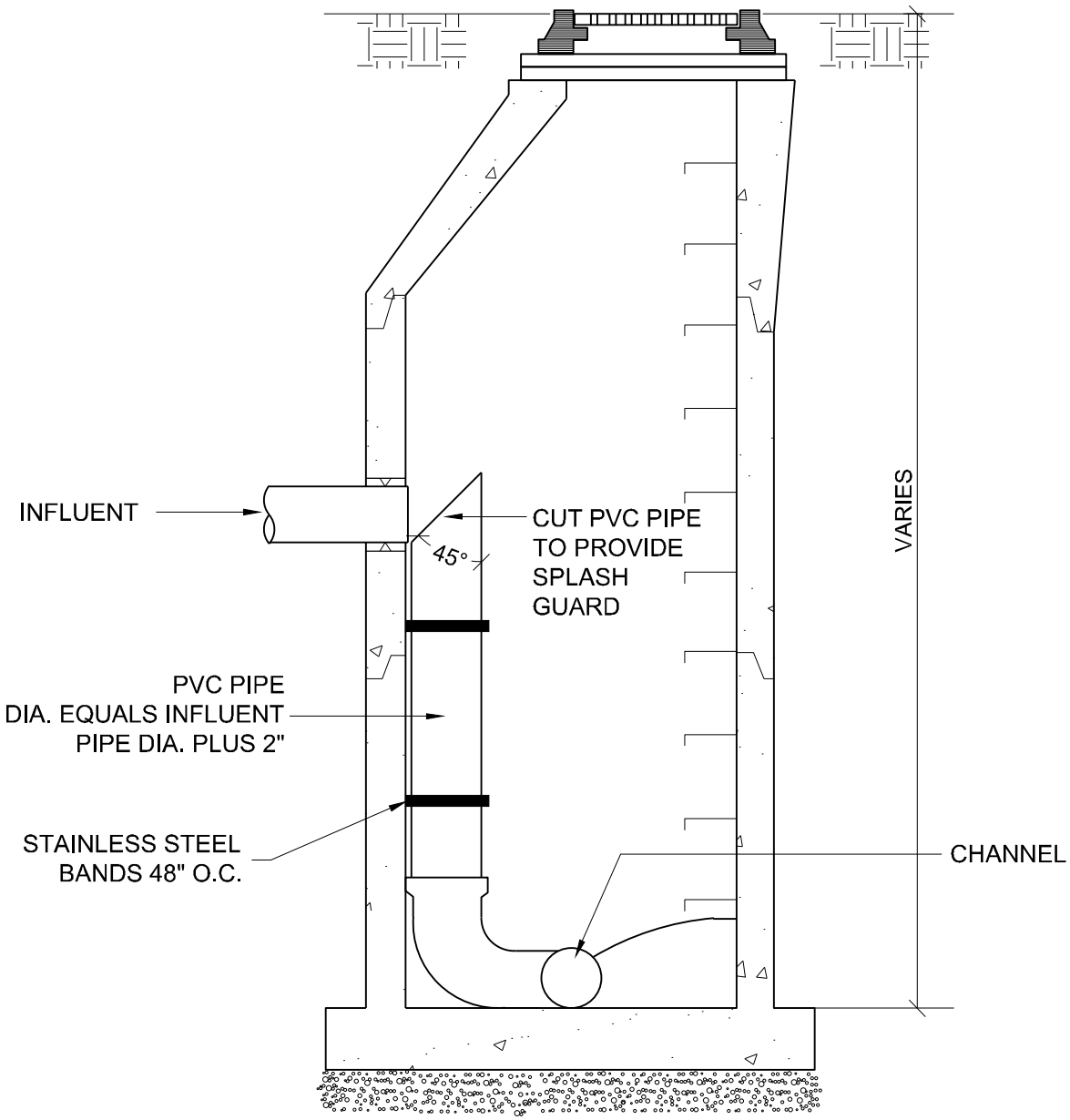
BOROUGH OF ORWIGSBURG
TYPICAL OUTSIDE DROP MANHOLE DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-18



TYPICAL INSIDE DROP MANHOLE DETAIL

SCALE: NONE

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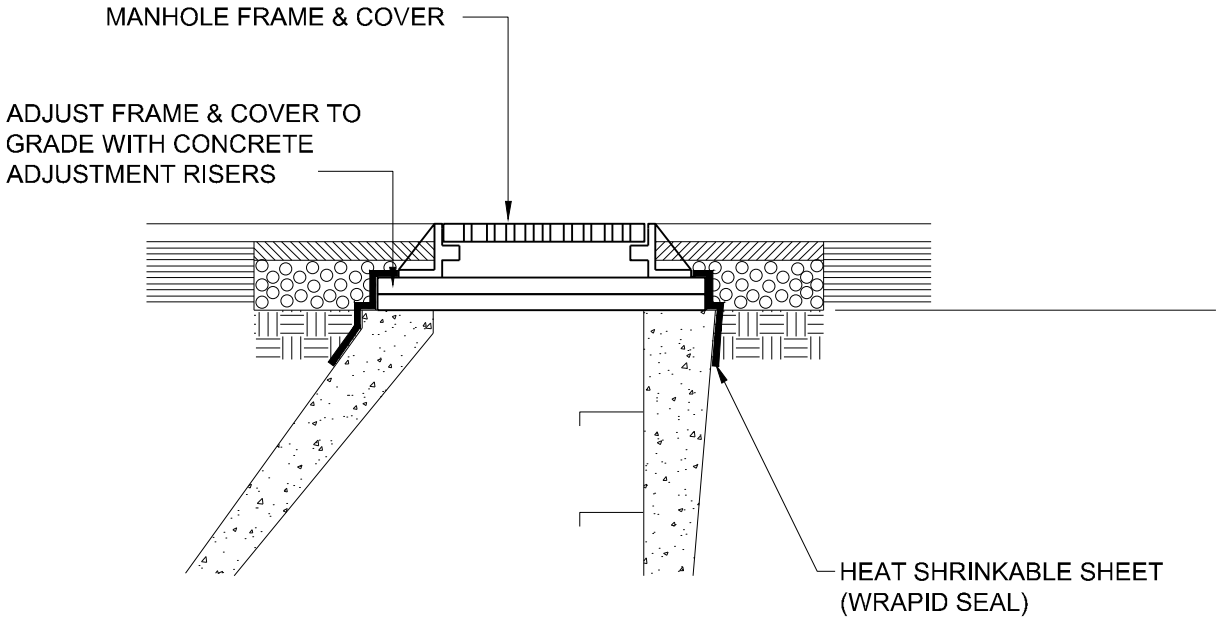
BOROUGH OF ORWIGSBURG
TYPICAL INSIDE DROP MANHOLE DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	S-19
				SCALE: NONE	



MANHOLE FRAME AND COVER ADJUSTMENT DETAIL

SCALE: NONE

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201 Penn Street | P.O Box 32 | Reading, PA 19603-0032
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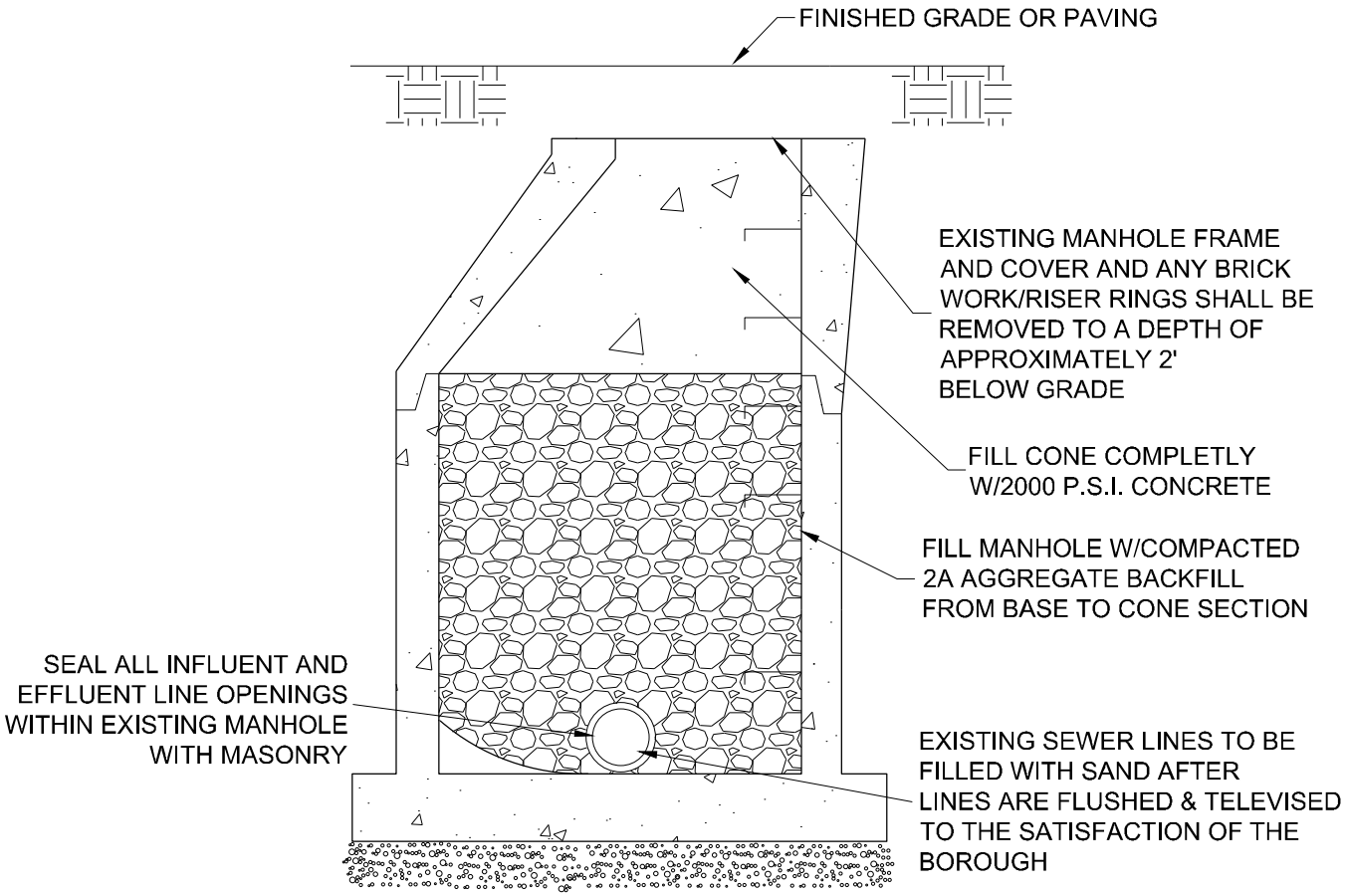
BOROUGH OF ORWIGSBURG
MANHOLE FRAME AND COVER ADJUSTMENT DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-20



MANHOLE ABANDONMENT DETAIL

SCALE: NONE

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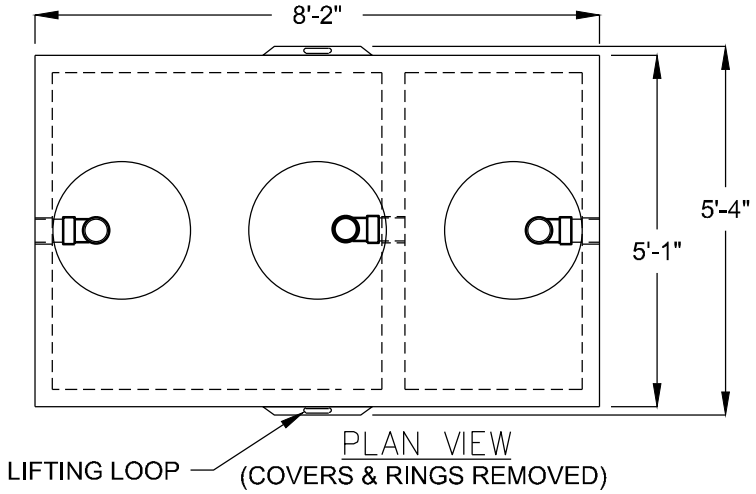
BOROUGH OF ORWIGSBURG
MANHOLE ABANDONMENT DETAIL

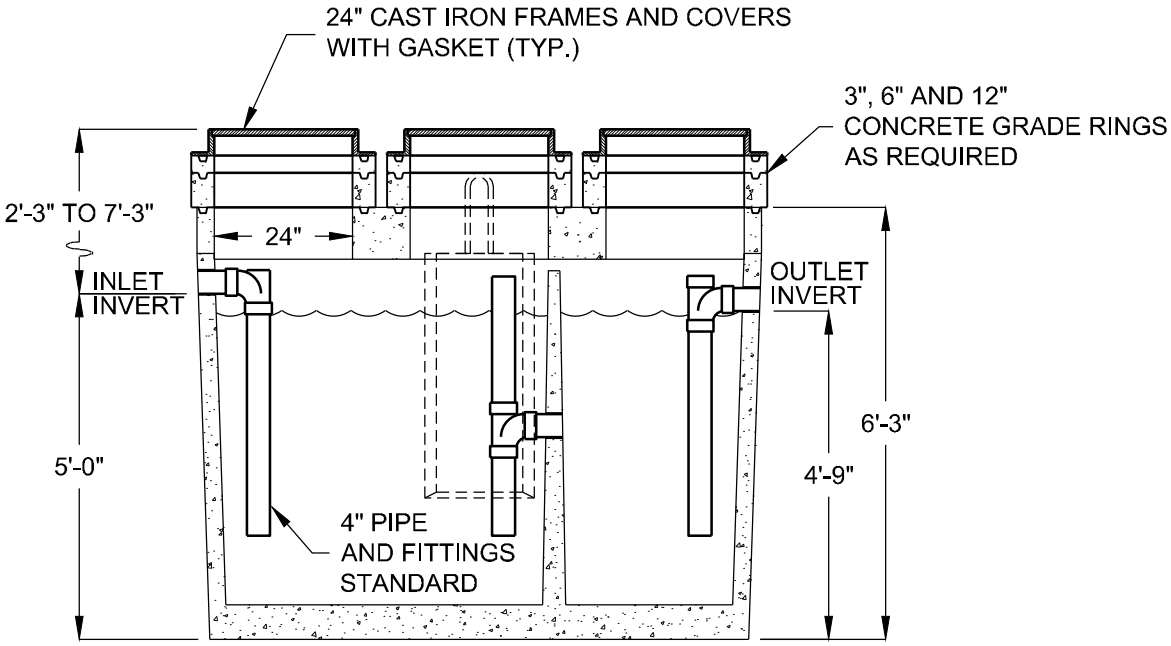
PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

DATE: 02/05/16

SCALE: NONE

DRAWING NO. S-21





NOTES:

1. DETAIL DEPICTS A 1,000 GALLON OPERATING CAPACITY GREASE INTERCEPTOR. THE ACTUAL TYPE AND CAPACITY MUST BE DETERMINED BY OWNER AND APPROVED BY BOROUGH.
2. DESIGN LOAD: H-20 TRAFFIC WITH DRY SOIL CONDITIONS (WATER LEVEL BELOW TANK) AND 1'-6' EARTH COVER.
3. SUITABLE SUB-BASE BEDDED WITH GRANULAR MATERIAL SHALL BE PREPARED TO HANDLE ANTICIPATED LOADS.
4. FOR KITCHEN USE ONLY NOT TO BE USED WITH SEWAGE SYSTEM.
5. INTERCEPTOR TO CONTAIN WATER TIGHT JOINTS.

1000 GALLON GREASE INTERCEPTOR

SCALE: NONE

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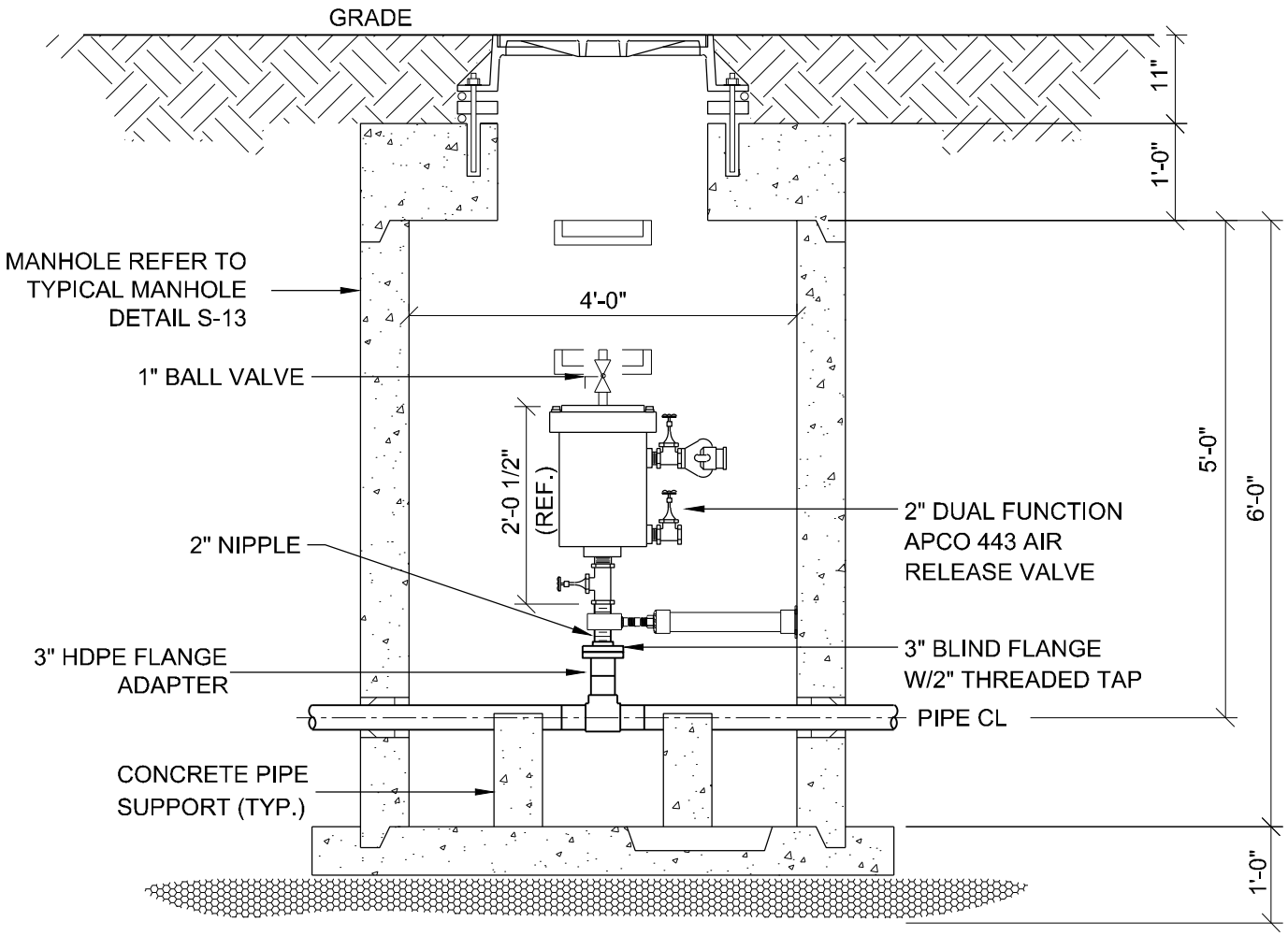
BOROUGH OF ORWIGSBURG
1000 GALLON GREASE INTERCEPTOR

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

DATE: 02/05/16

SCALE: NONE

DRAWING NO. S-22



AIR RELEASE VALVE MANHOLE

SCALE: NONE

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201 Penn Street | P.O Box 32 | Reading, PA 19603-0032
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Pottsville p: 570.628.5655 | Mountaintop p: 570.868.0275 | Lititz p: 717.626.6666 | Pittsburgh p: 412.264.2800

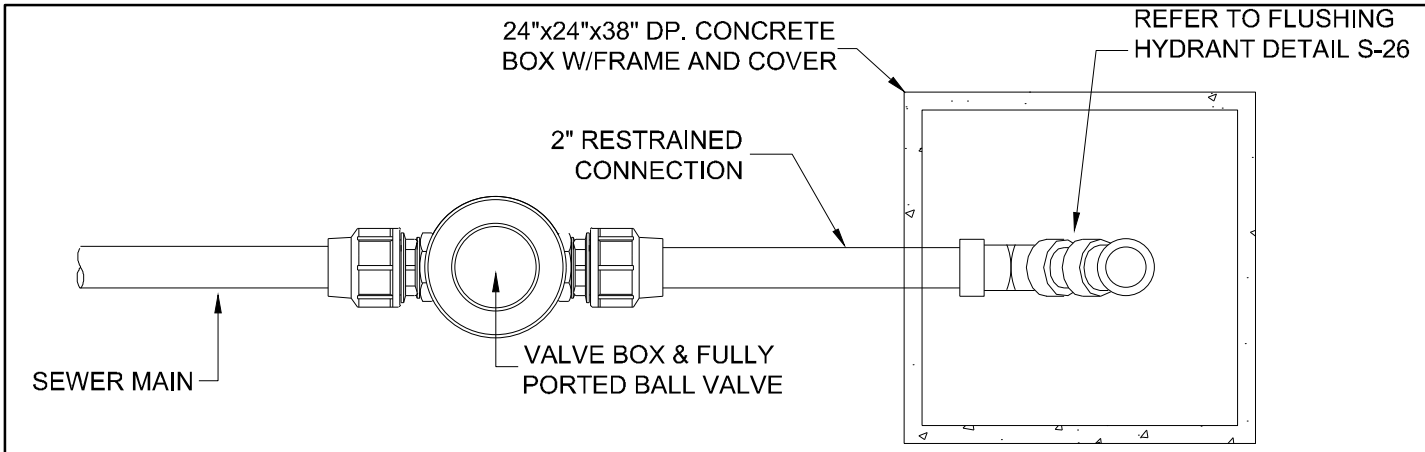
BOROUGH OF ORWIGSBURG
AIR RELEASE VALVE MANHOLE

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

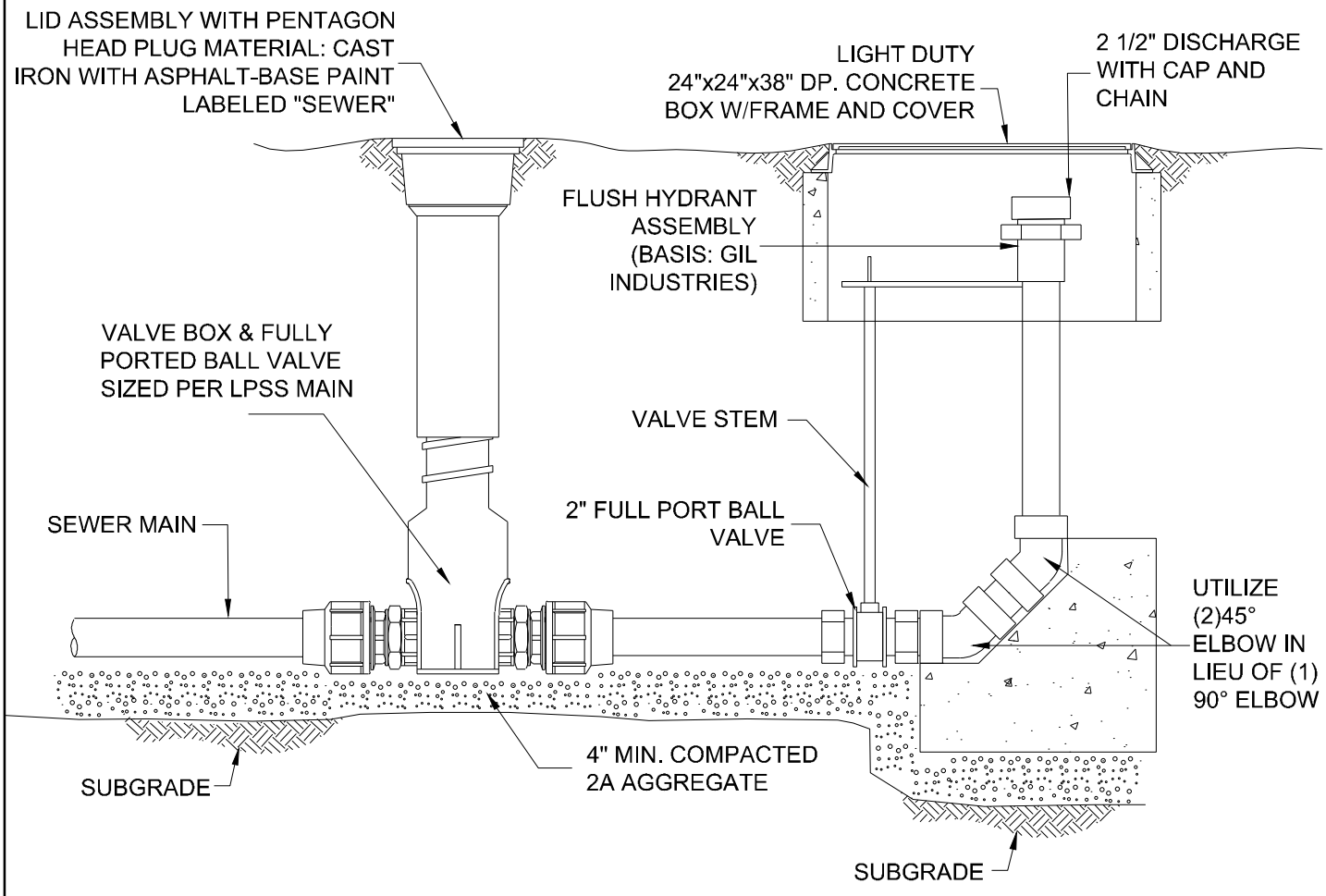
DATE: 02/05/16

SCALE: NONE

DRAWING NO. S-23



PLAN VIEW



ELEVATION VIEW

TERMINAL CLEANOUT ASSEMBLY

SCALE: NONE

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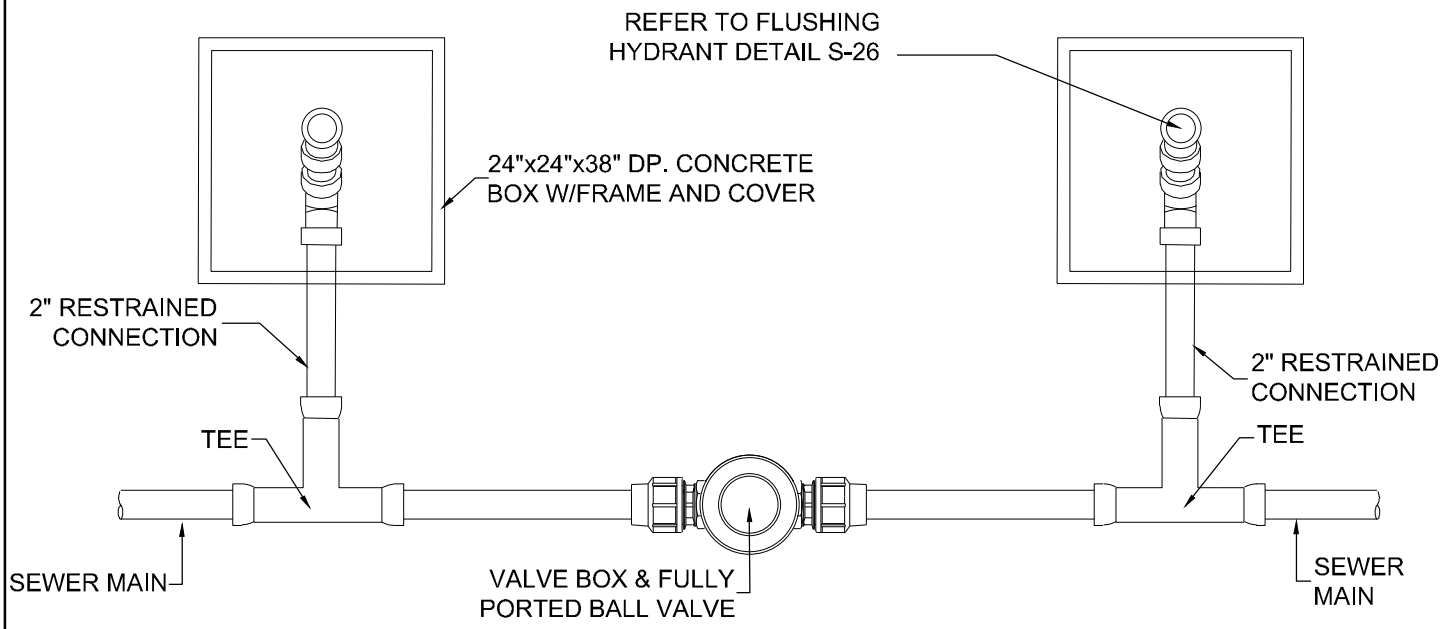
BOROUGH OF ORWIGSBURG
TERMINAL CLEANOUT ASSEMBLY

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

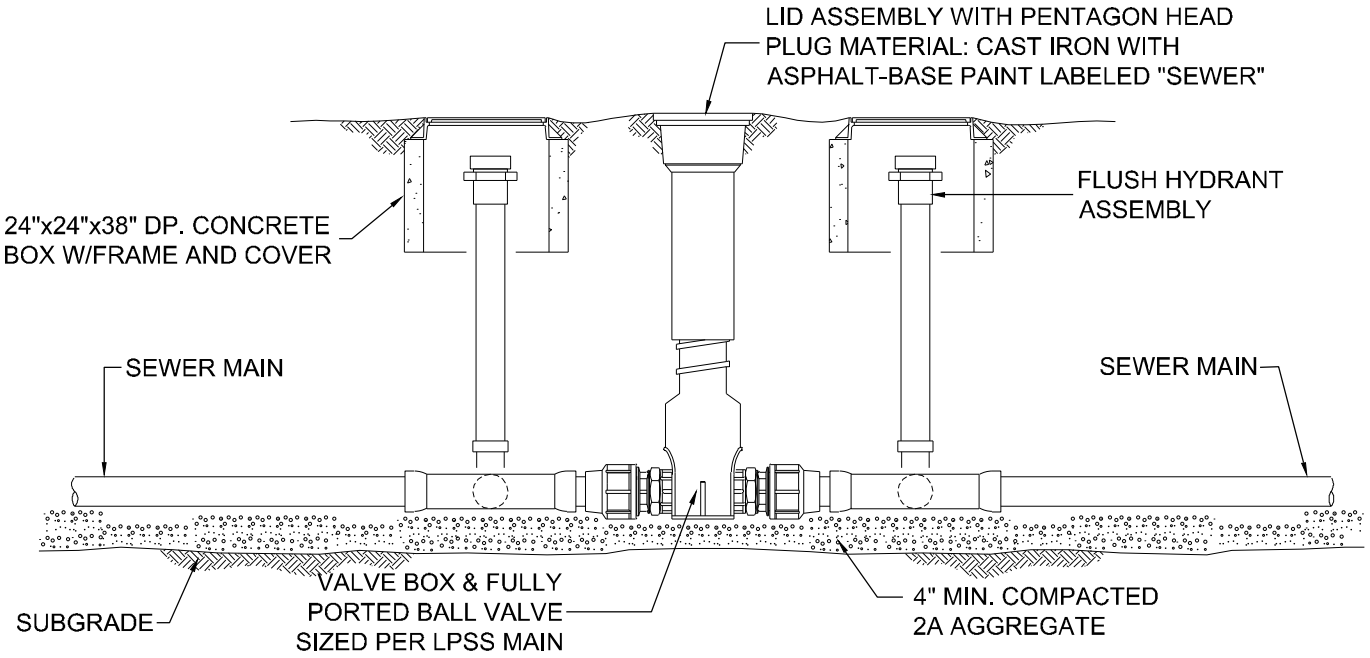
DATE: 02/05/16

SCALE: NONE

DRAWING NO. **S-24**



PLAN VIEW



ELEVATION VIEW

INTERMEDIATE CLEANOUT ASSEMBLY

SCALE: NONE

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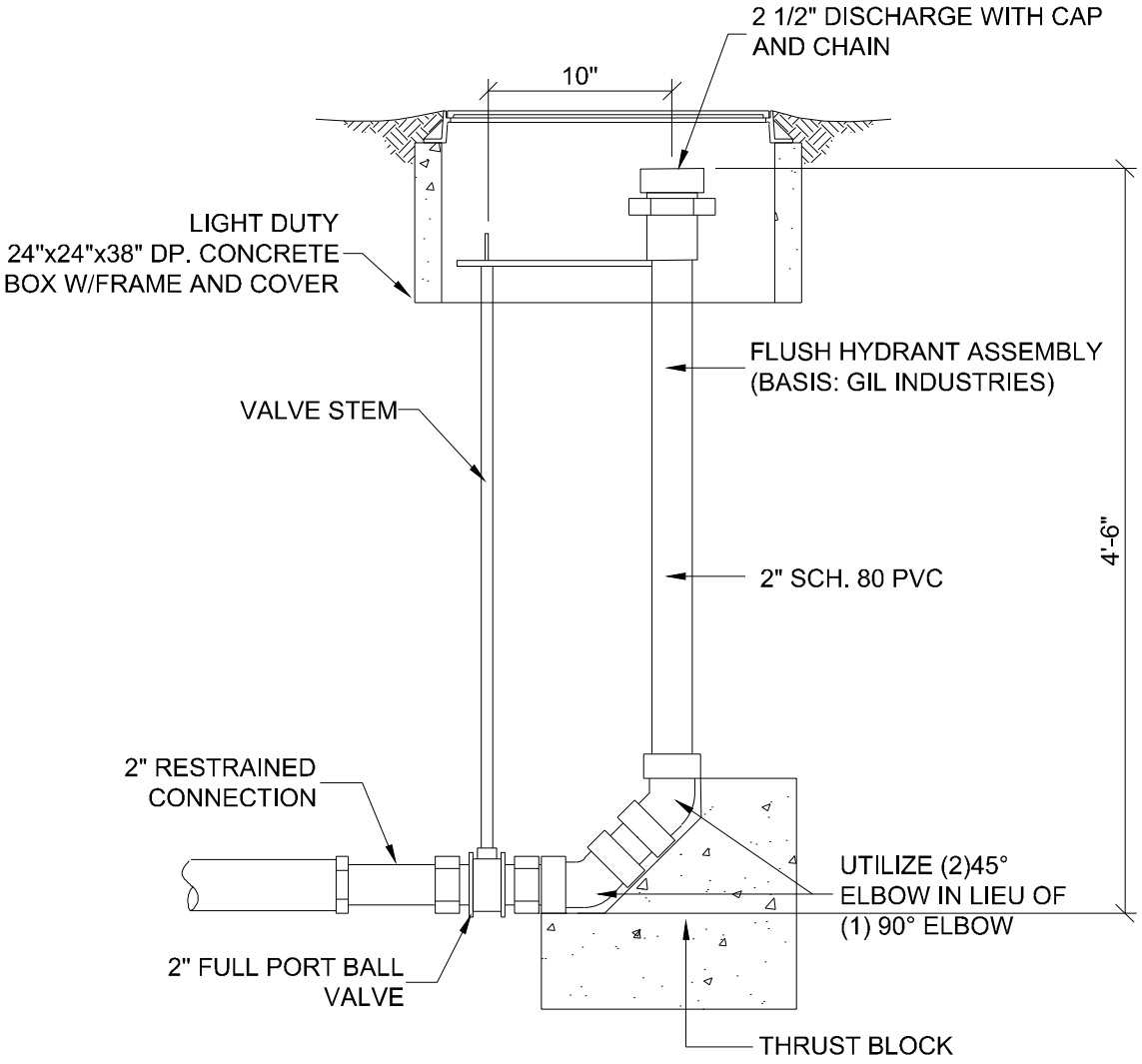
BOROUGH OF ORWIGSBURG
INTERMEDIATE CLEANOUT ASSEMBLY

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

DATE: 02/05/16

SCALE: NONE

DRAWING NO. **S-25**



FLUSHING HYDRANT DETAIL

SCALE: NONE

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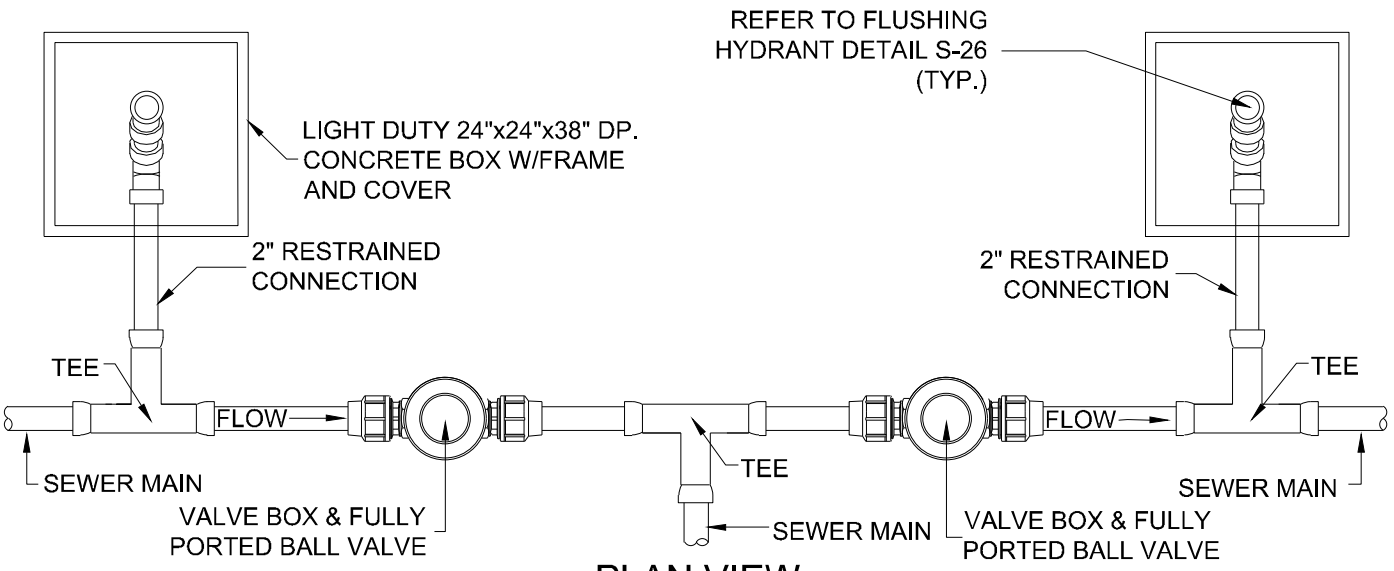
BOROUGH OF ORWIGSBURG
FLUSHING HYDRANT DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

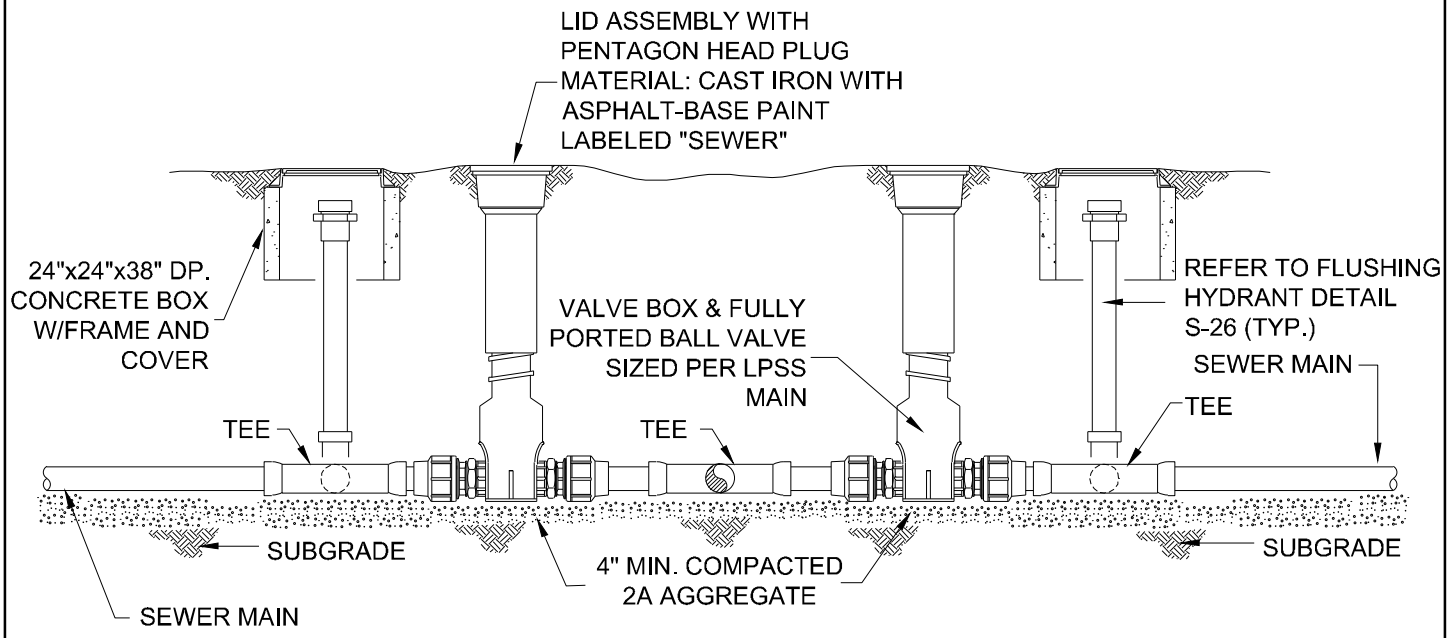
DATE: 02/05/16

SCALE: NONE

DRAWING NO. S-26



PLAN VIEW



ELEVATION VIEW

2 WAY BRANCH CLEANOUT ASSEMBLY

SCALE: NONE

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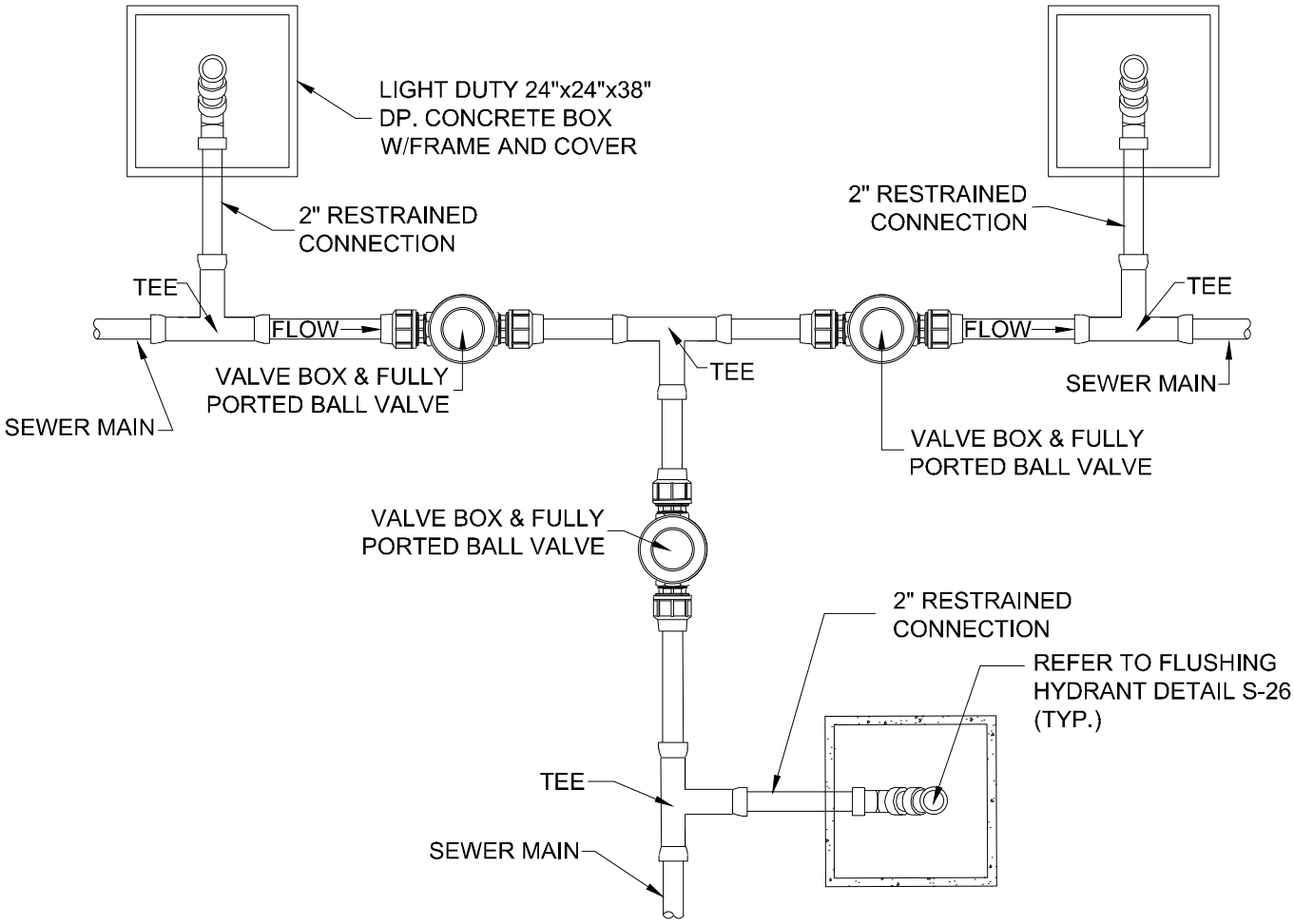
BOROUGH OF ORWIGSBURG
2 WAY BRANCH CLEANOUT ASSEMBLY

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

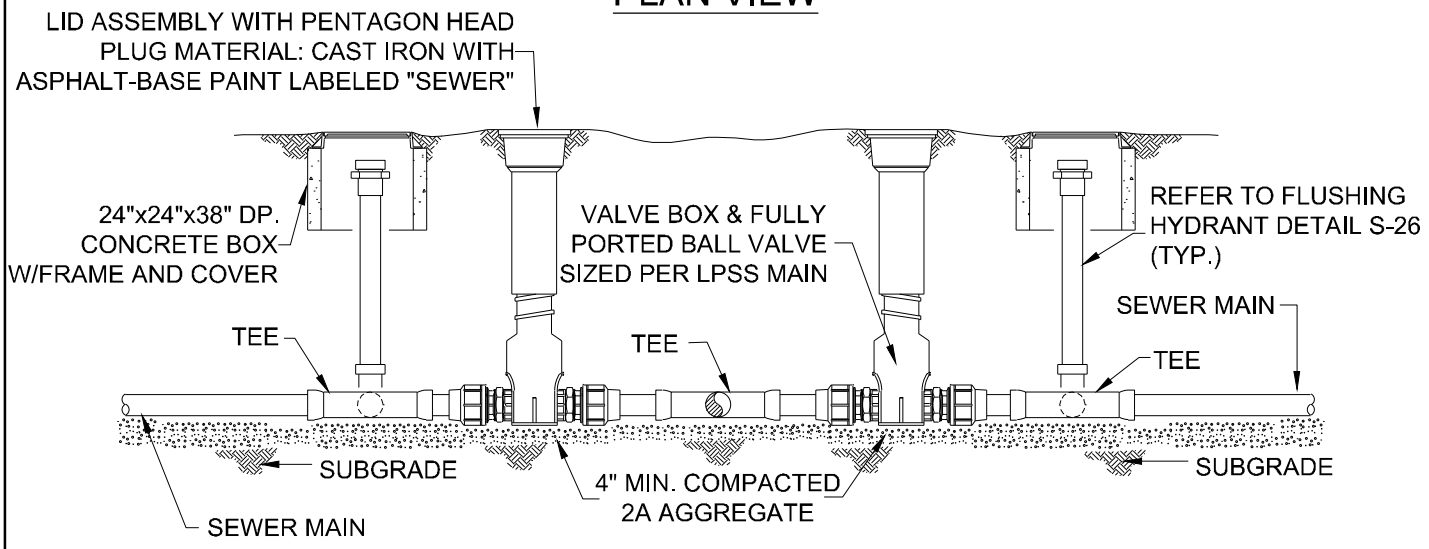
DATE: 02/05/16

SCALE: NONE

DRAWING NO. **S-27**



PLAN VIEW



ELEVATION VIEW

3 WAY BRANCH CLEANOUT ASSEMBLY

SCALE: NONE

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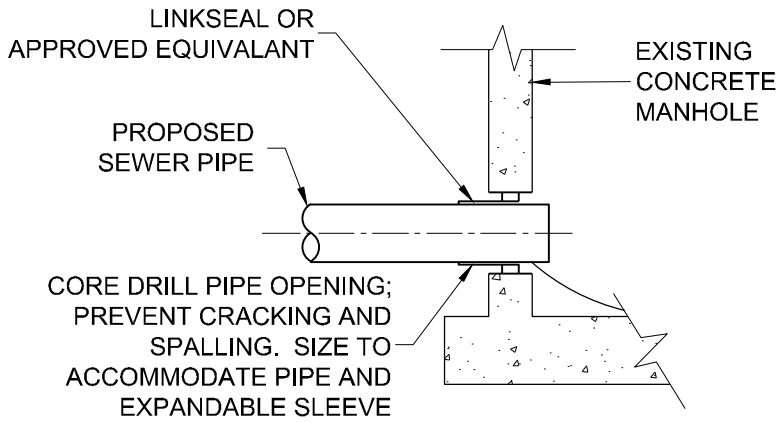
BOROUGH OF ORWIGSBURG
3 WAY BRANCH CLEANOUT ASSEMBLY

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

DATE: 02/05/16

SCALE: NONE

DRAWING NO. **S-28**



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

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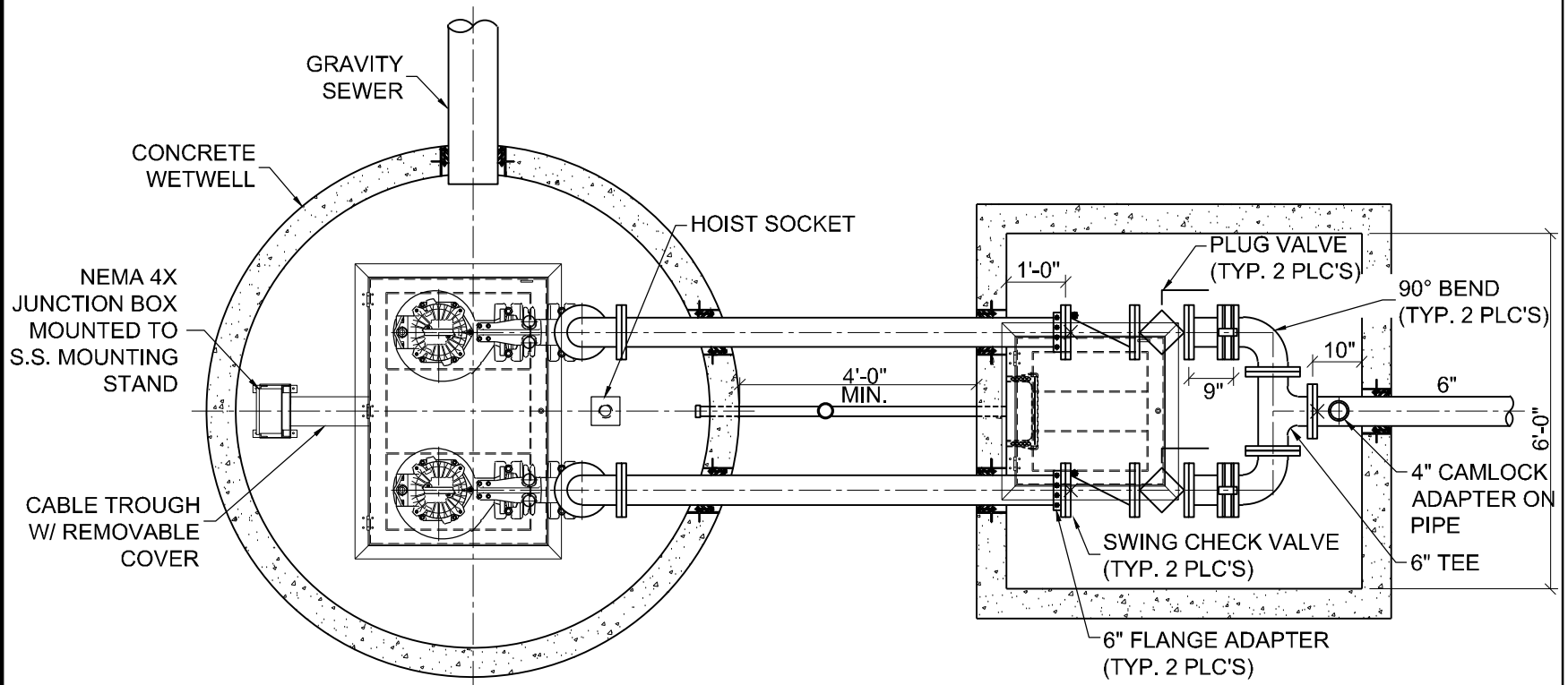
BOROUGH OF ORWIGSBURG
TYPICAL TIE-IN TO EXISTING MANHOLE DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-29

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



PLAN VIEW - PUMP STATION

SCALE: NONE

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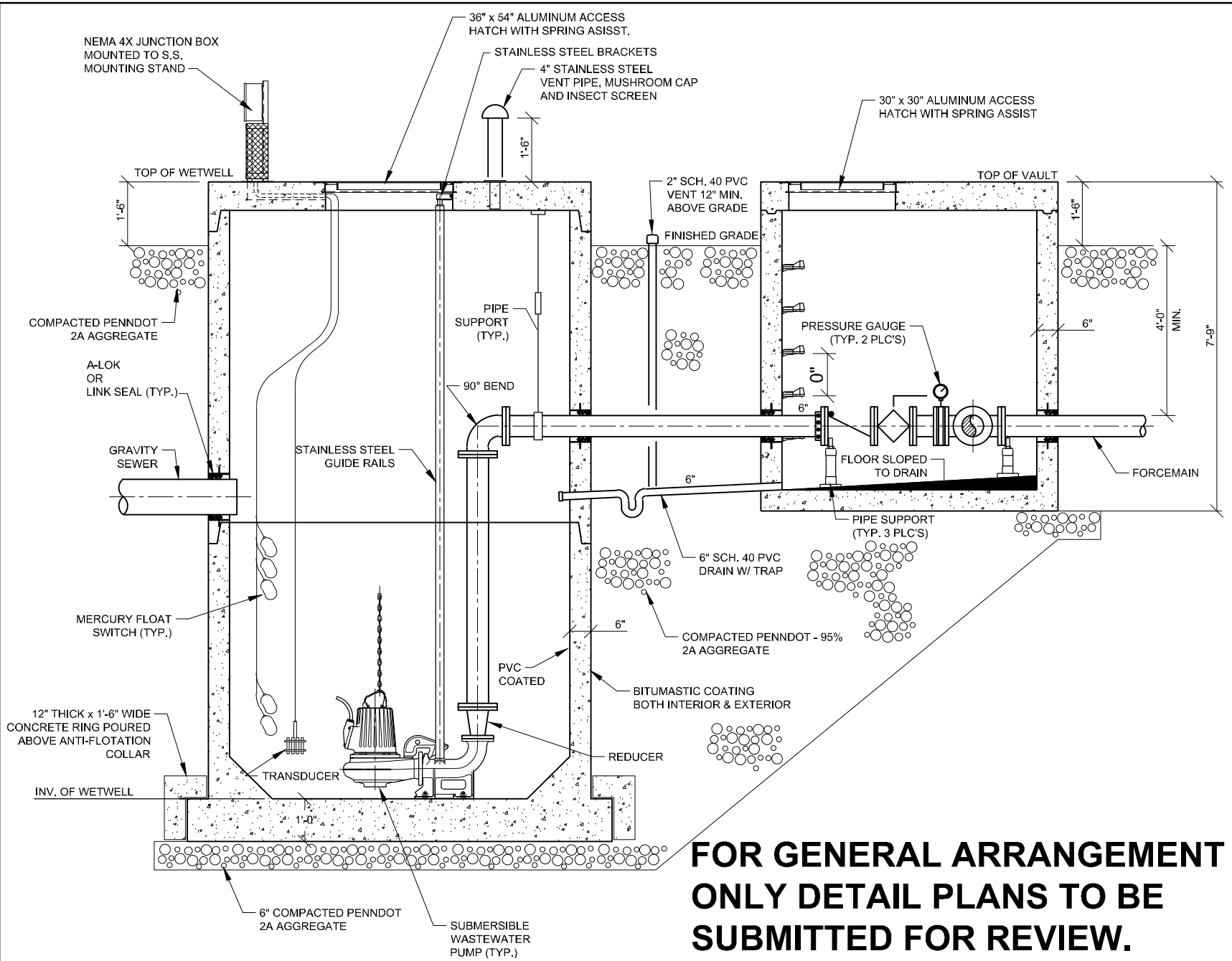
p: 570.628.5555
Mountaintop
p: 570.868.0275
Lititz
p: 717.626.6666
Pittsburgh
p: 412.264.2800

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

BOROUGH OF ORWIGSBURG
PLAN VIEW - PUMP STATION

DATE: 02/05/16
SCALE: NONE
DRAWING NO. S-30



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

SECTION VIEW - PUMP STATION

SCALE: NONE

PREPARED BY: MAH
CHECKED BY: BAK
APPROVED BY: EJP
PROJECT NO.: 4169.11
SCALE: NONE
DATE: 02/05/16
DRAWING NO.: S-31

BOROUGH OF ORWIGSBURG
SECTION - PUMP STATION

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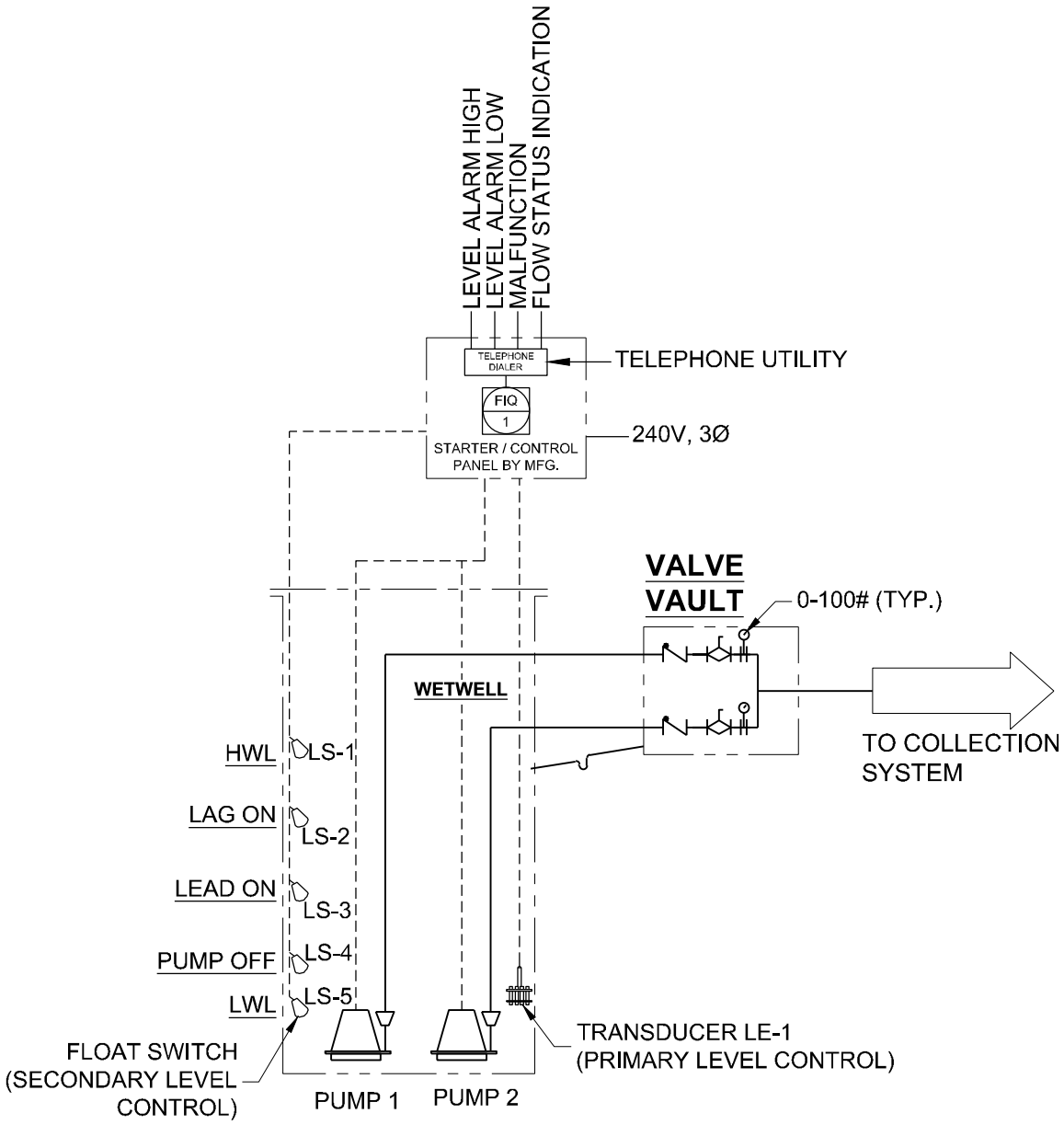

PUMP STATION PROCESS & INSTRUMENTATION DIAGRAM

SCALE: NONE

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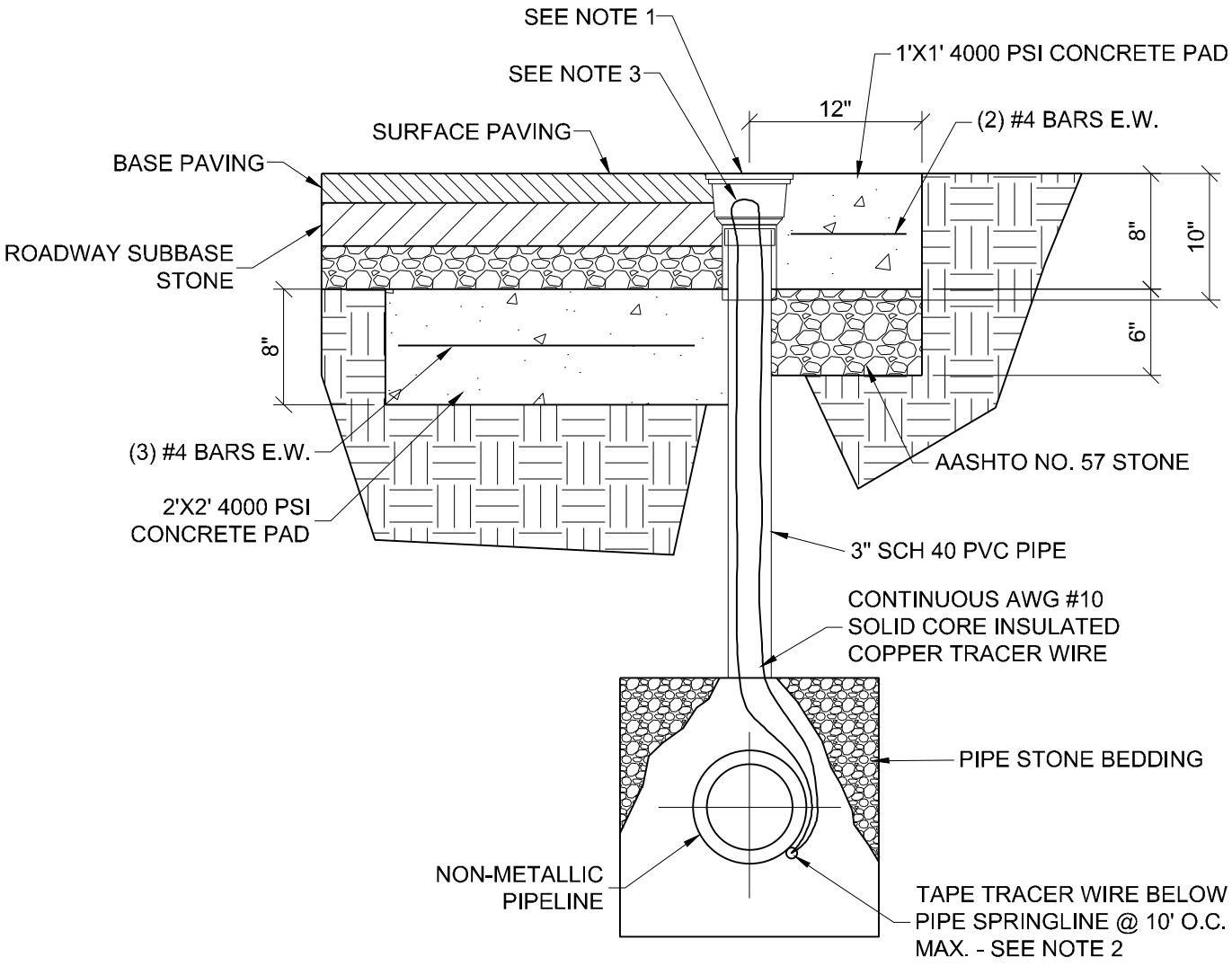
BOROUGH OF ORWIGSBURG
PUMP STATION PROCESS & INSTRUMENTATION DIAGRAM

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-32



NOTES:

1. C.I. BOX SHALL BE TYLER 10" C.I. VALVE BOX TOP SECTION SLIP MODEL 10T-A WITH 5 1/4" DROP LID MODEL 14549 MARKED "SEWER"
2. DO NOT SPICE TRACER WIRE UNDERGROUND.
3. PROVIDE 3 FEET OF LOOPED WIRE WITHIN TEST STATION BOX.
4. SPACE TEST STATIONS 500 FEET MAX. AND AT ALL CHANGES IN FORCE MAIN DIRECTIONS
5. PROVIDE METALLIC CAUTION TAPE CENTERED ON FORCE MAIN 12" BELOW FINISHED GRADE.

FORCE MAIN TRACER WIRE TEST STATION

SCALE: NONE

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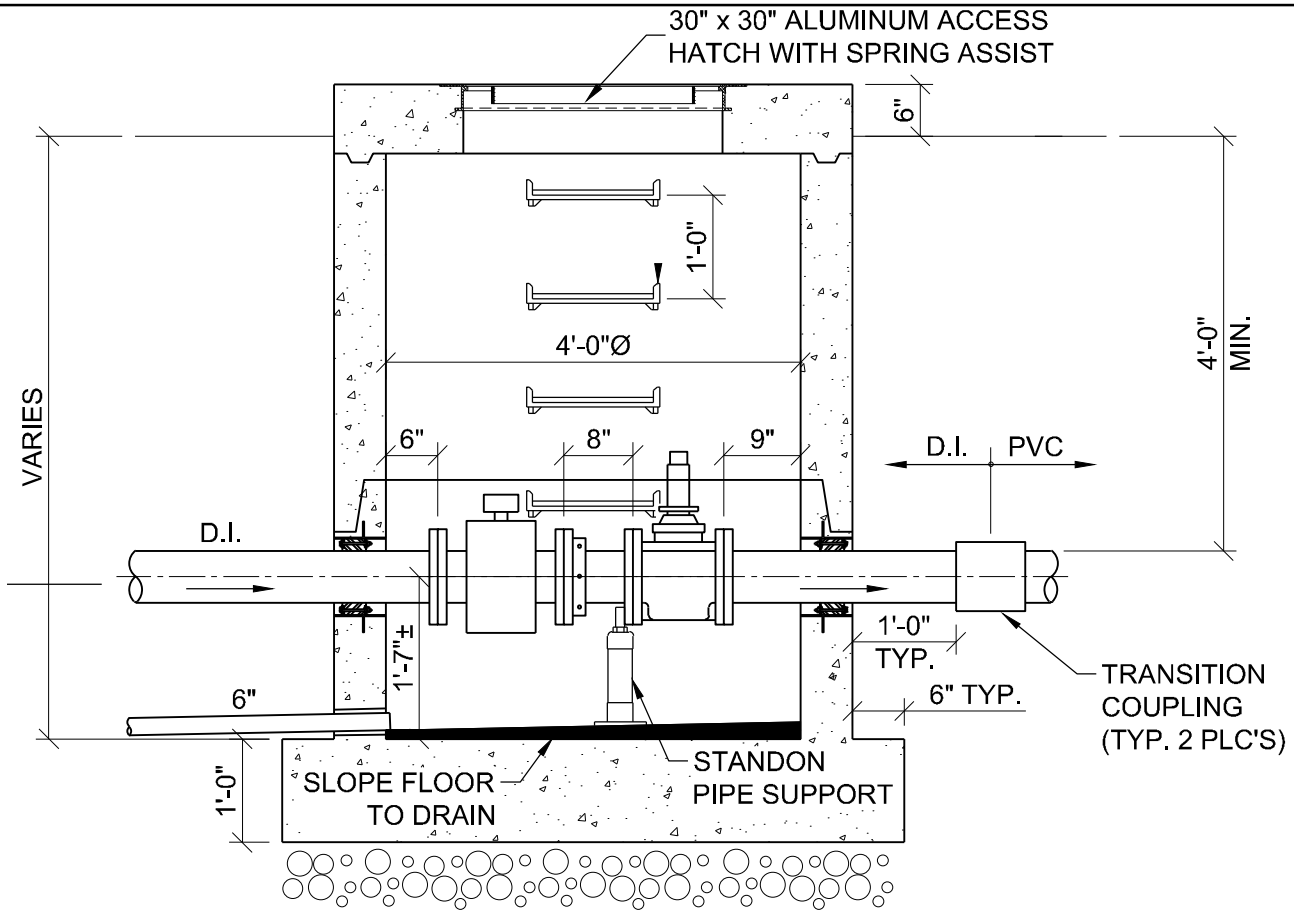
BOROUGH OF ORWIGSBURG
FORCE MAIN TRACER WIRE TEST STATION

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.
MAH	BAK	EJP	4169.11

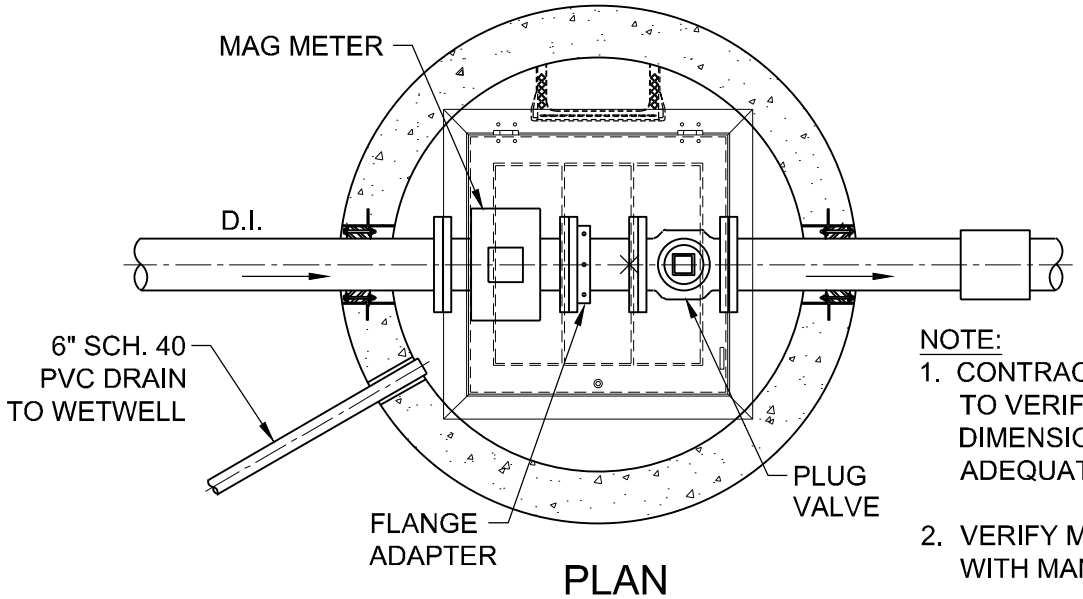
DATE: 02/05/16

SCALE: NONE

DRAWING NO. S-33



SECTION



PLAN

NOTE:

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

FORCE MAIN METERING MANHOLE DETAIL

SCALE: NONE

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BOROUGH OF ORWIGSBURG
FORCEMAIN METERING MANHOLE DETAIL

PREPARED BY	CHECKED BY	APPROVED BY	PROJECT NO.	DATE:	SCALE:	DRAWING NO.
MAH	BAK	EJP	4169.11	02/05/16	NONE	S-34