STANDARD CONSTRUCTION AND MATERIAL SPECIFICATIONS

FOR

SEWER COLLECTION SYSTEM

Adopted April 19, 2022

QUARRYVILLE BOROUGH AUTHORITY
LANCASTER COUNTY, PENNSYLVANIA

Project No. 11209151

GHD
1240 NORTH MOUNTAIN ROAD
HARRISBURG, PA 17112
(717) 541-0622

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PROJECT MANUAL

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GENERAL INSTRUCTIONS

SECTION 1 – GENERAL INSTRUCTIONS

1.1 DEFINITIONS: Wherever in these Specifications the following words, terms and expressions, or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

A. Authority: QUARRYVILLE BOROUGH AUTHORITY including any agent, officer or employee duly authorized to act for the said party in the execution of the work required by the Contract.

B. Building Sewer: Shall mean the extension from the sewage drainage system (House Drain) of any structure to the Lateral (Service Lateral) of a sewer.

C. Commercial Establishment: Means any structure or any portion thereof intended to be used wholly or in part for the purposes of carrying on a trade, business or profession or for social, amusement, religious, educational, charitable or public uses, and which contains plumbing for kitchens, toilets or washing facilities.

D. Completion Certificate: The certificate of the Engineer or Authority Inspector indicating the completion and acceptance of all work specified and performed under the Contract.

E. Contract: The written agreement executed by and between the Developer and the Contractor, or the Authority and the Contractor, covering the performance of the work and the furnishing of labor, materials and service in the construction of sewer extensions or sewer replacement to the QUARRYVILLE BOROUGH AUTHORITY Sewer Collection System.

F. Contractor: The corporation, partnership or individual hired by the DEVELOPER to construct sanitary sewer system or party hired by the QUARRYVILLE BOROUGH AUTHORITY to construct sanitary sewer system, acting directly or through his authorized lawful agents, legal representatives, superintendents or employees, appointed to act for said party in the performance of the work under contract.

G. Curb Line: Shall mean that location which is one (1) foot behind a concrete curb, if there shall be no concrete curb, then one (1) foot from the edge of road surface.

H. Developer: For new Subdivisions, the corporation, partnership or individual intending to develop for residential or other purposes a certain tract of land situated within the sewer franchise area of the Authority, acting directly or through any authorized lawful agents, legal representatives or employees appointed to act for said party in the execution of the work of the Contract.

I. Drawings or Plans: Collectively, all of the drawings or plans (or reproductions of them) pertaining to the construction of the project and attached to the Contract or otherwise made a part thereof; and also such supplementary drawings as may be issued from time to time in order to elucidate or clarify said Contract Drawings, or for showing details which are not shown thereon.

J. Engineer: The person or organization duly employed by the Authority as consultant and authorized to inspect the results of the performance of the work under Contract by the Contractor, acting directly or through properly authorized agents, engineers, assistants, inspectors, or other representatives acting severally within the scope of the particular

duties entrusted to them. The word "Engineer" shall include the officers, agents and employees of the Engineer. In cases where the Authority does not employ a consultant, the word "Authority" is substituted for "Engineer" throughout these Specifications.

K. House Drain: Means that part of the main horizontal drain and its branches inside the walls of the building, vault or area and for five (5) feet outside thereof, and extending to and connecting with the Building Sewer.

L. Improved Property: Shall mean any property located within the service area of Authority upon which there is erected a structure intended for continuous or periodic habitation, occupied or used by human beings or animals, and from which structure Sanitary Sewage and/or industrial Wastes shall be of may be discharged.

M. Industrial Establishment: Means any structure intended to be wholly or in part for the manufacturing, fabricating, processing, cleaning, laundering or assembly of any product, commodity or article.

N. Industrial Waste: Means any solid, liquid or gaseous substance or waterborne wastes of form of energy rejected or escaping from any industrial manufacturing, trade or business process or from the development, recovery or processing of natural resources, as distinct from Sanitary Sewage.

O. Inspection: The examination of the work performed by the Contractor to ascertain its conformity with the Specifications; may also be referred to as Construction Observation.

P. Lateral (Service Lateral); Shall mean that part of the Sewer System extending from the sewer to the curb line, if there shall be no curb, then one (1) foot past the edge of the paved road surface. If Sewer System is located in an unpaved rights-of-way then to the edge of the dedicated rights-of-way.

Q. Municipality: Means such municipality (either Borough or Township) in which Sewer Services are provided by the Authority.

R. Owner: Means any person vested with ownership, legal or equitable, sole or partial, of any improved Property.

S. Person: Means any individual, firm, company, association, society, corporation or other group.

T. pH: Means the logarithm of the reciprocalof the concertration of hydrogen ions, indicating the degree of acidity or alkalinity of a substance.

U. Private Dwelling Or Living Unit: Means a structure or dwelling intended to be occupied as a whole by one or an apartment intended to be occupied by one family or any other one-family living unit.

V. Project: All the necessary performance, services and materials required for the satisfactory completion of the work under Contract as described in the Specifications and indicated on the Drawings.

W. Sanitary Sewer: Means the normal water carried household and toilet wastes from residence, business buildings, institutions, Commercial Establishments ad Industrial Establishments.

X. Sewer System: Means all temporary and permanent facilities at the time, and from time to time, owned or leased and operated by the Authority and used or usable for, or in connection with, the collection of Sanitary Sewage and acceptable Industrial Wastes.

Y. Specifications: Collectively, all of the definitions, descriptions, directions, provisions, requirements, terms and stipulations contained in these Standard Specifications; and all written supplements thereto, made or to be made, pertaining to the Contract, and the materials and workmanship to be furnished under the Contract.

Z. Street: Shall mean and include any street, road, lane, court, public square or alley.

AA. Subcontractor: A person, firm or corporation having a direct contact with the Contractor to perform part of the latter's contract; such as one who installs or furnishes and installs equipment forming a permanent part of the Contract work, or who furnishes labor for work required by the Contract in accordance with the Plans and Specifications. This term does not include individual workmen furnishing labor only, nor one who merely furnished material not worked to a special design.

BB. Terminology: Technical terminology contained in these Standard Specifications shall be interpreted by and through, and shall have the meanings set forth in the "Standard Methods" for the Examination of Water and Wastewater, most current edition, prepared by the American Public Health Association.

CC. Warranty Period: An 18 month time period beginning with the Authority's issuance of certificate of final acceptance.

DD. Wastewater Manager: Means any person who may from time to time be placed in general charge of the Sewer System.

EE. Wastewater Treatment Plant: Means the plant and facilities located in the Township of Providence, Lancaster County, Pennsylvania.

FF. Water Supplier: Means the public agency or private company furnishing water service to the particular property connected to the sewer service.

GG. AASHTO: American Association of State Highway and Transportation Officials.

HH. ACI: American Concrete Institute.

II. AISC: American Institute of Steel Construction.

JJ. ANSI: American National Standards Institute.

KK. ASTM: American Society of Testing Materials.

LL. Fed. Spec: Federal Specifications, United States Government.

MM. "Approved", etc. The words "approved", acceptable", "satisfactory" or words of like import, shall mean approved by, or acceptable, or satisfactory, to the Engineer, unless another meaning is plainly intended or otherwise specifically stated.

1.2 DRAWINGS AND SPECIFICATIONS

A. The Drawings and Specifications are complimentary, and the requirements of any one shall be considered as the requirements of all.

B. The Specifications in this document are written as if they were included in the Contract Documents executed by and between the Developer and the Contractor and/or Authority and Contractor. Whether they are so used is at the discretion of the Developer; however, the Authority will not accept the sanitary sewer extensions provided by the Developer unless and until they conform to the requirements of these Standard Specifications.

C. All drawings or plans pertaining to the Project (the Contract Drawings) are to be submitted by the Developer to the Authority for review at the time of the Preliminary Planning Phase of the development. After review of these Contract Drawings by the Authority, the Developer shall make any corrections required, and submit corrected copies thereof to the Authority. The Authority's approval of the Contract Drawings shall not relieve the Developer from responsibility for errors or discrepancies in such drawings. All Contract Drawings shall be prepared and submitted in conformance with the requirements set forth in Section 01300.

D. Deviations from the Drawings or Specifications required by the exigencies of construction will be determined by the Engineer only, and authorized in writing.

E. At all times the Contractor shall keep on the Project, available to the Engineer and his representatives, one (1) copy of the Drawings and Specifications.

1.3 PRELIMINARY INSPECTION

A. Unless the requirement is waived by the Engineer prior to the start of actual construction operations, the Contractor, or his authorized representative, shall go over the Project accompanied by the Engineer, or his designated representative, and shall observe for himself/herself, with the approved Drawings before him/her, all pertinent conditions relative to the Contract, including the status of rights-of-way and structures, obstructions, or other objects to be removed, altered and changed.

1.4 WORKING CONDITIONS

A. No night, weekend or legal holiday work, requiring the presence of the Engineer or Authority or a representative of either, will be permitted, except in cases of emergency, and then only with the written consent of the Engineer or Authority and to such an extent as he may judge necessary.

B. Any request for inspectors other than normal working hours must be put in writing 48 hours prior to time needed; the availability of an Inspector is not guaranteed.

1. Normal working hours are considered to be between 7:00 AM and 4:00 PM.

2. Work beyond the specified normal working hours will be charged to the developer at a rate of 1½ times the normal billing rate.

1.5 MATERIALS

A. The Contractor shall furnish the Engineer promptly after the award or execution of the Contract with a complete statement of the origin, composition and manufacture of all materials to be used in the construction of the Project. Only materials conforming to the requirements of these Specifications and approved by the Engineer shall be used in the work.

B. Representative preliminary samples of the materials of the character and quality prescribed in the Contract shall be submitted when indicated or directed for advance examination or test. Written approval of the quality of such samples shall be received by the Contractor prior to obtaining materials from the respective sources of supply.

C. Samples of all materials requiring laboratory tests shall be taken under the direction or supervision of, or in the manner prescribed by the Engineer. Such materials shall not be used until accepted as the result of such tests. Materials will be used only so long as the quality of the material remains equal to that of the accepted sample. The acceptance at any time of any material shall not be a bar to its future rejection, if it is subsequently found to be defective or inferior in quality to the material specified.

D. Required laboratory tests of materials shall be made by a testing laboratory or agency selected or approved by the Engineer and in accordance with the methods indicated herein. When standard Specifications and serial numbers of technical societies and associations are stipulated, the reference shall be construed to be the latest of such Specifications and serial numbers.

E. The Contractor shall furnish all labor, materials and equipment necessary for collecting, packaging and identifying, representative samples of materials, and the shipping of such samples to the testing laboratory.

F. For tests or inspections conducted by, and at the options of, the Engineer, at sites other than the testing laboratory and not under the jurisdiction thereof, the Contractor shall furnish or arrange with the producer to furnish all material, labor, tools and equipment, and every facility for the verification of the accuracy of all scales, measures and testing equipment, necessary for such tests or inspections.

G. The Contractor shall permit or arrange with the producer to permit the Engineer or any agent of the testing laboratory to inspect or test any and all material being used or to be used, at any time before, during or after its preparation, or while being used during the progress of the work or after its preparation, or while being used during the progress of the work or after the work has been completed.

H. Materials shall be stored so as to ensure preservation of their specified quality and fitness for the work. When considered necessary, materials shall be placed on wooden platforms or other hard and clean surfaces, and not on the ground, and shall be placed under cover as directed. Stored materials shall be located so as to facilitate prompt inspection. Private property shall not be used for storage purposes without permission of the owner or lessee

of the property, unless written permission is received from the Owner and a copy provided to the Authority.

I. If any material intended for use in the construction of the Project has been inspected and rejected after such material has been delivered to the Site, the Contractor shall immediately remove all such rejected material from the property.

1.6 ADVERTISING

A. No advertising will be permitted on any part of buildings, scaffolding, fences, materials, obstructions, barricades or work.

1.7 PERMITS, LICENSES AND INSURANCE

A. With the exception of the PennDOT Highway Occupancy Permit, if applicable, and the Water Quality Management Permit, if applicable, which will be obtained with the assistance of the Authority, the Contractor or Developer shall, unless otherwise specified, procure all necessary permits and licenses, pay all charges and fees, and shall give all notices necessary and incident to the proper and lawful prosecution of the work. The Developer or Contractor shall pay any fees and charges associated with the Highway Occupancy Permit and the Water Quality Management Permit.

B. The PennDOT Highway Occupancy and Water Quality Management Permit applications shall be prepared by the Developer in the name of the Authority and submitted to the Authority along with the application fees. After review of the applications by the Authority, the Developer shall make any corrections, if required, and submit corrected copies to the Authority. The Authority will forward the applications and fees to the Pennsylvania Department of Transportation and the Department of Environmental Protection.

C. Payment for personnel from State or Local Agencies, as required to be on hand during the construction of work on Highways under their jurisdiction, shall be borne by the Contractor or Developer.

D. Where work is to be done by the Contractor, in placing any pipe or other construction under railroad tracks within the right-of-way of any railroad company the Contractor shall be governed by the requirements of the railroad company involved, and shall consult with the officials thereof relative to the installation. If the railroad company requires any of their personnel to be on hand during the construction of the work, payment for such personnel shall be borne by the Contractor or Developer.

E. The Developer shall comply with all regulations of the Department of Environmental Protection and Department of Transportation and with all conditions imposed on any permit or approval. The Developer shall post any financial security which Department of Transportation may require. The Developer shall arrange for, and pay all fees relating to, any inspections which the Department of Environmental Protection and Department of Transportation may require.

F. Prior to the initiation of any construction activities, the Developer and/or Developer's Contractor shall submit to the Authority a certificate or certificates of insurance outlining the required insurance coverages. The certificate shall contain a provision that coverages will not be canceled, materially changed or renewal refusal unless at least thirty (30) days' prior written notice has been provided to the Authority. Insurance coverages are required to be written on an "occurance basis" and be written through an insurance company rated as A- or better by AM Best. The policies of insurance shall include the Authority, the Authority Engineer and the Borough as additional insureds. The insurance coverages and minimum limits of liability shall be as follows"

1. Workers compensation meeting all State requirements.

2. Comprehensive General Liability. The comprehensive general liability policy shall satisfy the following requirements:

   a. The aggregate limits of insurance shall be on a "per project" basis (ISO Endorsement CG 2503 of its equivalent shall be included).

   b. Coverage shall be provided for completed operations and products liability.

   c. The exclusion with regard to property under the care, custody and control of the Developer and/or Contractor shall be eliminated.

   d. Coverage shall include contractual liability insurance.

   e. Coverage shall include explosion, collapse and underground insurance.

   f. Coverage shall include personal and advertising injury insurance.

   g. The minimum limits of liability shall be as follows:

   Each Occurrence (bodily Injury and Property Damage) $1,000,000

   General Aggregate (except Products-Completed Operations) $2,000,000

   General Aggregate (Products-Completed Operations) $1,000,000

   Personal and Advertising Injury $1,000,000

3. Comprehensive Automobile Liability: Bodily Injury and Property Damage: $1,000,000 each accident (combined single limit).

4. Owner's and Contractor's Protective Liability (Separate policy): $2,000,000 each occurrence; $4,000,000 aggregate.

5. Excess Liability – Umbrella Form: $2,000,000 each occurrence; $4,000,000 aggregate.

6. Property Insurance: Developer and/or Contractor shall purchase and maintain property insurance upon the work at the site in the amount of the full replacement cost thereof subject to a deductible amount of $1,000. This insurance shall be written on a Builders Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the work, temporary buildings, false work and work in transit and shall insure against at least the following perils: fire, lightening, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of law and regulations, and water damage.

1.8 CARE OF PUBLIC AND PRIVATE PROPERTY

A. The Contractor shall take all necessary precaution to prevent damage to all overhead and underground structures and to protect and preserve property within or adjacent to the Project and shall be responsible for damage thereto. Special care must be used by the Contractor in the prosecution of the work in order to avoid interference or damage to any operating utilities or plants; however, where there is any possibility of such interference or damage, the Contractor shall make satisfactory arrangements with responsible officers or with the owners of the utilities or plants, covering the necessary precautions to be used as safeguards during the performance of the work by the Contractor. Such arrangement shall be made before the work is started and shall be subject to the approval of the Engineer, which approval will not be considered as releasing the Contractor from any responsibility for the acts of himself or his employees or representatives. The Contractor shall protect all land monuments and property markers that will be affected by the construction until they have been correctly referenced. Contractor, when directed, shall satisfactorily reset monuments and markers that are disturbed by the Contractor during the construction of the Project or otherwise.

B. If the sewer lines cross telephone, telegraph, electric, television cables, gas, oil or water lines, no excavation or pipe laying shall be done at those crossings without the presence of an authorized representative from the office of the authority having jurisdiction. Attention is directed to the provisions of Act No. 287 (1974), and its amendments thereto of the Commonwealth of Pennsylvania, and full compliance therewith is required.

1.9 SAFETY REQUIREMENTS

A. The Contractor is responsible for all site safety.

B. If and when the use of explosives is necessary for the prosecution of the work, the Contractor shall store and use such explosives in strict conformity to all State and local laws and regulations. No explosives shall be used without first securing a blasting permit from the Township and/or Borough.

C. Observance of, and compliance with, said regulations shall be solely and without qualification the responsibility of the Contractor without any responsibility whatsoever on the part of the Authority or Engineer. The duty of enforcing such laws and regulations lies with the said Department, not with the Authority or Engineer.

1.10 REGULATIONS AND REQUIREMENTS OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

A. The Contractor and the Developer are advised that they will be required to design and conduct their work in compliance with the rules, regulations and requirements of the Pennsylvania Department of Environmental Protection.

1.11 OBSERVANCE OF LAWS AND REGULATIONS

A. The Contractor at all times shall observe and comply with all Federal and State laws and regulations, and local bylaws, ordinances and regulations in any manner affecting the conduct of the work or applying to employees on the Project, as well as all safety precautions and orders or decrees which have been promulgated or enacted, or which may be promulgated or enacted, by any legal bodies or tribunals having authority or jurisdiction over the work, materials, equipment, employees or the Contract; such observance and compliance shall be solely and without reliance on superintendence or direction by the Authority or Engineer.

1.12 ENGINEER'S DUTIES, EXAMINATION AND INSPECTION

A. The work shall at all times be subject to the examination and inspection of the Engineer, Authority or its authorized employees, who shall have free access to the work, and be furnished by the Contractor with every reasonable facility for examination of the work, to the extent of uncovering, testing or removing finished portions thereof. The Contractor shall provide all labor and equipment necessary for such examinations. The Engineer may require the Contractor to uncover for examination, or to remove any work done or placed in violation or disregard of instructions issued to the Contractor by the Engineer or his representative.

B. The Engineer and its assistants are the representatives of the Authority during the construction of the Work. When so authorized by the Authority, it shall be the duty of the Engineer to see that all materials and work are properly inspected and that all such materials and work conform fully to the requirements of the Specifications. The Engineer shall perform such other duties as may be defined assigned him from time to time and shall have such additional authority as may be defined elsewhere in these General Instructions. The Engineer shall in no case act as foreman or perform other duties for the Contractor nor interfere with the management of the work by the Contractor.

C. All inspections and tests shall be performed without unnecessarily delaying the work. All material and workmanship, if not otherwise designated by the Specifications shall be subject to inspection, examination and test by the Engineer or his duly authorized representatives. The Engineer shall have the right to reject defective material or workmanship, or require its correction. Rejected workmanship shall be satisfactorily replaced with proper material and the Contractor shall promptly segregate and remove rejected material from the premises. If the Specifications, the Engineer's instructions, laws, ordinances or any public authority require the work to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection.

D. The Engineer shall, within a reasonable time after presentation to it, determine all questions in relation to the construction of the Project, and in all cases decide every question that may arise relative to the performance of the work covered by the Contract.

E. The Engineer shall have full authority to decide all questions that may arise under the Contract relative to the quality and acceptability of materials furnished and the manner, rate of progress, quality and acceptability of work performed, and the interpretation of any or all Plans and Specifications.

F. Any verbal opinion or suggestion that the Engineer may give the Contractor shall in no way be construed as binding the Authority in any way.

G. In case of any dispute relative to the quality of materials or work, the Engineer shall have authority to reject materials and to advise the Authority to suspend the work. He shall not be authorized to revoke, alter, enlarge, relax or release any requirements of the Specifications, nor to approve or accept any portion of the work, or issue instructions contrary to the Specifications.

1.13 DEFECTIVE WORK

A. When any material not conforming to the requirements of the Specifications and Drawings has been delivered upon the Site of the Project or incorporated in the Work, or when any Work performed is of inferior quality, such material or work shall be considered as defective and shall be immediately removed and renewed or made satisfactory as directed by the Engineer. Failure or neglect on the part of the Engineer to condemn or reject any bad or inferior work or materials, shall not be construed as to imply an acceptance of such work or materials, if such bad or inferior material or work becomes evident at any time prior to the delivery of the Completion Certificate by the Authority to the Developer.

B. The Contractor shall remove any work or material condemned and shall rebuild and replace the same.

C. The Contractor shall promptly move from the premises all materials condemned by the Engineer as failing to conform to the Specifications, whether incorporated in the structure or not, and the Contractor shall promptly replace its own work in accordance with the Contract.

1.14 NOTICE

A. The service of any notice, by the Authority or Engineer to the Developer or Contractor, shall be considered accomplished upon completion or any one of the following procedures.

1. When delivered, in writing, to the person in charge of the office used by the addressee to conduct business.

2. When delivered, in writing, to the addressee or any of its authorized agents in person.

3. When delivered, in writing, to the addressee or any of its agents at the office used by the addressee to conduct the business of the Contractor at or near the Site of the work.

4. When deposited in the United States Mail, postpaid, and addressed to the party intended for such service at its office used for conducting the business of the Contract at the Site of the work, or its last known place of business.

1.15 ENGINEERING STAKES

A. The Contractor shall furnish, set and maintain suitable stakes, grade boards, temporary structures, templates and other materials for establishing and maintaining points, marks and lines. The Contractor shall be held responsible for the preservation of all stakes and marks.

1.16 ITEMS REQUIRED PRIOR TO BEGINNING CONSTRUCTION

A. Sewer Extension Agreement.

B. Lancaster County Conservation District-approved Erosion and Sediment Control Plan.

C. Blasting Permit, if needed.

D. PennDOT Highway Occupancy Permit, if needed.

E. Local Street Cut Permits, if needed.

F. 10-Day Notice Letter indicating Contractor intends to start Work.

G. Pre-Construction Meeting.

H. Sewer Connection Permit(s) issued with Building Permit, applicable to the Project.

I. Evidence that the Developer has recorded the subdivision and/or land development plan in the Office of the Recorder of Deeds of Lancaster County.

J. Posting of financial security to secure completion of the sewer extension in an amount acceptable to the Authority Engineer and form acceptable to the Authority Solicitor and posting of any escrow required to reimburse the Authority for inspection and other fees.

The Authority is irrevocably authorized to withdraw from time to time any monies deposited by Developer in escrow in order to pay expenses and fees, including legal and engineering fees, incurred by Authority pursuant to or in connection with the Project. Should the escrow account become depleted, the Developer will be required to deposit additional finds at the Authority's request. The Authority shall have the right to suspend work pending receipt of the sum billed.

K. Receipt of a letter from the Developer stating the name of the Contractor who will be installing the sanitary sewer extension, when applicable.

L. Receipt from the Authority of a copy of the Water Quality Management Permit (WQM) issued by DEP, when applicable; or DEP Planning Module approval letter if WQM is not required.

M. A list of suppliers for the materials to be used in the sanitary sewer construction.

N. Shop drawings of manhole bases, manhole risers, manhole frames and covers, pipe and other necessary construction materials approved by the Authority.

O. Certification from the pipe manufacturer that the pipe meets or exceeds the requirements of the Authority to proceed with construction.

P. Evidence that easements for all sewer facilities to be dedicated to the Authority not located within rights-of-way of public streets have been executed and recorded in the Office of the Recorder of Deeds of Lancaster County.

Q. Insurance certificate(s) meeting requirements of Section 1.7.F.

R. Written approval by the Authority to proceed with construction.

END OF SECTION 1

DIVISION 1
GENERAL REQUIREMENTS

SECTION 01010 – SUMMARY OF WORK

PART 1 – GENERAL

1.1 SITE LOCATION

A. Project locations are in the sewer service area of the Quarryville Borough Authority, Lancaster County, Pennsylvania.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Without intending to limit or restrict the extent of Work required under these Specifications, the Work generally comprises construction of extensions to the existing wastewater collection system in accordance with these Specifications, Sewer Detail Drawings bound herein and the latest Building Sewer Specification.

B. Drawings: The Sewer Detail Drawings represent the standards of construction of the Authority and are bound in the back of the Specifications.

1. On the Sewer Detail Drawings, the words “Project Manual” are to be defined as these Standard Specifications.

1.3 PRELIMINARY REQUIREMENTS

A. Before any work is started, the Developer shall ascertain from the Authority whether or not the latter intends to employ a consultant as Engineer for the Project. If the Authority indicates that no Engineer will be employed, the word “Authority” is substituted for the word “Engineer” throughout these Specifications, and the Developer and Contractor shall be guided accordingly.

B. Where sewers are to be installed within the limits of existing streets, all removal and protection of street paving, backfilling of trenches, temporary and permanent replacement of street paving, restoration of shoulders and the maintenance and protection of traffic will be performed in strict conformance with the requirements of the Quarryville Borough Authority, Quarryville Borough, East Drumore Township, Eden Township, Providence Township or other governing municipality, or the Commonwealth of Pennsylvania Department of Transportation, as applicable. The cost of inspection by personnel of the Commonwealth of Pennsylvania Department of Transportation or the local municipality, utilities, railroads, etc. shall be paid by the Developer. Perform work within the right-of-way of State Highways in accordance with the requirements of the latest edition of the Commonwealth of Pennsylvania, Pennsylvania Code, Title 67, Transportation, Department of Transportation, Chapter 459, Occupancy of Highways by Utilities. The Regulations are made a part of these Specifications.

C. When service connections are required as work of this project, construct them from the curb and/or rights-of-way cleanout to the building using materials required by the latest version of the Building Sewer Specifications.

D. All water and sewer lines shall be installed in public street rights-of-way. Installation in rights-of-way over private property will only be considered for approval when the Authority determines such installation is in the best interest of the Authority and the Authority is provided with an easement and/or right-of-way agreement acceptable to the Authority Solicitor. If any part of a main extension intended to be dedicated to the Authority is to be installed anywhere other than in publicly dedicated streets, before the Authority gives its final approval of the plans, the Developer shall provide the Authority with easements and/or rights-of-way in form and substance satisfactory to the Authority and its Solicitor, evidencing the right of the Developer and the Authority to install, maintain and reconstruct lines across private property. Any easement shall have a width of not less than thirty (30) feet. Such easement and/or right-of-way agreement shall be recorded before commencement of construction.

E. Do not connect storm water or ground water drainage to any sewer extension of the Authority's system. No rain water leaders, roof drainage, area or yard drainage, basement, surface water or water from fire hydrants, ground water or water from underground drainage fields shall be permitted to drain into or be admitted into the sanitary sewer system; nor shall any of these waters be admitted to the sanitary sewer system by the use of pumps of any type. The only exception is for sump pumps in existing homes connecting to the sanitary sewer system. Sump pumps in existing dwellings may be connected provided they are in a sealed system (solid bottom or other solid enclosure) and are incapable of pumping groundwater from the foundation or any other area of the building. The sanitary sewer system and all extensions are intended to convey sanitary wastewater only.

F. Interfacing Existing Construction:

1. Do not permit ground or surface water to enter the existing sanitary sewer facilities through the new sewer piping connection.

2. Do not flush, drain or deposit water or debris from the new sewer piping or related construction into the existing sanitary sewer facilities.

3. Install a watertight plug in new sewer piping entering a new manhole. Maintain the plug until all debris and accumulated water has been removed from the new sewer facilities and the new sewer facilities have passed all specified acceptance tests.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 01010

SECTION 01300 – SUBMITTALS

PART 1 – GENERAL

1.1 SUBMISSIONS REQUIRED FOR AUTHORITY CONTRACTS

A. Contract Drawings for Authority Contract work shall be submitted by the Engineer.

1.2 SUBMISSIONS REQUIRED FOR NEW SUBDIVISIONS

A. General: The descriptions under the SUBMITTALS Article in each Specifications Section indicate the type of submission required. In addition, submit copies of Developer's plans and a construction progress schedule.

1. Make all submissions to the office of the Authority unless otherwise directed by the Authority.

B. Definition: The term shop drawing used throughout this Section includes manufacturer's product data in the forms of descriptive literature, specifications and published detail drawings, and also Contractor prepared drawings, certified test records or reports and such other certificates required by the Specifications.

1.3 GENERAL OUTLINE OF STEPS FOR DEVELOPER SEWER EXTENSIONS

A. All subdivision and/or land development plans regardless of size shall be required to submit four (4) sets of drawings to the Authority for review and comment.

B. Planning Phase

1. Upon notice to the Authority of the intent to propose an extension, Authority staff will provide a preliminary planning conference to provide information about Authority extension approval procedures and to receive general information from the Developer about the proposed extension.

2. Submit an application and agreement for wastewater treatment capacity reservation. The Authority Engineer will determine if capacity exists and will so advise the Authority. All reservation applications and agreements must be acted on by the Authority Board.

3. After approval of a reservation agreement, the Authority will process its portion of a PADEP Sewage Planning Module if requested.

4. Developer must obtain a copy of the Authority's "Standard Construction and Material Specifications for Sewer Collection System".

5. The Developer shall submit a "Proposed Sewer System Extension Feasibility Study" (hereinafter "Study") prepared by a registered professional engineer. The Study shall contain any analysis and information needed to support included certification by the author of the Study that: (1) the proposed extension will

adequately serve the wastewater needs of the new development; (2) that any existing wastewater collection and/or conveyance system to which the extension is planned to discharge to are capable, or have capacity, to receive the additional flows generated by the development without adverse impacts according to standards applied by the Authority Engineer; and (3) that the extension can be successfully designed in conformance with the "Standard Construction and Material Specifications" for the sewer system. The Study shall include a general layout of the extension on a plan, if not a finished design, showing the proposed system connection point(s), pipe sizes and locations, manhole locations, locations of any proposed pump stations, and other features or proposed improvements deemed important to determine the feasibility of the extension.

6. The Authority Board shall act on the Study based on the written recommendation of the Authority Engineer. If approved, such approval shall not be deemed as an approval of any extension of the sewer system, or as a waiver of any other requirement for the approval of an extension plan, or an acceptance of dedication of any facility to be constructed according to the Study. The meaning of the approval of the Study shall be limited to an affirmation that the requirement for the submission of a Study has been met, and that, as of the time of the submission of the Study, it appears that the completion of the extension is feasible based on the information and certification contained therein. A sewer capacity reservation agreement is required prior to approval of the Study as extensions are not feasible without the availability of sewer capacity.

7. Table 1 contains a checklist to assist the developer in completing the "Proposed Sewer System Extension Feasibility Study."

Table 1
Technical Review Checklist for Sewer System Extension Feasibility Study

Job Number: _____

Developer: _____

Development: _____

Date: _____

Submittal No.: _____

Item Number	Item	Acceptable	Unacceptable
1	Feasibility Study is prepared by a registered professional engineer		
2	Identification of wastewater needs of proposed development (i.e. proposed wastewater flows)		
3	Identification of capacity of the collection/conveyance system to which the proposed development discharges		
4	Proof that existing capacity is capable of handling additional flows from proposed development		
5	Acknowledgement that proposed extension can be designed in accordance with standard specifications		
6	General layout of sewer extension, including connection points to existing sewer system		
7	Sewer extension plan shall include: a. Pipe sizes b. Pipe locations c. Manhole locations d. Location of proposed pump stations (if applicable) e. Miscellaneous features/ proposed improvements necessary to determine the feasibility of the extension		

C. Design Phase

1. The Developer should submit four (4) sets of drawings for each submission to the Authority for review and comment. The initial submission shall be done during the preliminary planning stages at the local municipality.

   a. When the drawings are delivered to the Authority a check for ($2,000) should be submitted to cover the initial costs to the Authority for plan review.

   b. Enter into a plan review escrow with the Authority. A copy of the escrow will be forwarded to the Developer upon receipt of the Drawings and the

($2,000). No plans will be reviewed without receipt of the ($2,000) escrow.

c. As the design review progresses and the Authority incurs costs greater than the ($2,000) deposit, the Authority may, depending on the escrow deficiency, request escrow deposits from the Developer.

2. The Developer should submit documentation to the Authority indicating permission from neighboring property owners when a right-of-way is required from a property not owned by the Developer, or when the Developer intends to use an easement not explicitly stated to be used by the Authority. These may include gas, electric or phone easements.

3. If a Highway Occupancy Permit is needed for installation of sewer, the Developer should prepare the permit in the name of the Authority. The Developer should then deliver the application to the Authority for signature and subsequent delivery to PennDOT.

4. Upon approval of the drawings, the Authority will be provided a listing of requirements prior to issuance of a Notice to Proceed.

5. The Developer shall submit five (5) sets of drawings to the Authority's Engineer. These drawings will be stamped approved for construction. During the Preconstruction Meeting, these drawings will be distributed to Developer, Contractor, Authority, Construction Inspector and Authority's Engineer.

D. Agreement Phase

1. Upon approval of the design drawings, a Sewer Extension Agreement shall be entered into between the Developer and the Authority. Sewer extension agreements apply to both private and public sewer extensions.

a. Construction Cost Estimate for Financial Security when constructing a public and/or private sewer extension

(1) The amount of financial security shall be equal to 110% of the cost of the required improvements for which financial security is to be posted. The cost of the required improvements shall be established by submitting to the Authority a bona fide bid from a contractor chosen by the party posting the financial security. In the absence of a bona fide bid, the cost shall be established by an estimate prepared by the Authority's engineer

(2) The Developer shall submit a construction sequence/schedule at this time to aid in the determination of an adequate inspection escrow amount.

(3) The Developer shall then select the desired form of financial security. The Authority prefers financial security in the form of an irrevocably letter of credit but will accept other forms of financial security which meet requirements of the Municipality Authorities Act. The Authority has standard forms for each of these items. The

Developer is responsible for selecting and submitting the security to the Authority's standards.

b. Upon receipt of the above information, the Authority's Engineer will develop three (3) original copies of the Sewer Extension Agreement and attach the Developer's financial security.

(1) If additional escrow is required, the Sewer Extension Agreement will also indicate that additional money shall be deposited with the Authority for costs to be incurred by the Authority.

(2) The Authority's Engineer will determine the amount of escrow needed.

(3) The Engineer will then forward the Sewer Extension Agreement to the Developer for execution.

2. The following items must also be submitted to the Authority prior to issuance of a Notice to Proceed:

a. Developer shall submit a minimum of five (5) copies of Shop Drawings to the Authority's Engineer for review and comment.

b. Developer's Engineer shall submit to the Authority's Engineer a complete set of the approved plans prior to construction in digital format.

c. Developer shall have executed the Sewer Extension Agreement.

d. Developer shall have established the escrow account to the dollar amount specified in the Sewer Extension Agreement.

(1) If additional escrow money is needed during construction, the Authority will duly notify the Developer that an escrow deposit is required.

E. Construction Phase

1. The Developer is issued a Notice to Proceed when all of the above items are addressed.

2. The Developer is responsible for issuing a ten (10) day notice to the Authority indicating the intent to start construction.

a. At this time, a Preconstruction Meeting will be held. Attendees at the Preconstruction meeting include at a minimum, the Contractor, Developer, Authority, Construction Inspector and Authority's Engineer.

3. Developer's Contractor shall install the sewers in accordance with Authority's Standard Construction Specifications.

a. The Contractor is responsible for record keeping of lateral locations, final elevations of manholes and final location of all piping.

b. The Contractor is responsible for survey and layout of sewer.

4. The Authority's Construction Inspector shall observe testing of the sewer extension.

5. The Authority's Construction Inspector shall prepare a list of punch list items.

6. The Developer's Contractor shall complete all punch list items.

F. Post Construction

1. Record Drawings as outlined later in Section 01300 must be submitted to the Authority at the close of construction. All costs associated with the preparation of these drawings shall be the responsibility of the Developer. No permits to connect to the sewer system will be issued until Record Drawings are submitted and approved by the Authority.

2. After completion of construction, satisfactory inspection by the Authority Engineer of all construction, payment of any outstanding fees or charges owed to the Authority, and approval of the Record Drawings, Developer may request that the Authority accept dedication of the sewer extension. The Authority shall have no obligation to maintain any facilities until such facilities are formally accepted by the Authority at a public meeting. The Developer shall reimburse the Authority for all costs associated with the processing of a request that the Authority accept dedication of the sewer extension.

3. Developer shall submit to the Authority maintenance security in a form acceptable to the Authority Solicitor. The maintenance security shall expire no earlier than 18 months from the date of acceptance of dedication and shall be in the amount of 15% of the actual cost of installation of the improvements. Thirty days prior to the expiration of the maintenance security, the Authority or the Authority Engineer shall inspect the accepted sewer facilities. The Developer shall correct any deficiencies or, if the Developer refuses to correct the deficiencies, the Authority may draw upon the maintenance security and correct the deficiencies.

4. Upon approval of the above information, the Authority will then permit issuance of individual connection permits in accordance with the Sewer Extension Agreement.

1.4 CONTRACT DRAWINGS – DEVELOPER SUBMISSION

A. General

1. Submit four (4) sets of drawings for review. After review of these drawings, make any corrections required and resubmit four (4) corrected sets.

2. If a WQM permit is required from DEP, submit six (6) sets.

3. Sheet Size: 24 × 36 inches.

4. Base all elevations on USGS datum, State Plane Coordinate System and refer to Authority record drawing elevations of the existing sewers and indicate the difference between USGS and Authority datum.

5. Include the following note on each drawing: "All materials used and construction methods employed shall be in accordance with the latest standards of the QUARRYVILLE BOROUGH AUTHORITY STANDARD CONSTRUCTION AND MATERIALS SPECIFICATIONS FOR SEWER COLLECTION SYSTEM."

6. Include the following note on each drawing: "For sewer detail drawings, reference the QUARRYVILLE BOROUGH AUTHORITY STANDARD CONSTRUCTION AND MATERIALS SPECIFICATIONS FOR SEWER COLLECTION SYSTEM."

7. Include the following note on each drawing: "Contractor shall test pit all utility crossings prior to installing any sanitary sewer pipe to verify existing horizontal and vertical elevations to assure no conflict with new sewer."

8. Show details of manholes, bedding, encasement, service connections, etc., on drawings.

9. Bind drawings in sets and number them consecutively.

10. Include a copy of the design checklist found in Table 2 of this section indicating that all items meet the Authority's Standards with the initial submission.

B. Indicate on the design drawings the following general items:

1. Name of the Design Engineer/Surveyor.

2. Seal of the Design Engineer/Surveyor (on Final Approved Drawings).

3. Signature of the Design Engineer/Surveyor (on Final Approved Drawings).

4. Name of the development and the owners.

5. Original Date and all subsequent revision dates.

6. Indicate by note on the Index Map(s) or Plan and Profile sheet(s) the Water Quality Management Permit Number, or DEP File Code No. if no WQM permit was required, of the existing facility that the proposed sewers are connecting into.

7. Act 287 list of utilities, PA One Call Serial Number and Logo (and all subsequent amendments thereto).

C. Include the following drawings:

1. Location Plan: Showing approximate area of the municipality in which the project is located. No particular scale is required.

2. Overall: Plan sheet indicating proposed sanitary sewer and water facilities. All sewers will have flow direction arrows. All designs will be on "State Plan Coordinate System."

3. Plan and Profile Drawings: Plan View drawn to a scale of 1" = 50' and Profile View drawn to a horizontal scale of 1" = 50' and a vertical scale of 1" = 10' and having the following items included thereon:

   a. Table 2, at the end of this section, is a checklist of minimum design criteria for sewer extensions. This completed list must be included with each plan submission.

   b. Location of each existing or proposed building with elevation of the existing or proposed basement (Plan View). If proposed basement elevations are not known, the drawings must include a note stating which lots are not intended to be provided with gravity basement drainage.

   c. Sewer ties to existing permanent and semi-permanent features (Plan View).

   d. Top elevations of manholes (Profile View).

   e. Invert elevations of manholes (Profile View).

   f. Manhole numbers corresponding to those on Index Map (Plan View and Profile View). Numbering system to be provided by the Authority.

   g. Distance between manholes (Profile View); maximum 400 lineal feet.

   h. Grade of proposed sewer (Profile View); minimum 0.50 percent on 8-inch main and 1.00 percent for terminal manhole runs (see Section 02700 for minimum slopes for larger pipes and Table 2 below for additional design criteria).

   i. Minimum depth, to top of pipe, of gravity sewer shall be eight (8) feet.

   j. Sewers installed at a depth greater than 20 feet shall be made of Class 52 cement lined ductile iron pipe with Field Lok gaskets and will require prior approval by the Authority.

   k. For sewers installed in fill areas, a note should be placed on the drawings indicating that the "fill shall be compacted to a minimum of 95% of ASTM D698 Standard Proctor." The Authority may request testing data to verify that at the invert elevation of the sewer main that the compaction requirements have been met. Any sewers located in fill are to be constructed of ductile iron pipe and have Field Lok gaskets.

   l. Size of proposed sewer (Profile View); Minimum 8-inch main with 6-inch Service laterals and Building sewers. All pipes will be SDR-35 PVC unless otherwise approved by the Authority.

m. Location, size and elevation of all existing and proposed underground utilities (Plan View and Profile View); minimum ten (10) feet horizontal clearance to water mains and five (5) feet to all other utilities.

n. Service Lateral Installation Location:

(1) The measurement to locate sanitary tee or wye branch is the horizontal distance measured along the centerline of the main sewer from the centerline of downstream manhole to the centerline of tee branch.

(2) The ties and measurements necessary to locate the upper free end of the service connections are:

(a) The horizontal distance measured to the closet tenth of a foot from the downstream and upstream property markers, house corners, to the end of the service connection.

(b) The horizontal distance from the centerline of the main sewer to the end of the service connection.

(c) Connections to manholes are permissible. Invert "in" will be three tenths (0.3) above the "out" invert.

(d) Laterals shall be installed at right angles to the main.

(e) Laterals will be 6" diameter and have a minimum slope of one (1) percent.

(3) A note should be included indicating that no laterals shall be placed in driveways, sidewalks, 10 feet from a water service, and a minimum of 5 feet from any street tree planting.

(4) Locate laterals fifteen (15) feet from the property line on the low side of the lot in relation to the sewer main.

o. Invert elevations of manholes having greater than 24 inches difference between influent and effluent shall require construction of an inside drop connection.

(1) Manholes having less than 24 inches of fall shall have smooth flow transitions (channel) from influent to effluent pipes.

(2) Manholes requiring drop connections shall be a minimum of five (5) feet in diameter and shall be of the inside variety.

p. Manholes with the flow angle less than 90° will be a 5 foot diameter manhole.

q. All manholes shall be a minimum diameter of 4 feet and have a minimum 6" anti-flotation toe.

r. All force mains 4 inches in diameter and larger shall be constructed of Class 52 ductile iron pipe. Force mains less than 4 inches in diameter shall be constructed of HDPE or pipe DR rated for a minimum of 200 PSI.

s. All pump station lots will be a developable lot in accordance with the municipal requirements. All pumping stations will have a minimum building size of 20 feet × 20 feet, constructed of (split face block) and similar in design to the _____ pumping stations.

t. All sewers will be extended to the furthest edge of the property, in all directions when applicable.

u. Low pressure systems will not be permitted.

u. All Rights-of-Way for sewers and force mains will be a minimum of thirty (30) feet with an additional ten (10) foot buffer set on either side restricting the construction of any structures, houses, buildings, sheds, decks, pools, any underground and/or overhead facilities, etc. within that area. Also, no trees, shrubs, bushes, fences, etc. will be constructed within the Rights-of-Way.

Table 2
Technical Review Checklist for Sanitary Sewer Extensions

Job Number: _____

Developer: _____

Development: _____

Date: _____

Submittal No.: _____

Item Number	Item	Acceptable	Unacceptable
1	Base Datum on existing sewers		
2	Plans on State Plane Coordinate System		
3	Note on each Drawing "All materials used and construction methods employed are to be in accordance with the Standard Construction and Material Specifications for the Sewer Collection System of the Quarryville Borough Authority"		
4	Note on Drawings "For sewer detail drawings reference Standard Construction and Material Specifications for the Sewer Collection System of the Quarryville Borough Authority"		
5	Note on Drawings "Contractor shall test pit all existing utility crossings prior to installing any sanitary sewer pipe to verify existing horizontal and vertical elevations to assure no conflict with new sewer"		

6	Note on Drawings when sewer is installed through Authority rights of way including planter 'islands', "No trees, landscape walls, etc. shall be installed within limits easement in accordance with the Authority's standard Deed of Dedication"		
7	Note on Drawings "Lateral locations to be placed outside driveway and sidewalk areas, 10 feet from any water service and five (5) feet from any street tree"		
8	Name of Engineer/Surveyor		
Item Number	**Item**	**Acceptable**	**Unacceptable**
9	Seal of Engineer/Surveyor		
10	Signature of Engineer/Surveyor.		
11	Name of Development and Owner		
12	Act 287 Utility List and Serial Number		
13	Location of building(s)		
14	Note indicating those lots not having basement service		
15	Elevation of Basements shown on Plan or if no basement service then show first floor elevation		
16	Minimum Cover of 8 feet		
17	Minimum manhole height		
18	Minimum slope across manhole 0.1 feet		
19	Check Prefix and number system		
20	Check for clearance with water (10 feet)		
21	Check for clearance with storm sewer (5 feet)		
22	Do the plans indicate other proposed underground facilities?		
23	Exclusive 30-foot minimum Rights-of-Way		
24	Constructability		
25	Maintenance		
26	Maximum Run length of 400 feet		
27	Placement of manholes on street; are they in the wheel path		
28	Placement of manholes in parking lots; are they in the parking space		
29	Minimum Slope of 0.5% for 8-inch pipe		
30	Terminal Run Minimum Slope of 1.0%		
31	Invert Ins, Invert Outs, Rim Inverts shown on Drawings		
32	Lateral Stationing from downstream manhole		
33	Size of Laterals Shown, should be 6-inch		
34	Lateral Length		

Item Number	Item	Acceptable	Unacceptable
35	Inside drops with 5-foot diameter manholes are required for inverts greater than 24-inches		
36	If steep slopes (4% to 9%), inverts across manholes shall be 4 inches for constructability		
37	If steep slopes (9% to 20%), inverts across manholes shall be 6 inches for constructability		
38	If steep slopes (greater than 20%), inverts across manholes shall be 12 inches for constructability		
39	Verify depth of sewer doesn't exceed Authority requirements		
40	Where there is fill beneath proposed sewer, a note about 95% percent compaction should be on the drawings		
41	If sewer is deep, greater than 20 feet, DIP should be used		
42	Sheet Size 24 × 36		
43	Revision Date Shown		
44	Correct slopes and lengths		
45	Curb cuts when sewer extends off of streets so that there is right-of-way access for vehicles		
46	Need for right-of-way gate		
47	If on-lot grinder pumps are needed, does design comply with Specifications		
48	Indicate those manholes that require watertight covers		
49	When FM/Grinder discharges are proposed indicate manholes to be lined. A minimum of 2 upstream and 4 downstream.		
50	Indicate those manholes that have private frames and covers		
51	Indicate all utilities on the plans and profiles		
52	Do stream crossings meet County standards for use of ductile iron pipe (DIP) or concrete encased		
53	If the sewer is too shallow, use DIP		
54	Provide copies of all permits		
55	Provide the following for pumping stations:		
	a. Hydraulic Study		
	b. Geotechnical Report		
	c. Civil Drawings		
	d. Architectural Drawings		
	e. Mechanical/Process Drawings		
	f. Structural Drawings		
	g. Plumbing/HVAC Drawings		
	h. Electrical Drawings		

D. Final Acceptance Submissions:

1. Record Drawings:

a. Before Sewer Connection Permits will be issued and the work will be accepted by the Authority, submit a digital copy of the plans and profiles containing pipe sizes and horizontal and vertical location, including elevations, of all manholes, cleanouts, vaults, reconnection fittings and other appurtenances. The information will be provided digitally and consistent with the Plan Datum and Control as shown on the drawings. The contractor will employ the services of a Registered Professional Surveyor licensed in the Commonwealth of Pennsylvania to provide the information. Information will be provided in AutoCAD format.

b. The Authority intends to use prints of the reproducibles to provide information to designers and contractors as required by the Commonwealth of Pennsylvania Act 287 and its amendments thereto.

c. Record drawings shall indicate:

(1) Sheet size 24" × 36".

(2) Lot lines and lot number adjacent to sewer easement or roadway.

(3) All information as identified in Section 01300.1.04.C.2- Plan and Profile Drawings.

(4) Name of Design Engineer/Surveyor including seal and signature.

(5) Name of Developer including address.

(6) Name of Owner if different than Developer.

(7) All manhole numbers as provided by the Authority.

2. Straight Line Diagrams: Contractor shall prepare and submit one copy of the lateral locations to the Authority and one copy to the Owner/Developer. Forms are available from the Authority. Sewers including manhole numbers shall be indicated.

3. Final Acceptance Tests, as specified under the various Sections, completed and successful.

4. Video Documentation: Video documentation shall be provided for all sanitary sewers. Documentation shall be in accordance with NAASCO requirements.

5. Final Acceptance Affidavits: An affidavit and such other satisfactory evidence as is required that all labor, material, rentals, contractors and subcontractors, and indebtedness arising out of performance of the sewer contract work have been paid; and that all other claims against the Owner/Developer, Contractor or Subcontractors arising out of performance of the sewer contract work either have

been paid or that the Owner/Developer, Contractor or Subcontractor has and will maintain in force such Public Liability and Property Damage Insurance as will fully protect them and the Authority from any such claims as may be pending or that may thereafter arise, to include any work performed during or at the end of the Contractor's Guarantee period of 18 months. Such guarantee work as may be required as a result of the Authority's Guarantee Reinspection which will take place at the end of the 18 month Guarantee time period.

6. Deed of dedication/Bill of Sale of all sewer mains and manholes to the Authority. All laterals, grinder pumps, private pressure pipe systems and off-street sewers not covered by a right-of-way shall remain with the property owner, Developer or by a homeowners association where required by Borough or Township regulations.

7. Submit the Table 3 Technical Review Checklist for Record Drawings when submitting the Record Drawings to the Authority.

Table 3
Technical Review Checklist for Record Drawings

Job Number: _____

Developer: _____

Development: _____

Date: _____

Submittal No.: _____

Item Number	Item	Acceptable	Unacceptable
1	Drawings Titled "Record Drawings" ("As-Builts" are not acceptable). Provide ACAD drawing files, including all point data.		
2	Base Datum on existing sewers		
3	Name of Engineer/Surveyor		
4	Seal of Engineer/Surveyor		
5	Signature of Engineer/Surveyor		
6	Name of Development and Owner		
7	Location of building(s)		
8	Plan view 1 inch = 50 feet; Profile 1 inch = 10 feet		
9	Video documentation (internal) of the new sewer system, including manholes		
10	Check Prefix and number system		
11	Right-of-way – 30 feet		
12	Invert Ins, Invert Outs, Rim Inverts shown on Drawings		
13	Lateral Stationing from downstream manhole		
14	Size of Laterals Shown		
15	Lateral Length - from Main to R/W Line		

16	Lateral Depth at end of service lateral	_____	_____
17	Sheet Size 24-inch × 36-inch	_____	_____
18	Correct Slopes	_____	_____
19	Type of sewer pipe	_____	_____

1.5 BILL OF SALE

A. Provide a deed of conveyance/Bill of Sale transferring ownership of the sanitary sewer extension to the Authority.

1.6 CONSTRUCTION PROGRESS SCHEDULE – CONTRACTOR SUBMISSION

A. Contractor shall submit a letter to the Authority indicating its intent to start construction at least ten (10) days prior to the desired start date.

B. At least seven (7) days before work is commenced, submit three (3) copies of a practicable and feasible progress schedule showing the order in which the Work is to be carried on, the dates on which salient features will start (including procurement of materials and equipment), and the contemplated dates for completing same.

C. Prepare the schedule in chart form and of a suitable scale so as to appropriately indicate the percentage of Work completed at any time.

D. At the end of each month, update the Construction Progress Schedule by entering the actual progress of the Work on the schedule. Deliver three (3) copies of the updated Construction Progress Schedule immediately after its completion.

1.7 SHOP DRAWINGS – CONTRACTOR SUBMISSION

A. Submit a minimum five (5) copies of each shop drawing with such promptness as to avoid delay in the work.

B. Each submission of shop drawings must be accompanied by a letter of transmittal listing the items in the submission. Each shop drawing must be marked with the name of the Project and the name of the Contractor and be numbered consecutively.

C. When making a submission for approval, the Contractor shall do so with the understanding that he is considered to have checked the items in the shop drawing before submitting them and that he is satisfied that, in their present state, they not only meet the requirements of the Specifications, but will present no difficulties in erection and completing his Contract, and shall clearly note his approval on all shop drawings prior to their submission to the Engineer. Failure of the Contractor to note his approval will be reason for the Engineer to return such submission to the Contractor unchecked.

1. If it appears that shop drawings submitted by the Contractor to the Engineer have not been properly checked, even though the Contractor's approval has been noted thereon, it will also be considered reason for the Engineer to return such submission to the Contractor unchecked.

2. Markings, written or otherwise, made by the Contractor or by his suppliers or manufacturers must be made on the Submittal in a color other than red. RED is reserved for the exclusive use of the Engineer in marking Submittals.

E. If shop drawings show variations from the Specifications requirements because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in his letter of submission in order that (if accepted) suitable action may be taken for proper adjustment in the Contract; otherwise the Contractor will not be relieved of the responsibility for executing the Work in accordance with the Specifications even though the shop drawings have been approved.

F. The approval of shop drawings will be general and shall not relieve the Contractor from the responsibility for proper fitting and construction of the Work nor from furnishing materials and work required by the Specifications which may not be indicated on the shop drawings when approved.

G. After review by the Engineer, shop drawings will be returned marked as follows: Approved, Approved As Noted, Revise and Resubmit or Not Approved.

1. Approved: When shop drawings are returned "Approved", that means the shop drawings have been found to be in conformance with the Specifications. The Engineer's approval of the shop drawings does not relieve the Contractor from responsibility for errors or discrepancies in such shop drawings.

2. Approved As Noted: When shop drawings are returned "Approved As Noted" that means the shop drawings have been found to be in conformance with the Specifications, provided the changes noted by the Engineer are incorporated in the shop drawings. Shop drawings returned "Approved As Noted" will not require resubmission.

3. Revise and Resubmit: When shop drawings are returned noted "Revise and Resubmit" that means the Contractor shall make the required corrections and resubmit five (5) copies of corrected shop drawings to the Engineer.

4. Not Approved: When shop drawings are returned "Not Approved" that means the Contractor shall make completely new shop drawings and submit five (5) copies to the Engineer for review.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 01300

SECTION 01500 – TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1 TEMPORARY SERVICES

A. General: Provide temporary services at the site of the Work throughout the entire period of construction and until the Work of the Contract is completed and the new facilities are placed in operation of the Authority's personnel.

B. Temporary Water Control

1. At all times during the construction of work of this Contract maintain the flow of storm water, naturally occurring water and wastewater in existing facilities and channels affected by the Work. Bypass pumping may be required to accommodate existing sanitary sewer flows.

2. Particular attention is directed to above requirement in regard to the maintenance of flow in existing sewer service connections during removal and replacement of the sewer main.

3. Contractor assumes risk from floods or other causes, and any damages done to the work in progress or to work completed under Contract. Make repairs and replacements to the satisfaction of the Engineer.

4. Contractor assumes responsibility for damages to property caused by flooding or backflooding of property due to blocking or restriction of storm water passages, natural waterways and wastewater facilities capacity during normal or excessive periods of water flow.

5. At any time do not permit wastewater flow from existing sewers to flow into nearby waterways or to flow on surface areas. Furthermore, should an accidental discharge occur, notify Department of Environmental Protection immediately.

6. The means and methods the Contractor employs to meet above requirements are at his discretion but will be subject to the Engineer's approval.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1 REMOVAL

A. Contractor shall dismantle (if required) and remove such temporary facilities as required during construction of the project.

END OF SECTION 01500

SECTION 01570 – TRAFFIC REGULATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Purpose: The purpose of this Section is to provide the Contractor with general guidelines for the control of traffic while the work of the Project within street right-of-way is being performed. The goal is to help ensure safe and efficient traffic movement through work areas and provide safety for the Contractor's work force.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies

1. Furnish, erect and maintain at closures, intersections and throughout the Project, the necessary approved barricades, suitable and sufficient lights, approved reflectors, danger signals, warning, detour and closure signs. Provide a sufficient number of watchmen and take the necessary and legal precautions for protection of work and safety of the public. Barricades, danger signals, signs and obstructions shall be illuminated from sunset until sunrise. Materials and safety devices (i.e., barricades, flashing warning lights, torches, reflectors and signs) shall conform to the State Department of Transportation Specifications.

2. Traffic regulation on Authority service area streets shall conform in all respects to the requirements for traffic control on State Highways except enforcement, which will be by the respective Borough or Township police.

a. Provide a traffic control plan (modeled after a state Highway plan) to the Authority prior to start of work and also keep a copy of the plan at the site of the work at all times.

3. State Highways

a. The Contractor is advised that he is required to provide traffic control in complete compliance with the rules and regulations of the Pennsylvania Department of Transportation (PADOT), including but not necessarily limited to the following:

(1) PA Code Title 67, Transportation: Chapter 212 – Official Traffic Control Devices.

(2) PA Code Title 67, Transportation: Chapter 441 – Access to and Occupancy of Highways by Driveways and Local Roads.

(3) PA Code Title 67, Transportation: Chapter 459 – Occupancy of Highways by Utilities.

(4) Section 901 "Maintenance and Protection of Traffic During Construction" of the Commonwealth of Pennsylvania Department

of Transportation Specifications Publication 408, as supplemented, and such other sections therein which complement this Section.

b. Fines and related costs resulting from the Contractor's failure to provide adequate traffic control shall be borne solely by the Contractor.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Materials and safety devices such as barricades, flashing warning lights, reflectors and signs, provided for the purpose of protecting the work and the safety of the public, and for maintaining and protecting traffic, must conform to the requirements specified in Section 901 of the current edition of the Commonwealth of Pennsylvania Department of Transportation Specifications Publication 408 (as supplemented) and to requirements specified in the current edition of PA Code Title 67, Transportation: Chapter 212 – Official Traffic Control Devices which complements Section 901.

B. Provide danger signals and warning signs in the approved color.

PART 3 – EXECUTION

NOT USED

END OF SECTION 01570

DIVISION 2
SITE WORK

SECTION 02010 – SUBSURFACE EXPLORATION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Digging Test Pits

1. In locations where new sewers are to be connected to existing sewers, the Contractor will not be permitted to proceed with new construction until he has dug test pits and determined the exact location and elevation of any existing facilities.

2. All appropriate approvals (i.e. street cut permits) must be obtained by the contractor from the governing municipality prior to any subsurface exploration.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 02010

SECTION 02211 – ROCK REMOVAL

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Rock Removal: Mechanical Method

B. Rock Removal: Explosive Method

1.2 RELATED WORK

A. Section 02221, Trenching for Utilities, comply with paragraph 1.5, Protection, as applicable.

1.3 QUALITY ASSURANCE

A. Contractor: Contractor shall have five (5) years documented experience with the use of explosives for disintegration of subsurface rock.

1. Blaster shall be licensed in accordance with all applicable Federal, State and/or local laws, ordinances and regulations.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable Federal, State and/or local laws, ordinances and regulations for explosive disintegration of rock.

B. Obtain and display permits on site from authorities having jurisdiction before explosives are brought to site or drilling is started.

C. Contractor to obtain blasting permit from Borough or respective Township.

1.5 REFERENCES

A. NFPA-495 Code: Manufacturer, Transportation, Storage and Use of Explosive Materials.

B. 25 PA Code Chapter 211: Storage, Handling and Use of Explosives.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Rock Definition: Solid mineral material with a volume in excess of 1/3 cu. yd., that cannot be machine excavated as determined by the Engineer.

B. Explosives: Type recommended by explosives firm and required by authorities having jurisdiction.

C. Delay Devices: Type recommended by explosives firm.

D. Blasting Mat Materials: Type recommended by explosives firm.

PART 3 – EXECUTION

3.1 INSPECTION

A. Verify site conditions and note irregularities affecting work of this Section.

B. Beginning work of this Section means acceptance of existing condition.

3.2 ROCK REMOVAL – MECHANICAL METHOD

A. Excavate for and remove rock by the mechanical method.

B. Cut away rock at excavation bottom to form level bearing.

C. Remove shaled layers to provide sound and unshattered base for footings, slabs and embankments.

D. In utility trenches, excavate to 8 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

E. Remove excess or unsuitable materials from site.

F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of Section 02221.

3.3 ROCK REMOVAL – EXPLOSIVES METHODS

A. If rock is uncovered requiring the explosives method for rock disintegration, notify the Engineer and execute according to the following conditions.

B. Advise owners of adjacent building or structures in writing and conduct pre-blast survey of wells and structures on adjacent properties, as applicable.

C. Provide seismographic monitoring during progress of blasting operations or limit charges as prescribed in regulations of the Pennsylvania Department of Environmental Protection.

D. Disintegrate rock and remove from excavation.

1. Conduct blasting operations to avoid injury to persons and property.

2. Use explosive quantity and strength required to break rock approximately to intended lines and grades and yet leave rock in unshattered condition.

3. Cover rock with logs or mats, or both where required.

4. Issue sufficient warning to all persons prior to detonating a charge.

5. Store caps and exploders separately from explosives.

6. Remove all explosives from site at completion of blasting operations.

E. Provide the Engineer with copies of daily blasting Records as prescribed in 25 PA Code Chapter 211.46 *"Storage, Handling and Use of Explosives"*.

F. Repair any damage to structures, walls, paving, etc. resulting from blasting activities to satisfaction of property owners.

G. The Owner reserves the right to prohibit blasting and the right to require that rock be removed by drilling and/or drilling and wedging.

3.4 FIELD QUALITY CONTROL

A. Provide for visual inspection of bearing surfaces and cavities formed by removed rock.

END OF SECTION 02211

SECTION 02221 – TRENCHING

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Excavated trenches for utilities as shown on Drawings.

B. Compacted bed and compacted fill over utilities to subgrade elevations.

1.2 RELATED WORK

A. Section 02211 – Rock Removal: Removal of rock during excavation.

1.3 REFERENCES

A. Pennsylvania Department of Transportation Publication 408.

1.4 PERMITS

A. Borough or Township Highway Occupancy Permit and/or Street-Cut Permit.

B. State highway occupancy permit in Authority's name.

C. Blasting permits (Borough or other).

D. Stream crossing permit.

E. Wetland encroachment permit.

1.5 PROTECTION

A. Notify all utilities prior to work so that they may locate all affected facilities.

B. Protect excavations by shoring, bracing, sheet piling, underpinning or other methods required to prevent cave-in or loose soil from falling into excavation.

C. Underpin adjacent structures which may be damaged by excavation work, including service utilities and pipe chases.

D. Notify Engineer of unexpected subsurface conditions and discontinue work in affected area until notification to resume work.

E. Protect bottom of excavations and soil adjacent to and beneath foundation from frost.

F. Use rubber tired or treated equipment on pavement unless otherwise authorized in writing by agency having jurisdiction.

G. Grade excavation top perimeter to prevent surface water run-off into excavation.

H. Contractor, at all times, shall keep the gutters open so that storm or other waters shall not have their flow obstructed. If, in any case, the material excavated from the trenches must temporarily extend over the gutters, it shall be duty of the Contractor to plank or bridge over the gutters without extra compensation so that the flow of water is not prevented.

I. Temporary Protective Construction

1. Temporary Fence Barricade: Erect and maintain substantial temporary fences surrounding excavation to prevent unauthorized persons entering such areas.

2. Temporary Fence: Where necessary, to keep one side of streets or roadway free from obstruction or to keep material piled along side of the trench from falling on private property outside the right-of-way, erect and maintain a safe and substantial fence.

3. Barricades: Furnish and erect substantial barricades at crossings of trenches, or along trenches, to protect the traveling public.

4. Excavation Covers: Cover open excavation when work therein is suspended or left unattended, such as at the end of a work day. For such covers, use materials of sufficient strength and weight to prevent their removal by unauthorized persons.

5. Remove temporary protective construction at the completion of work on the Project.

1.6 WORK IN PRIVATE RIGHT-OF-WAY

A. Right-of-way, if required to be secured by owner, protect from injury all property including land, ornamental shrubs and trees, fences and other improvements there to what may exist and replace in kind all those damaged.

B. Pay all claims for property damage, trespass occupation for damage outside the right-of-way.

C. It shall be the Contractor's responsibility to obtain all other rights-of-way for access to the Construction site. Written authorization from all effected property Owners shall be provided to Engineer before beginning work in the affected area.

PART 2 – PRODUCTS

2.1 SELECT MATERIALS IN ACCORDANCE PENNDOT'S PUBLICATION 408 (The use of any type of Slag Materials is prohibited)

A. Coarse Aggregate AASHTO No. 8 (PennDOT 1B Stone).

B. Coarse Aggregate AASHTO No. 57 (PennDOT 2B Stone).

C. Coarse Aggregate PA No. 2A.

D. Coarse Aggregate PA No. R-3.

E. HMA Superpave.

F. Class E – 1 Emulsified Asphalt Tack Coat.

G. AC – 20 Asphalt Cement.

PART 3 – EXECUTION

3.1 INSPECTION

A. Verify stockpiled fill to be reused is approved.

B. Verify areas to be backfilled are free of debris, snow, ice or water, and surfaces are not frozen.

C. Backfilling of frozen materials is not permitted.

3.2 PREPARATION

A. Identify required lines, levels, contours and datum.

B. When necessary, compact subgrade surfaces to density requirements for backfill material.

3.3 EXCAVATION

A. All excavation shall be unclassified; remove as required for piping installation shown on the Drawings. Excavate subsoil required for piping as shown on the Drawings.

B. Removal of Pavement and Storage of Materials.

1. Grub and clean surface of all materials of whatever nature over the line of trench.

2. Classify material removed and preserve such material as may be required for use in backfilling.

3. Store material removed and preserve such material as may be required for use in backfilling.

4. Cut paving to neat lines equidistant from the centerline of the trench. Width of paving removed initially shall be no greater than the trench width.

5. In business streets, important thoroughfares, narrow streets or other limited areas, proceed as follows:

a. Remove from streets, the first 100 feet or additional length as may be necessary when directed by the Engineer at no additional cost to the Owner.

b. Material subsequently excavated shall be used to backfill the trench where required by the Detail Drawings.

c. Material not required for backfilling or which cannot be stored on streets or right-of-ways shall be removed at no cost to the Owner. Contractor shall at his own expense bring back as much of the required material removed as maybe required to properly backfill the trench or if so required furnish other material as may be necessary at no cost to the Owner.

C. Hand trim excavation and leave free of loose matter. Hand trim for bell and spigot pipe joints.

D. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd, measured by volume. Remove larger material under Section 02211.

E. Excavation shall not interfere with normal 45 degree bearing splay of foundations.

F. Correct unauthorized excavation at no cost to Owner.

G. Fill over-excavated areas under pipe bearing surfaces in accordance with direction by Engineer.

H. Stockpile excavated material in area designated on site and remove excess subsoil not being reused from site.

I. Excavate trenches at least 30 feet in advance of pipe laying except in muck or quicksand where pipe laying must follow as closely as the best interests of the Work will require.

J. Excavated material shall be placed so as to minimize the inconvenience to occupants traveling in streets and driveways of adjoining properties.

K. Excavated material shall not be deposited on private property without written consent of the property Owner thereof has been filed with the Owner.

L. In case more material is excavated from an excavation or trench than can be backfilled over the completed work, or can be stored within the limits of the right-of-way, or in the event working space is limited or space cannot be provided for traffic and drainage, the excess material shall be removed to some convenient place provided by the Contractor. The Contractor shall at his own cost, bring back as much material so removed as may be required to backfill the work; if of the proper kind; or, if so required furnish other material as may be necessary.

3.4 BACKFILLING

A. Support pipe during placement and compaction of bedding fill. The bedding shall be graded by hand to provide a uniform and continuous bearing support for its entire length - bell holes shall be provided at ends of pipe lengths, but size of holes shall be kept to a minimum. The bell holes shall be backfilled with bedding material which shall be compacted and brought up to the height of the adjacent material. After pipe is placed bedding material shall be hand placed and carefully compacted to the dimension shown on the Drawings.

B. Backfill trenches to contours and elevations. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet or spongy subgrade surfaces.

C. Compact all backfill material as shown on detailed Drawings or as directed by Engineer, or the governmental agency.

D. Maintain optimum moisture content of backfill materials to attain required compaction density.

E. Remove surplus backfill material from site.

F. Backfill in accordance with the details shown on the Drawings, or as required by the local governmental agency.

G. Materials shall be placed to 95% of the maximum dry density as determined by ASTM D698 or as directed by the Engineer.

H. At the end of each work day the excavated area shall be completely backfilled and/or steel plates shall be placed over the excavation to accommodate traffic.

I. Backfill shall be free of topsoil, vegetation, lumber, metal and refuse; and free of rock or similar hard objects larger than six inches in any direction. No rocks larger than 6 inches will be allowed in any portion of the trench.

3.5 UNSUITABLE MATERIAL

A. Remove and dispose of unsuitable material encountered during trench excavation work. Replace with R-3 Coarse Aggregate material as specified herein.

3.6 TOLERANCES

A. Top Surfaces of Backfilling: Plus or minus one-eighth (1/8) inch.

3.7 SEEDING

A. General Requirements: The Seeding work shall consist of surface restoration work in lawn areas and also in right-of-ways. Minimum materials requirements are as follows:

1. Topsoil: Use productive topsoil as available on site as excavated. Add topsoil as required using topsoil from Contractor’s source. Provide topsoil that is free of subsoil, clay, stones and materials toxic or otherwise harmful to lawn and grass growth.

2. Lime and Fertilizers: Provide lime and fertilizer which conforms to the applicable State regulations and which is specifically formulated for lawn and grass growth.

3. Lawn Mulch and Mulch Binder: Provide mulch material free of noxious weeds, seed bearing stalks and roots harmful to lawn growth. Provide non-asphalt emulsion binders of water soluble sticking aids, gums and polymers.

B. Grass Seed: New crop seed, furnished in sealed packages with proof of correct mixture evidenced, age of seed indicated and compliance with applicable state regulations evidenced if required.

1. Mixture Type A (Lawns):

Species in Mix	Mixture Percent By Weight	Minimum Percent		Maximum Percent Weed Seed
		Purity	Germination	
Kentucky 31, Tall Fescue	20	90	90	0.50
Kentucky Bluegrass	60	85	80	0.40
Perennial	20	90	90	0.50

2. Mixture Type B (Right-of-Way):

Species in Mix	Mixture Percent By Weight	Minimum Percent		Maximum Percent Weed Seed
		Purity	Germination	
Kentucky Bluegrass	30	85	80	0.40
Perennial Rye Grass	70	90	90	0.15

C. Performance: Place topsoil over the restored areas to an approximate depth of four inches. Grade the surface to meet adjoining grades and to be free of objectionable material larger than two inches.

1. Incorporate lime and fertilizer into the topsoil layer in a tillage operation. Apply lime and fertilizer at the rates recommended on the packages of the individual products.

2. Sow the seed mixtures at the minimum rate of five (5) pounds per 1,000 sq. ft. area and not more than five (5) days after soil supplements have been applied.

a. Cover seeds by imbedding them into the topsoil ¼ inch using equipment designed for the specific purpose.

b. Compact the seeded areas using a lawn roller weighing 60 to 90 pounds per linear foot of roller.

c. Immediately following seeding, apply mulch to a total coverage depth of not less than 1½ inches. Apply mulch binder in the number of passes as needed to secure the mulch but not to exceed three passes with the maximum applied binder not exceeding 10.0 gallons per 1,000 sq. ft.

d. Mulching and seeding to be installed, as required by PennDOT Pub. 408 Sections 804 and 805, or as directed by local Conservation District.

e. All Authority Rights-of-Way are to be free of obstructions, including ruts, rocks, tree stumps, mulch piles, fences and construction debris as to be safely navigable and mowable. Rights-of-Way are to be properly profiled and sloped to be safely mowed and maintained.

END OF SECTION 02221

SECTION 02270 – EROSION AND SEDIMENT POLLUTION CONTROL

PART 1 – GENERAL

1.1 DEVELOPER SEWER EXTENSIONS

A. The Developer and Developer's Engineer and Contractor assume all responsibility for design and implementation of the Erosion and Sediment Pollution Control Plan.

1.2 REQUIREMENTS OF REGULATORY AGENCIES

A. Erosion and Sediment Pollution Control Plan:

1. Conduct soil erosion and sediment control work in accordance with rules, regulations and requirements adopted by the Pennsylvania Department of Environmental Protection (DEP) at 25 PA Code Chapter 102.

2. Detail requirements for the control plan are described in an Erosion and Sediment Pollution Control Program Manual that may be obtained from the Bureau of Watershed Management, Division of Waterways, Wetlands and Stormwater Management, Pennsylvania Department of Environmental Protection.

B. Fines and related costs resulting from failure to provide adequate protection against soil erosion and sediment pollution control are the obligation of the Contractor.

C. Soil erosion and sediment pollution control measures employed will be subject to approval and inspection by the Pennsylvania Department of Environmental Protection and/or Lancaster County Conservation District.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 02270

SECTION 02300 – TUNNELING, BORING AND JACKING

PART 1 – GENERAL

1.1 RELATED WORK

A. Rock Removal: Section 02211

B. Trenching: Section 02221

C. Piped Utilities – Sanitary Sewers: Section 02700

D. Service Lateral and Building Sewer Installation: Section 02720

1.2 QUALITY ASSURANCE

A. Workmen Qualifications

1. Employ in the work only personnel thoroughly trained and experienced in the skills required.

2. Have welds made only by welders, tackers and welding operators who have been previously qualified by tests as prescribed in the Structural Welding Code AWS D1.1 of the American Welding Society to perform the type of work required.

B. Design Criteria

1. Provide encasing conduit under highways of sufficient strength to support all superimposed loads, including an American Association of State Highway and Transportation Officials H-20 Loading with 50 percent added for impact.

C. Requirements of Regulatory Agencies

1. Work of this Section within State Highway right-of-way will be subject to inspection by representatives of the Commonwealth of Pennsylvania Department of Transportation (PennDOT), and the work must be performed in accordance with the requirements of the latest edition of the Commonwealth of Pennsylvania, Pennsylvania Code, Title 67, Transportation, Department of Transportation, Chapter 459, Occupancy of Highways by Utilities.

2. Inspection, insurance or other charges demanded by the Commonwealth of Pennsylvania Department of Transportation, or other authority having jurisdiction shall be paid for by the Developer.

3. Work performed within railroad rights-of-way will be subject to all requirements of the railroad. All costs associated with this work shall be paid for by the Developer.

D. Source Quality Control

1. Shop Tests: In accordance with Article 1.5 of the General Instructions, factory test pipe materials listed below. Each pipe manufacturer must have facilities to perform listed test. The Engineer reserves the right to require the manufacturer to perform such additional number of tests as the Engineer may deem necessary to establish the quality of the material offered for use.

MATERIAL	TEST METHOD	NUMBER OF TESTS
Steel Pipe	ASTM A 139 or ASTM A 53	As specified in ASTM A 139 or ASTM A 53 as applicable

2. Laboratory Tests: The Engineer reserves the right to require that laboratory tests also be conducted on materials that are shop tested. Furnish labor, materials and equipment necessary for collecting, packaging and identifying representative samples of materials to be tested and the shipping of such samples to the Testing Laboratory.

3. Minimum casing diameter will be 36 inches for main lines.

4. Casing for service laterals will be on a case by case basis. Minimum casing size for service laterals is 10 inches.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials (H-20): (AASHTO) Loading for Conduits Installed Under Streets, Road or Highways.

B. American Society for Testing and Materials

1. ASTM A 53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

2. ASTM A 123, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

3. ASTM A 139, Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 in. and Over).

4. ASTM A 307, Specification for Carbon Steel Externally Threaded Standard Fasteners.

5. ASTM A 569, Specification for Steel, Carbon (0.15 Maximum Percent, Hot-Rolled Sheet and Strip, Commercial Quality.

6. ASTM A 615, Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

7. ASTM C 32, Specification for Sewer and Manhole Brick (Made from Clay or Shale.)

8. ASTM C 33, Specification for Concrete Aggregates.

9. ASTM C 150, Specification for Portland Cement.

10. ASTM C 270, Specification for Mortar for Unit Masonry.

C. American Welding Society: AWS D1.1 Structural Welding Code.

D. Commonwealth of Pennsylvania Department of Transportation (PennDOT), Specifications Publication 408/2011, as supplemented.

1. PADOT Section 703.2 Coarse Aggregate.

1.4 SUBMITTALS

A. Shop Drawings and Products Data: Furnish completely dimensioned shop drawings, cuts or other data as required to provide a complete description of Products to be installed.

B. Certificates: 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.

C. Furnish PennDOT for approval, detail drawings, accompanied by design calculations, for the tunneling shield, tunneling pits, including sheeting and bracing therefore, tunnel liner plate and tunneling procedure and grouting method and all such drawings and computations shall bear the seal of a Registered Professional Engineer.

D. Furnish PennDOT for approval, detail drawings, accompanied by design calculations, for boring or jacking pits including sheeting and bracing therefore, steel pipe and boring or jacking procedure and grouting method and all such drawings and computations shall bear the seal of a Registered Professional Engineer.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Transport, handle and store materials and Products specified herein in a manner recommended by the respective manufacturers of such to prevent damage and defects.

1.6 SITE CONDITIONS

A. Scheduling

1. Perform tunneling, boring or jacking operations continuously on a 24-hour basis if required by PennDOT or Railroad Company.

B. Protection: As specified in Section 02221 and such added requirements included herein.

1. Adequately support and protect utilities and facilities that are encountered in, or may be affected by, the work.

2. Accommodation of Traffic: As specified in Section 01570.

3. Explosives and Blasting: Not permitted in performance of work of this Section.

4. Excavation Conditions: As specified in Section 02221.

5. Excess Materials: As specified in Section 02221.

6. Borrow Material: As specified in Section 02221.

PART 2 – PRODUCTS

2.1 ENCASING CONDUIT

A. Steel Tunnel Liner Plate: Cold formed, steel, four flanged liner plates.

1. Minimum Inside Neutral Axis Diameter: 36-inches

2. Minimum Thickness: U.S. Standard Gauge 8, marked on each liner plate by manufacturer.

3. Steel: Structural quality hot rolled carbon steel; ASTM A 569.

4. Provide tapped grout holes and plugs (minimum 1½ inch diameter) in every third plate.

5. Hot Dipped Galvanized: ASTM A 123.

6. Nuts and Bolts: Minimum ½ inch diameter, coarse thread, conforming to ASTM A 307, Grade A.

7. Coating: Factory coat inside and outside with asphaltic material to a minimum thickness of 0.05 inch.

8. Acceptable Manufacturers:

a. Armco Drainage and Metal Products, Inc.

b. Republic Steel Corp.

c. Commercial Shearing and Stamping Company.

d. Or Equal.

B. Steel Pipe: ASTM A 139, Grade B or ASTM A 53, Grade B.

1. Minimum Diameter for Main Line Sewers: 36 Inches.

2. Minimum Diameter for Service Laterals (case-by-case basis): 10 Inches.

3. Minimum Wall Thickness: As required by design criteria.

2.2 SEWER PIPE AND FITTINGS

A. SDR-35 PVC Pipe: As specified in Section 02700.

B. Ductile Iron Pipe (DIP): As specified in Section 02700.

2.3 MISCELLANEOUS MATERIAL

A. Casing Spacers

1. Spacers shall be made of Stainless Steel and UHMW polymer plastic runners.

2. Shall be supplied by Advance Products & Systems, Inc., PO Box 53096, Lafayette, LA 70505-3096. 1-318-233-6116.

B. End Seals

1. 1/8-Inch thick synthetic rubber with S.S. Brands.

2. Model AC Pull on End Seal by Advance Products & Systems, Inc.

C. Aggregate Backfill

1. AASHTO No. 8 (PennDOT 1B stone) Coarse Aggregate conforming to PennDOT Section 703.2.

D. Sand: ASTM C 33, fine aggregate.

E. Hold Down Rod: Reinforcement bar, ASTM A 615, Grade 60, deformed.

1. Field coat with Bitumastic No. 300-M as manufactured by Koppers Company, Inc., or equal.

2.4 CONTRACTOR OPTIONS IN PRODUCTS

A. The Contractor may install a larger diameter encasing conduit than is shown on the Drawings, provided that the Contractor has secured the prior written approval of the applicable agencies having jurisdiction. If the Contractor elects to install a larger diameter encasing conduit than is shown on the Drawing, all necessary clearances under the roadways, pipe lines or other structures shall be maintained.

PART 3 – EXECUTION

3.1 INSPECTION

A. Inspect Materials and Products before installing in conformance with the inspection requirements of the appropriate referenced standard.

B. Remove rejected Materials and Products from the Project.

3.2 PREPARATION

A. As specified in Sections 02221 and 02211.

3.3 PERFORMANCE

A. Excavation: As specified in Section 02221 and 02211 and such added requirements included herein:

1. Should the Contractor in constructing any tunneling, boring or jacking pit excavate below the subgrade for the pipe sewer, he will be required to backfill the area excavated below the subgrade with Aggregate Backfill or with concrete as required by the Engineer.

B. Tunneling

1. Tunneling shall conform to the applicable requirements of Section 02221 and all applicable requirements of PennDOT.

a. Install the tunnel liner plate to the limits indicated on the Drawings or required by the Engineer or PennDOT.

b. Tunneling pits shall be as shown on the Sewer Detail Drawing entitled "Tunnel Work Pit and Tunnel Liner Plate".

c. Exercise care in trimming the surface of the excavated section in order that the steel liner plates fit snugly against undisturbed material.

d. Do not advance excavation ahead of the previous installed liner plates any more than is necessary for the installation of the succeeding liner plate.

e. Support vertical face of the excavation as necessary to prevent sloughing. Completely bulkhead the heading at any interruption of the tunneling operation.

f. Paint field bolt heads and nuts.

2. Grouting

a. Place a uniform mixture of grout under pressure behind the liner plate and the undisturbed material.

b. Provide grout holes tapped for no smaller than 1½ inch pipe, spaced at approximately 3 feet around the circumference of the tunnel liner plates in every third ring.

c. Start grouting at the lowest hole in each grout panel and proceed upwards simultaneously on both sides of the tunnel.

d. Install a threaded plug in each grout hole as the grouting is completed at that hole.

e. Proceed with grouting as required by the Engineer, but in no event shall more than six linear feet of tunnel be progressed beyond the grouting.

C. Boring

1. Boring shall conform to the applicable requirements of the regulatory agency and additional requirements specified herein.

    a. Install the encasing conduit by the boring method to the limits indicated on the Drawings or such additional limits required by the Engineer or regulatory agency.

    b. Excavate and sheet boring pit.

    c. Provide devices at the front of the pipe to prevent auger and cutting heads from leading the encasing conduit. Unsupported excavation ahead of pipe is prohibited.

    d. Over-cut by cutting head not to exceed the outside diameter of the encasing conduit by more than ½ inch.

    e. The use of water or other liquids to facilitate casing placement and spoil removal is prohibited.

    f. If voids develop or if bored-hole diameter is more than 1 inch greater than the outside diameter of the encasing conduit, place grout to fill voids.

    g. Check conduit alignment in a manner and at times required by Engineer. Check alignment and grade at least once per shift as the work progresses.

    h. Completely bulkhead heading at interruptions in boring operation.

    i. Completely weld joints around the circumference between sections of steel pipe encasing.

D. Jacking

1. Jacking shall conform to all applicable requirements of the regulatory agencies and additional requirements specified herein. This operation shall be conducted without hand mining ahead of the pipe and without the use of any type of boring, auguring or drilling equipment.

    a. Install the encasing conduit by the jacking method to the limits indicated on the Drawings or such additional limits required by the Engineer or the regulatory agencies.

    b. Preliminary work shall consist of excavating and sheeting an acceptable shaft on the downstream side of the crossing and the installation of a backstop and guide timbers.

    c. Design: Bracing and backstops shall be so designed and jacks of sufficient rating used so that the jacking can be progressed without stoppage except for adding lengths of pipe.

    d. Accurately place guide timbers on line and grade.

    e. Support: The vertical face of the excavation shall be supported as necessary to prevent sloughing.

f. Use poling boards and bulkheads as required if subgrade conditions in the heading are unstable.

g. Jacking and excavation within the pipe shall proceed simultaneously with the ground being cut no more than 2 inches outside the pipe at the top and sides and not less than 2 inches above subgrade at the bottom.

h. The use of water or other liquids to facilitate casing placement and spoil removal is prohibited.

i. If voids develop or if jacked-hole diameter is more than 1 inch greater than the outside diameter of the encasing conduit place grout to fill voids in manner approved by the regulatory agencies.

j. Check conduit alignment in a manner and at times required by Engineer. Check alignment and grade at least once per shift as the work progresses.

k. Completely bulkhead heading at interruptions in jacking operation.

l. Completely weld joints around the circumference between sections of steel pipe encasing.

E. Laying and Testing Pipe: Lay and test pipe in encasing conduit as specified in Section 02700 and such added requirements included herein.

1. Support and maintain the alignment and grade of sewer piping until the concrete cradle is installed and concrete has cured.

2. Provide concrete cradle as indicated on Detail Drawings.

3. Paint exposed portion of hold down rod if used.

F. Encasing Conduit Filling and Closing: After the pipe sewer has been installed in the encasing conduit and has been tested, fill the encasing conduit with sand or AASHTO No. 8 stone. Concrete is not considered acceptable fill material.

1. Close one end of encasing conduit with rubber boot before filling encasing conduit. Close other end of encasing conduit with rubber boot after filling encasing conduit or as operation dictates.

G. Cleanup: As specified in Section 02221.

3.4 FIELD QUALITY CONTROL

A. Testing: After laying pipe in encasing conduit and before filling conduit conduct line acceptance testing as specified in Section 02700.

END OF SECTION 02300

SECTION 02605 – MANHOLES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

B. Section 02700: Piped Utilities – Sanitary Sewers.

1.2 WORK INCLUDED

A. Installation of Manholes, etc.

1.3 QUALITY ASSURANCE

A. Manhole Acceptance Tests

1. General

a. After the manhole has been completely constructed, the frame bolted thereon, and the trench backfilled, a vacuum test shall be performed. A manhole acceptance test shall be conducted after backfilling and bituminous concrete base course or binder course has been completed unless otherwise directed by the Inspector. This test will be done from the rim of the manhole frame.

b. Any damage caused to properties due to sewage handling and/or sewage backup while vacuum testing shall be the responsibility of the Developer/Contractor.

2. Vacuum Testing Equipment

a. Furnish testing equipment as specified in the manufacturer's written instructions. Pressure gauge for this procedure MUST read in inches of mercury, not in PSI.

3. Vacuum Test Procedures

a. Perform vacuum testing in accordance with the testing equipment manufacturer's written instructions.

b. Draw a vacuum of ten inches of mercury and close the valves.

c. Manhole will be acceptable when vacuum does not drop below nine inches of mercury for the following manhole sizes and times:

(1) Four foot diameter - 60 seconds.

(2) Five foot diameter - 75 seconds.

(3) Six foot diameter - 90 seconds.

d. Repair or replace defective manholes and retest.

1.4 SUBMITTALS

A. Submit shop drawings or catalogue cuts, as appropriate, for materials listed under Article 2.1 of this Section. Submit only those materials that are actually to be used in the work. These materials will usually be as follows:

1. Precast Concrete Manholes

2. Manhole Grade Rings

3. Manhole Steps

4. Manhole Castings

5. Gaskets, Adapters, and Other Appurtenances

6. Inside Drop Bowl

B. Submit manufacturer's Certification of Compliance in accordance with Section 01300.

C. Make submittals prior to start of construction. Make submittals to Engineer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle manholes, manhole frames and covers and appurtenances in accordance with the manufacturer's recommendations, and in such manner as to protect the materials from damage.

B. Manholes and related materials shall be loaded and unloaded by lifting with hoists so as to avoid damage. Under no circumstances shall such material be dropped or skidded against material already on the ground.

C. Manholes and related materials shall at all times be handled with care to avoid damage. The interior shall be kept free from dirt and foreign matter. All manholes, manhole frames and covers and appurtenances shall be carefully lowered or raised into place with suitable equipment in a manner that will prevent damage to the material. Under no circumstances shall manholes or accessories be dropped or dumped.

D. Manholes, and all related materials, shall be thoroughly inspected for defects prior to their being installed. Any defective, damaged or unsound material shall be repaired or replaced as directed.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Manholes

1. Precast Concrete Manhole Base, Top and Riser Sections.

a. Precast Concrete manholes shall be of the design and dimensions shown on the sewer Detail Drawings. Precast concrete bases shall be manufactured in accordance with the requirements of ASTM C478 except as indicated below.

b. All manhole bases will have a minimum six (6) inch antiflotation toe. Calculation are to be submitted by manufacter.

2. Portland Cement: Composition and compressive strength conforming to ASTM C478 except use ASTM C150, Type I or Type III with Xypex Concentrate Admix C-2000 (for sulphate resistance), or ASTM C 150 Type II cement or Type I with portland blast-furnace slag cement or portland-pozzolan cement conforming to ASTM C595, except that the pozzolan constituents of the Type IP portland-pozzolan cement shall be fly ash and shall not exceed 25% by weight.

a. Openings in precast concrete manholes to accommodate the connection of piping shall be custom preformed for each manhole at the time of manufacture. Openings for connection of the piping shall be of the size and shape required for the particular type of pipe seal provided.

b. All precast concrete manholes shall be designed to accommodate AASHTO highway load class HS-20.

c. The tops of the precast concrete bases shall be accurately formed to receive the tongue of the bottom precast concrete manhole section of the wall.

d. The bases shall be monolithically cast and shall consist of a manhole bottom and a wall which shall extend a minimum of 10 inches above the top of the highest influent sewer. The top of the base section shall be carefully formed to receive the tongue of the barrel section. There shall be a minimum distance of 3 inches between the invert of the lowest effluent sewer and floor of the precast base to provide for the construction of a formed invert and bench wall within the manhole.

e Precast top sections shall have hold down bolt inserts factory cast in the top section. Each top shall have four (4) three quarter (3/4) inch threaded inserts or slotted inserts to accommodate manhole frame hold down bolts. Insert types designed for an ultimate load in tension of 12,500 pounds. Coordinate insert locations in the top section to match the bolt hole locations on the manhole frame. All inserts shall be factory plugged before shipping.

3. Monolithic Poured-In-Place Concrete Manhole Bases. (Approval must be obtained from the Authority to use this type of base.)

a. Monolithic poured-in-place concrete bases are permitted for use on a case-by-case basis, with prior written approval of the Authority.

b. Portland cement: As specified in paragraph 2.1, A.2 of this section.

c. Concrete used for poured-in-place manhole bases shall be of a 4,000 psi mix design.

d. Consistency: The concrete shall be of uniform consistency. The maximum allowable slump shall be 2 inches.

(1) This strength requirement shall be verified by tests. At least one test shall be made per day or one test per structure. A test shall consist of at least two cylinders whose 28-day compressive strengths shall be determined by an approved laboratory.

4. Concrete used for channels inside precast manhole bases shall be of a 3,500 psi mix design with a 3/8-inch diameter maximum allowable aggregate size.

a. Consistency: The mixed concrete shall be of uniform consistency. The maximum allowable slump shall be 1 inch.

b. Portland cement: As specified in paragraph 2.1, A.2 of this section.

5. Precast Reinforced Concrete Manhole Riser and Top Sections

a. As specified in paragraph 2.1, A.1 of this section.

6. Steel Reinforcement

a. Steel reinforcement used in the manufacture of precast concrete manhole bases and precast concrete riser and top sections shall conform to the requirements specified in Section 6 of ASTM C478.

7. Gasket for Sealing Precast Concrete Manhole Joints

a. Manhole section joint gasket materials specified herein shall be used in accordance with the Detail Drawings. Only one method of joint sealing and gasketing will be permitted for all manholes.

(1) Preformed Plastic Gaskets for Manhole Joints

(a) Flexible plastic gasket-type sealant for manhole joints shall be butyl rubber (plastic) sealant, which shall meet the requirements of Federal Specification SS-S-210A (3.4 Adhesion and Hydrostatic Pressure) and shall conform with the applicable requirements specified in Section 5.7 of ASTM C361.

(b) The sealing compound shall not leak at the joints (while being tested at 10 psi) for a period of 24 hours. Requirements for sag and flow resistance (vertical and overhead 1-inch wide joints) shall be such that no sagging is detected (while being tested at 135°F) for a period of five (5) days. Requirements for chemical resistance shall be such that no visible deterioration of the sealing

compound occurs (when immersed separately in a solution of acid, alkalies and saturated hydrogen sulfide) for a period of thirty (30) days.

(c) The sealing compound shall be supplied in extruded rope form of suitable cross-section. The size of the sealing compound shall be in accordance with the manufacturer's recommendations and sufficient to obtain squeeze-out of the material around the entire interior and exterior circumference when the joint is completed. The sealing compound shall be protected by a suitable removable two-piece wrapper. The two-piece wrapper shall be so designed that one-half may be removed longitudinally without disturbing the other half to facilitate application of the sealing compound. The sealing compound contained within the joint shall be the sole element utilized in sealing the joint from internal and external hydrostatic pressure. Joint surfaces shall be primed, sealing compound applied, and joint made in strict conformance with the written specifications of the sealing compound manufacturer.

8. Pipe Openings and Seals

a. Openings shall be preformed during manufacturing in each base and riser section requiring a pipe opening. Each opening shall accommodate the type of pipe and pipe seal required.

b. Pipe opening seals shall meet the requirements specified in ASTM C923.

c. Pipe opening seals integrally cast with holes for pipe in precast concrete manhole walls shall be all-rubber composition, flexible, pliable and provide up to 15 degrees lateral, diagonal or vertical pipe deflection. Gaskets shall be leak-proof tested to 20 psi and shall meet or exceed rubber quality standards of ASTM C443.

d. Pipe opening seals not cast with holes for pipe shall be pliable and permit deflection. A strong rubber coated steel center compression ring and a long rubber sleeve with a deep groove secured stainless steel clamp shall be used to create a positive seal.

e. Rubber adapter ring for use on PVC pipe in poured-in-place manhole bases shall be recommended by the manufacturer and shall only be used on a case-by-case basis with prior approval of Engineer.

f. Manhole adapters shall be provided for all PVC pipe in cut-in pipe opening and shall be as recommended by the pipe manufacturer.

9. Frame Hold Down Bolts

a. Bolts, nuts and washers shall be stainless steel in accordance with ASTM A307 and ASTM A276.

10. Manhole Steps

a. Aluminum Step: Aluminum alloy 6061-T6, tensile 38,000 psi, yield 35,000 psi. Manhole steps shall be installed in the reinforced concrete walls of the riser and eccentric top sections. Coat the portion of aluminum step being embedded in concrete with bituminous paint.

b. Reinforced Plastic Step: Composed of a 3/8-inch Grade 60 ASTM A615 deformed steel reinforcing bar completely encapsulated in Grade 49108, ASTM D4104 polypropylene copolymer compound Type II.

(1) MA Industries, Inc.: Type PS-2-B or Type PS 4.

(2) Or equal.

c. Field installation of manhole steps shall not be permitted.

d. Steps shall be aligned vertically and spaced so as to be on equal centers in the assembled manhole, a maximum distance apart 16 inches. Steps shall be located the minimum distance from the ends of riser and top sections as shown on the Detail Drawing. Each step shall be embedded in the riser section at least three and one-half (3½) inches but not more than four (4) inches.

11. Manhole Castings

a. Castings for manhole frames and covers shall be heavy duty cast iron.

b. Ferrous Castings shall be of uniform quality, free of blow holes, shrinkage distortion or other defects.

c. Metal shall conform to ASTM A48 Class 30 for gray iron. Designed for AASHTO highway loading class HS-20.

d. All castings shall be manufactured true to pattern; component parts shall fit together in a satisfactory manner. Frames and covers shall have continuously machined bearing surfaces to prevent rocking.

e. As-cast dimensions may vary one half the maximum shrinkage characteristic of the metal or ±1/16 inch.

f. Manhole Casting Schedule

(1) Standard frame and cover.

(a) Total weight, 255 pounds minimum.

(b) Provide two stainless steel recessed lifting eyes. Lifting eyes extending through the cover will not be permitted.

(c) The word “SANITARY SEWER” shall be cast appropriately in the center of the cover. Lettering shall be a minimum of 2 inches high.

(d) Two concealed pick holes shall be provided.

(e) Provide machined dovetail groove centered in lip seat of cover for ¼-inch diameter continous loop polyisoprene or neoprene rubber gasket (40 durometer).

(f) Drill four 7/8-inch diameter holes in frame flange equally spaced.

(2) Watertight frame and cover.

(a) Total weight 600 pounds minimum.

(b) The word "SANITARY SEWER" shall be cast appropriately in the center of the cover; lettering shall be a minimum of 2 inches high.

(c) Two concealed pick holes shall be provided.

(d) The inner lid shall be provided with a machined dovetail groove for a self-sealing ¼-inch diameter continuous loop polyisoprene gasket (40 durometer).

(e) Drill four 7/8-inch diameter holes in frame flange.

g. Manhole frames and covers shall be as shown on the Detail Drawings.

h. Manufacturer

(1) East Jordan Iron Works, Inc., Middletown, DE (no substitutes allowed)

(a) Frame Model Number:1835Z1

(b) Cover Model Number: 1835A1GS

(c) Watertight Model Number: 1040

12. Grade Rings

a. General

(1) Grade adjustment for a manhole shall not exceed six (6) inches.

b. Precast Concrete Grade Rings

(1) Precast concrete grade rings for leveling units shall be manufactured in compliance with the requirements of the Specifications for Precast Reinforced Concrete Manhole Sections, ASTM Designation C478; and shall be as thick as necessary to provide the required grade adjustment, but not less than 1½ inches in thickness. Split grade rings are unacceptable. Broken or cracked concrete grade rings will not be acceptable.

c. Rubber Grade Rings

(1) Rubber grade rings (rubber adjustment riser) for leveling units shall comply with the following:

Physical Properties	Test Results	Test Method
Density	±1.098 g/cm^3	ASTM C 642 – 90
Durometer Hardness - Molded surface - Interior surface	 75A±10 points 73A±10 points	ASTM D 2240
Tensile Strength	1.6 MPa (232 psi) (not less than 1 MPa)	ASTM D 412 - 87
Compression Deformation - Initial deformation - Final deformation	under 1 MPa (145 psi) 6±4% 6±4%	ASTM D 575
Compression Set	0.4% (no more than 4%) under 1 MPa (145 psi)	ASTM D 395
Freeze and Thaw When Exposed to Deicing Chemicals	no loss after 50 cycles	ASTM C 672 – 91
Coefficient of Thermal Expansion	1.08 x 10^{-4} mm/mm/°C (6 x 10^{-5} in/in/°F)	ASTM C 531 – 85
Weathering (70 hours at 70°C) - Hardness retained - Compressive strength retained - Tensile strength retained - Elongation retained	 100%±5% 100%±5% 100%±5% 100%±5%	ASTM D 573 – 88

(2) Rubber grade rings shall only be used in paved areas.

(3) Tapered rubber grade rings shall be used to accommodate sloped paved surfaces.

13. Cement Grout

a. Cement grout shall be non-shrink non-metallic.

b. Use Type I cement where grout is not in contact with sewage.

c. Use Type II (Sulfate Resistant) where grout is in contact with sewage.

14. Waterproofing Mortar

a. Material composition meeting the requirements of ASTM C270, Type M with waterproofing admixture included.

b. Apply in accordance with manufacturer's instructions.

c. Acceptable Manufacturers.

(1) Medusa Waterproofing Paste or Powder; Medusa Cement Company.

(2) Hydralite, Grace Construction Material.

(3) Hydrolox, Chem Master Corporation.

15. Epoxy Bonding Compound

a. Provide a high-modulus, low viscosity, moisture insensitive epoxy adhesive having the following characteristics:

(1) Mix Ratio: 100 percent solids, two component; mixed one part by volume component B to two parts by volume component A.

(2) Ultimate Compressive Strength: 13,000 psi after cure at 73°F and 50 percent relative humidity determined in accordance with ASTM D695.

(3) Acceptable Manufacturers:

(a) Sikadur Hi-Mod; Sika Corporation

(b) Epoxtite Binder; A. C. Horn, Inc.

(c) 452 Epoxy System; Euclid Chemical Company

16. Manhole Lining System (force main and grinder discharges)

a. General Design/Installation Characteristics

(1) A minimum of four (4) manholes downstream and one (1) upstream of any force main discharges will be lined and two (2) downstream and one (1) upstream for grinder pump discharge shall be lined.

(2) Lining of the manhole shall result in a monolithic structure conforming to the shape and contour of the existing manhole.

(3) The liner shall be designed with independent structural hoop strength for full height hydrostatic pressure as if the liner were a secondary vessel inside the existing manhole. The manufacturer shall design adequate liner thickness into the system with or without additional fiberglass layers. Lining system will be required to pass a vacuum test after installation. This testing requirement is also for lining systems which are applied to existing manholes.

(4) The liner shall be completely watertight, free of any joints or

openings other than influent and effluent pipes and cover frame opening.

(5) The liner shall protect the existing manhole surfaces from hydrogen sulfide corrosion.

b. Structural Properties

(1) The liner shall have as a minimum the structural properties listed below:

Compressive Strength	ASTM D-695	8,699psi

c. Liner Materials

(1) The liner shall consist of multiple layers of non-woven and woven materials capable of carrying resin and withstanding installation pressures and curing temperatures. The liner shall be compatible with the resin system used. The liner shall be able to stretch to fit irregularities in the existing manhole. The liner shall be fabricated to a size that, when installed, will tightly fit the internal shape and contour of the existing manhole. Spray lining will have a dry finish thickness of 250mils minimum.

d. Resin

(1) Resin that is compatible with the liner materials and installation process shall be used.

(2) The resin shall have proven resistance to municipal wastewater, sulfuric acid corrosion and hydrogen sulfide gas.

e. Acceptable Manufacturers:

(1) Poly-Triplex® Technologies, Inc., Panama City Beach, FL

(2) Terre Hill Composites, Terre Hill, PA

(3) Sprayroq

2.2 MANHOLE INSERTS

A. Material And Design (To be used only when specified by Authority)

1. The insert shall be manufactured from corrosion proof material suitable for atmospheres and conditions commonly found in wastewater collection systems. The insert shall be made from High Density Polyethylene Copolymer material that meets ASTM Specification Designation D-1248 Class A, Category 5, Type 111. This material shall have superior stress crack resistance, combined with a high impact strength and rigidity. The insert shall have a minimum impact brittleness temperature of 105°F in accordance with ASTM D746-70. Softening temperature shall be 254°F, meeting all requirements of ASTM D 1525-70. The insert will have a tensile strength of 3,700 psi, and an elongation factor 800%, meeting all

requirements of ASTM D 638-71A. The thickness of the insert shall be a uniform 1/8 inch. The insert shall be manufactured to a dimension of approximately 24-inch diameter to be field verified by the Contractor prior to ordering.

2.3 INSIDE DROP CONNECTIONS

A. Inside drops are the only drop style connections permitted; no outside drops are permitted. In new construction, inside drop manholes are to be a minimum of five (5) feet in diameter.

B. Pipe penetrations through the manhole shall be sealed with a rubber boot.

C. A drop bowl and bowl cover with stainless steel hardware shall be installed for the drop and piped from the bowl to the channel with a ninety (90) degree bend at the bottom directing flow into the channel. Drop pipe will be a minimum of 8-inch diamtere and be SDR-35 pipe. All drops must be directed into the manhole channel or a new channel must be formed. Flow from drop connections is not permitted to splash or diffuse over the bench in the manhole.

D. Acceptable manufacturer: Reliner, Inc.

PART 3 – EXECUTION

3.1 MANHOLE CONSTRUCTION

A. General

1. Manholes shall consist of precast reinforced concrete round riser sections and eccentric or flat slab top sections on concrete bases, complete with cast iron frames and covers and aluminum steps.

2. Contractor shall provide precast reinforced concrete bases for manholes. Manholes with drop connections shall be provided with poured-in-place concrete bases or approved alternate.

3. Manholes shall conform to the design and dimensions shown on the Detail Drawings and to the requirements specified herein.

4. Manhole tops installed within streets and ground surfaces of residential areas shall be set to match existing grade and slope.

5. Where the Drawings show manhole tops to be above existing ground in undeveloped areas and in open country, manhole shall be set at the top elevations called for on the plans, unless otherwise directed by Engineer.

6. Manholes installed in undeveloped areas shall be marked with a reflector provided by Developer/Contractor.

B. Manhole Bases (Precast concrete and monolithically poured concrete (monolithically poured bases must be approved by the Authority))

1. All manhole bases shall be installed on a 6-inch layer of coarse aggregate as indicated on the Detail Drawings.

C. Concrete Channels

1. Channel configurations shall be as indicated on the Detail Drawings.

2. In manholes with more than one influent line the channels shall be properly formed as to direct the flow into the main channel and downstream.

3. All channels shall be molded in the concrete base and shall be of proper size, cross section, and to required grade; all bends in channels shall be built with the maximum possible radius. Channels shall be finished smooth in a neat and workmanlike manner with steel trowels.

D. Precast Concrete Riser and Top Sections

1. All precast reinforced concrete risers and top sections necessary to build a completed manhole shall be furnished, and the different sections shall fit together readily to permit effective jointing. Jointing shall be in accordance with the Detail Drawings.

2. Rubber gasket joints between adjacent sections shall be carefully made in accordance with the written instructions of the manufacturer of the precast concrete manhole sections. After the joints have been made, the annular spaces which remain on the inside and outside of the joints shall be completely filled with non-shrink grout.

3. Preformed plastic sealing compound joints between adjacent sections shall be carefully made in accordance with the written instructions of the manufacturer. After the joints have been made, the preformed plastic sealing compound shall be cut or trowelled smooth across the joint on the inside of the manhole wall. Where required on the Detail Drawings, joints shall also be sealed with non-shrink grout.

4. Lifting holes shall be sealed with properly designed tapered rubber plugs. The plugs shall be driven into the lifting holes to make the holes completely water and air tight. Sealing of lifting holes with non-shrink grout will also be permitted.

5. Adjoining riser and conical top sections shall be fitted together to assure true vertical alignment of manhole steps.

E. Manhole Steps

1. The manhole steps shall be as shown on the Detail Drawings and shall be set in a straight line on the side of the manhole and spaced as set forth on the Detail Drawings.

F. Manhole Frames and Covers

1. Where required, final adjustment of frame to elevation shall be made using precast concrete grade rings or rubber adjustment riser. Grade elevation adjustments shall not be permitted to exceed six (6) inches.

2. Joints between precast concrete grade rings for leveling units shall be made with preformed plastic sealing compound, and shall be ½-inch thick and trowelled or trimmed smooth on the inside of the manhole. In addition, the leveling units shall be sealed on the outside surface using non-shrink grout.

3. Joints between rubber grade rings for leveling units shall be made with Sikaflex compound.

4. The joint between the bottom of the frame and the top of grade ring leveling units, or the top manhole section as applicable, shall be made with preformed plastic sealing compound and shall be sealed on the outside surface using non-shrink grout.

5. Frames for all manholes shall be bolted to the manhole as shown on the Detail Drawings. Studs, nuts and washers shall be of stainless steel. Bolts shall have a sufficient number of proper sized threads for proper connection.

6. Bolt frames to top manhole section in rights-of-way only. Do not bolt frames in roadway areas.

7. Secure covers to frame as shown on the Detail Drawings.

8. Manhole frames and covers placed in paved areas shall be set a minimum of ¼ inch and maximum of ½ inch below finished blacktop grade as measured from the highest point on the manhole frame and/or cover.

END OF SECTION 02605

SECTION 02700 – PIPED UTILITIES-SANITARY SEWERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

A. Installation of Sanitary Sewers, Manholes, Specials, etc.

1.3 QUALITY ASSURANCE

A. Piping and specials specified herein shall be essentially the standard products of manufacturers who have been regularly engaged in the successful production of high quality materials of this type for at least ten (10) years, have supplied such materials for at least five (5) years of the ten-year period, and have at least five (5) installations in successful operation for at least five (5) years.

B. Repair or replace defective piping or specials.

C. Sewer Line Acceptance Tests

1. General

a. All sewers and plugged laterals shall be air tested. Sewer lines will be tested for leakage between manholes as the work progresses. The allowable leakage rates shall apply to each reach of sewer line, manhole-to-manhole, manholes included.

b. PVC sewers installed shall be tested for deflection.

c. All sewers, including manholes, shall be inspected prior to air testing, and all visible or detectable leaks shall be repaired before testing begins. The line acceptance tests shall be made after backfilling has been completed.

d. The Contractor shall repair all visible or detectable leaks or defects of any nature.

e. Any damage caused to properties due to sewage handling and/or sewage backup while air testing shall be the responsibility of the Developer/Contractor.

2. Testing equipment (Provided by Contractor)

a. Air Testing

(1) Air testing shall be performed utilizing testing equipment consisting of an air-compressor and storage tank of adequate capacity; an air control panel equipped with all necessary piping, valves and pressure gages to control the rate at which the air flows to the test section and to monitor the air pressure inside the test section; and all required plugs. In order to prevent overloading the test section with the full pressure of the compressor, the test equipment must be provided with an approved pressure relief device set to blow out at 10 psi. An extra pressure gage of known accuracy shall also be provided so that the gages of the test equipment can be frequently checked. All gages shall be oil filled and shall read to the half (1/2) P.S.I. increment.

b. Deflection Testing

(1) Deflection testing shall be performed using a rigid "Go-No-Go" device. A hydro-cleaner or blower/parachute device, complete with string lines, shall be provided for attaching pull lines.

(2) All sewer lines shall be tested. Testing shall be performed after the line as been backfilled for a minimum of thirty (30) days.

3. Cleaning

a. No debris, silt or other material shall enter existing sewers. It shall be the responsibility of the Contractor to have the pipe clean at the time of air testing and deflection testing. If required, the pipe shall be cleaned by hydro-flushing with water or by passing through the pipe a full gauge squeegee.

b. All cleaning must be done in a manor to prevent debris from passing down stream of the construction area.

c. The Authority requires that all sewers be televised after they have been cleaned. All televising shall conform to the NASSCO standards.

d. Provide a DVD and paper log sheets, for each run, with all sanitary sewer facilities. DVD will have lengths of runs, lateral locations, etc.

4. Air Testing Procedure

a. All wyes, tees or end of side sewer stubs placed for future connections shall be plugged with flexible-joint caps, or acceptable alternate, securely fastened to withstand the internal test pressure. Plugs or caps shall be readily removable.

b. Testing of any sewer may not be conducted until backfill and compaction are completed. Each pipe section shall be tested with low pressure air at 4.0 psi greater than the average back pressure of any groundwater that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization, adding only the amount of air required to maintain pressure.

c. The pipe shall hold the required test pressure for the duration prescribed in the air test table (Table 1) at the end of this section.

d. Repair and retest sections of sewer not meeting test requirements.

5. Deflection Testing Procedure

a. Use Go-No-Go device in accordance with pipe manufacturer's requirements. Testing shall be performed a minimum of thirty (30) days after the manhole run has been completed, including the installation of all lateral piping.

b. Unless specified otherwise by Engineer, long term pipe deflection (reduction in vertical inside diameter) shall not exceed 5 percent.

c. Repair and retest sections of sewer not meeting test requirements. (Repair: Removal and replace section that does not meet test requirements.)

D. Minimum Testing Requirements

1. Securely fasten and brace all line plugs in the pipe section being tested so that none of the plugs are suddenly released when the compressed air is applied to the pipe section. Limit the internal pressure in the sewer line to 5 psi greater than the average back pressure of any ground water that may submerge the pipe.

2. All gages, air piping manifolds and valves of the air testing equipment shall be located above ground at the top of the trench.

3. No one shall be allowed in the manhole during testing.

4. Special care shall be exercised during removal of plugs; and the pressure in the piping of the test section shall be completely relieved before any plug shall be removed.

E. Pressure Testing of Force Mains (Hydrostatic Test)

1. All completed pipe shall be tested for leakage between valves and bulkheads to encompass the entire length of the force main.

2. Piping shall hold the test pressure for 2 hours without pumping. Repair any visible leaks.

3. Hydrostatic pressure tests shall not be made until at least seven (7) days after concrete thrust blocks are installed. The Contractor, at his option and expense, may use high early strength concrete for thrust blocks in which case hydrostatic pressure tests shall not be made until at least three (3) days have elapsed.

4. The section of force main being tested shall be filled with water a minimum of 24 hours before the main is tested. The Contractor shall insure that air is expelled from the pipeline in accordance with AWWA C-600, Section 4.1.3. Any taps necessary to release air or water from the main during testing shall be made at the Contractor's expense. Taps shall then be plugged after the test has been completed.

5. After the pipeline has been filled with water for 24 hours, the Contractor shall conduct a hydrostatic test. Each section of force main shall be tested at 1½ times the maximum pump shut off head for two (2) hours. The Contractor shall not employ a test pressure, which exceeds the allowable pressure of any installed pipe, valve or appurtenance.

1.4 SUBMITTALS

A. Submit shop drawings or catalogue cuts, as appropriate, for materials listed under Article 2.1 of this Section. Submit only those materials that are actually to be used in the work. These will usually be as follows:

1. Pipe and Fittings, Air Release Valve, Gate Valves and Valve Boxes

2. Stone Certifications

3. Gaskets, Adapters, Cleanout Covers and Assessories and Other Appurtenances

4. Detection Tape, Cable, etc.

B. Submit manufacturer's Certification of Compliance in accordance with Section 01300.

C. Make submittals prior to start of construction. Make submittals to Engineer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle the piping, manholes, manhole frames and covers and appurtenances in accordance with the manufacturer's recommendations, and in such manner as to protect the materials from damage.

B. Pipe and related materials shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such material be dropped or skidded against pipe already on the ground.

C. Pipe and related materials shall at all times be handled with care to avoid damage. The interior shall be kept free from dirt and foreign matter. All pipe, manholes, manhole frames and covers and appurtenances shall be carefully lowered or raised into place with suitable equipment in a manner that will prevent damage to the material. Under no circumstances shall pipe or accessories be dropped or dumped.

D. Manholes and all related materials shall be thoroughly inspected for defects prior to their being installed. Any defective, damaged or unsound material, shall be repaired or replaced as directed.

E. All lumps, blisters and excess coating shall be removed from the ends of each pipe. The joints shall be wire brushed and wiped clean, dry and free from oil and grease before the pipe is installed.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Ductile Iron Pipe (Gravity Sewer and Force Mains: 4 inches and larger)

1. Pipe

a. Ductile iron pipe shall be centrifugally cast, annealed ductile iron manufactured in accordance with ANSI A21.51.

b. Pipe joints shall be push-on or mechanical joint and shall conform to ANSI specification A21.11. Furnish joints with all required accessories. Number of joints to be restrained shall be determined by the pipe manufacturer for the conditions encountered (minimum of four (4) joints on each side of the fitting and/or bend shall be restrained). Restrained joint pipe shall be as manufactured by U. S. Pipe, Clow, American or approved equal. The use of mechanical joint pipe with retainer glands may also be used.

c. Gaskets for restrained joints shall be Field Lok 350 gaskets as manufactured by U. S. Pipe or approved equal.

d. If ductile iron pipe is used in air release chambers and/or flushing manholes where the force main pipe is PVC then the ductile iron pipe shall have an interior coating of Protecto401 Ceramic Epoxy Lining as manufactured by Induron.

2. Fittings

a. Furnish fittings in accordance with ANSI 21.10 250 psi rating or ANSI 21.53, 350 psi rating.

b. Joints shall be push-on or mechanical joint in accordance with ANSI A21.11. Furnish joints with required accessories.

3. Cement and Mortar Lining

a. Cement and Mortar line all pipe and fittings in accordance with ANSI A21.4.

b. Paint seal coat in accordance with ANSI A21.4.

4. Ceramic Epoxy Lining

c. The interior of all ductile iron pipe is to be lined with Protecto 401 Ceramic Epoxy Lining, as manufactured by Induron. Coating shall be applied in accordance with the coating manufacturers specifications.

5. Tar Coat exterior of ductile iron pipe and fittings.

6. Furnish gaskets in accordance with ANSI A21.11.

7. All pipe shall be Class 52 unless otherwise specified.

B. PVC Pipe (Gravity Sewers Only)

1. 6-Inch – 18-inch Diameter (Only smooth wall exterior pipe allowed in these diameters)

    a. Unplasticized polyvinyl chloride (PVC) gravity sewer pipe and fittings with integral wall bell and spigot joints meeting ASTM D-3034 specification for Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings, Standard Dimension Ratio (SDR) 35 or ASTM F789.

    b. The pipe shall be joined with an integral bell, bell-and-spigot type rubber gasketed joint. Rubber gasket shall conform to ASTM F 477. The rubber gasket shall be compressed radially on the pipe spigot to form a watertight seal in accordance with ASTM D 3212.

    c. Fittings shall be made of PVC having a cell classification of 12454B or 12454C or as defined in ASTM D 1784. Fabricated fittings with solvent cemented components shall be made in accordance with ASTM D 2855 and taking cognizance of ASTM F 402.

    d. Pipe stiffness at 5% deflection shall be 46 PSI for all pipe diameters when tested in accordance with ASTM D 2412.

    e. Air testing and deflection testing to be performed in accordance with the requirements of this section.

2. 21-inch – 48-inch Diameter.

    a. Unplasticized polyvinyl chloride (PVC) gravity sewer pipe and fittings with integral wall bell and spigot joints meeting ASTM F 679 specification for "Poly Vinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings", or ASTM F 794 specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter or ASTM F1803specification for Poly (Vinyl Chloride)(PVC) Closed Profile Gravity Pipe and Fittings Based on Controlled Inside Diameter.

    b. The pipe shall be joined with an integral bell, bell-and-spigot type rubber gasketed joint. Rubber gasket shall conform to ASTM F477. The rubber gasket shall be compressed radially on the pipe spigot to form a watertight seal in accordance with ASTM D 3212.

    c. Fittings shall be made of PVC having a cell classification of 12454B or 12454C (only) as defined in ASTM D 1784. Fabricated fittings with solvent cemented components shall be made in accordance with ASTM D 2855 and taking cognizance of ASTM F402.

    d. Pipe stiffness at 5% deflection shall be 46 PSI for all pipe diameters when tested in accordance with ASTM D 2412.

    e. Air testing and deflection testing to be performed in accordance with the requirements of this section.

C. Polypropylene Pipe (21-inch and Larger)

1. Pipe and Fittings.

a. Polypropylene pipe shall be manufactured in accordance with ASTM F2736 and ASTM D4101. Polypropylene compound shall meet the material requirements of ASTM 2736, Section 4.

b. Pipe joints shall be push-on with an integral bell and spigot meeting the requirements of ASTM F2736. Spigot shall have two (2) gaskets meeting the requirements of ASTM F477. Joint seal shall meet the watertight requirements of ASTM D3212

c. Pipe stiffness at 5% deflection shall be 46 PSI for all pipe diameters when tested in accordance with ASTM D 2412.

D. High Density Polyethelyne Pipe (HDPE) (Force Mains less than 4-inch Diameter)

1. HDPE pipe may only be used for Force Mains less than 4-inches in diameter.

2. High Density Polyethylene (HDPE) pressure pipe, tubing and fittings for force main piping shall be SDR 11. Manufacturers shall verify the suitability of pipe for the intended applications. HDPE will be green in color.

3. All pipe sizes are to be minimum inside diameters (DIP's) for HDPE pipe. (Example: 4-inch HDPE is 4-inch inside diameter).

4. Materials used for the manufacturer of polyethylene pipe and fittings shall be high density, black PE 3408 meeting the following physical property requirements.

Property	Test Method[(1)]	Nominal Value
Material Designation	PPI/ASTM	PE 3408
Material Classification	D3350	345444C
Density	D1505	0.957
Flow Rate	D1238 (190/21.6)	8.5
Flexural Modulus	D790	136,000
Tensile Strength @ Yield	D638	3,500
ESCR	D1693	F_0>10,000
ESCR, Compressed Ring	F1248	F_0>10,000
UV Stabilizer ©	D1603	2.5
Elastic Modulus	D638	125,000
Brittleness Temperature	D746	≤180
Melting Point	D789	261
Vicat Softening Temperature	D1525	255
Hardness	D2240	64
Thermal Expansion	D696	1.1×10^{-4}
Volume Resistivity	D991	2.6×10^{16}
HDB @ 73.4°F	D2837	1,600
HDB @ 140°F	D2837	800
Molecular Weight Category		Extra High
Molecular Weight	GPC	330,000

(1) Test procedures are ASTM unless otherwise specified. (PPI = Plastics Pipe Institute and GPC = Gel Permeation Chromatography.)

5. Pipe and fittings shall be manufactured from identical material meeting the requirements listed and shall be designed for a 100 psi working pressure. The manufacturer shall certify that samples of the manufacturer's production pipe have been tested in-house, in accordance with ASTM D-2837 and validated in accordance with the latest revisions of PPI TR-3. Under these procedures, the minimum hydrostatic design basis shall be certified by the manufacturer to the 1,600 psi at 73.4°F and 800 psi at 140°F. The pipe and fitting manufacturer shall have an independent PPI Material Listing in accordance with PPI TR-3 and TR-4.

6. Pipe and fittings shall be produced by the same manufacturer.

7. Pipe shall be manufactured in accordance with ASTM F-714. Dimensions and tolerances for pipe outside diameter and minimum wall thickness shall be in accordance with ASTM F-714.

8. Fittings shall be manufactured to the requirements of ASTM D-3261 and as follows:

   a. Fabricated fittings shall be manufactured from pipe of at least one SDR heavier pipe than the system piping, and shall be pressure rated to match the system piping.

   b. The butt fusion outlets of fabricated fittings shall be machined to the same SDR as the system piping to which they are to be fused.

   c. The manufacturer shall subject samples from each molded fittings production lot to x-ray inspection for voids. Voids shall not be permitted, and if found in the samples, the entire production lot shall be x-ray inspected. If additional voids are found, the production lot shall be rejected.

9. Air Release Valve fittings will be Electorfusion Corp Saddles. Outlets shall be 2-inch NPT. Saddles will be as manufactured by Central Plastics Company.

E. PVC Pipe: (Force Mains less than 4-inch diameter and when excessive H2S determined to be an issue)

1 Pipe.

   d. PVC pipe will conform to the AWWA C900 specifications, with gaskets meeting ASTM F 477 and joints in compliance with ASTM D3139. Pipe will be DR 14 (200psi) and green in color.

   e. Joints shall be restrained with a Uni-Flange as manufactured by Ford or approved equal. Joint restraints are required for four (4) joints on either side of any fitting or bend (not including the fitting or bend).

2. Fittings.

a. Sameas noted above. Furnish joints with required accessories including Mega-Lugs for PVC. Mega-Lugs shall be as manufactured by EBBA Iron Works.

b. Joints shall be mechanical joint in accordance with ANSI A21.11. Furnish joints with required accessories including Mega-Lugs for PVC. Mega-Lugs shall be as manufactured by EBBA Iron Work.

3. Cement and Mortar Lining.

a. Cement and Mortar line all pipe and fittings in accordance with ANSI A21.4.

b. Paint seal coat in accordance with ANSI A21.4.

4. Tar Coat exterior of ductile iron fittings.

5. Furnish gaskets in accordance with ANSI A21.11.

F. Pipe Couplings and Adapters

1. All couplings and adapters shall be solid sleeve.

2. Constructed of materials which will pass the strength and chemical requirements of ASTM C954.

3. Approved manufacturers:

a. Mission, Corona, CA

b. Calder, Gardner, CA

c. Dresser, Bradford, PA

G. Flexible Pipe Coupling with Anti-Shear Stainless Steel Collar (For Gravity Sewer and only to be used when directed by the Authority)

1. Provide flexible pipe couplings with anti-shear stainless steel collar designed for differing pipe material connection: and for transition/reducing conditions of differing pipe material connections.

2. Coupling will be PVC material which meets the performance requirements of Commercial Standard Specification CS 226-59. Couplings designed for pipe outside diameter coupling shall incorporate recesses to contain the stainless steel bands. Couplings provided with pre-assembled type 305 stainless steel bands.

3. Use flexible pipe couplings only where directed by the Engineer.

4. Approved manufacturers:

a. FERNCO Inc., Distributed by the General Engineering Company

H. Wye Connections (Sanitary Tee)

1. PVC material to be ASTM D 3034, SDR-35.

2. All wyes shall bear the manufacturer's identifying mark and size.

I. Two-Way Cleanouts

1. PVC material shall be ASTM D3034, SDR-35.

2. On new construction and/or lateral replacement, 2-way cleanouts shall be installed as indicated on the Detail Drawings. Cleanouts shall be installed at all changes in vertical and horizontal directions greater than 45°. Where changes in direction are less than 45°, cleanouts shall be located every 90 feet. Cleanouts to be installed in accordance with the most recent edition of the International Plumbing Code requirements. Two-way cleanouts will be manufactured by:

   a. Plastic Trends, MI

   b. GPK Products, ND

3. All cleanout piping (vertical stack piping) shall be a minimum of six (6) inches in diameter. Cleanouts shall have a treaded cap. Glued caps or plugs are not acceptable.

4. All cleanouts will have a protective cover. Cover will capable of carring vehicular traffic loads. Acceptable manufacturers include:

   a. General Engineering Company, Frederick, MD

   b. East Jordan Iron Works, Delaware, MD

5. Connection between ductile iron pipe and SDR-35 PVC will be made with an MJ × SDR-35 Transition Gasket as maunfacturered by Romac Industries, Inc. No substitutions permitted.

J. Detection Tape and Detection Cable

1. Detection tape shall be a metal detectable reinforced underground utility marking tape with a 50 gauge (0.0005") solid aluminum foil core with permanent printing under a mylar layer.

2. The detection tape shall consist of a minimum 9.0 mil (0.0009") overall thickness, coated and colored cross-woven polyethylene, with no less than 2,500 Lbs of tensile break strength per 12-inch width and color coded suitable for direct burial.

3. Detection tape shall be 2-inch width minimum.

4. The detection tape shall be installed on top of the pipe bedding or a maximum of 12 inches above the pipe (see Trench Detail).

5. Detection cable shall 12 gage multi-strand stainless steel cable. Detection cable is be required for HDPE & PVC force mains. Valve boxes will be placed every 450 feet.

2.2 VALVES AND SPECIALS

A. Gates Valves 4-12 inches in diameter.

1. Gate valves shall be resilient seated meeting of exceeding AWWA C509. Gate valves shall have mechanical joint ends and be equipped with a 2-inch operating nut and be suitable for buried applications. Valves shall open when turned to the left. Valve shall have fusion-bond epoxy coating on the inside and outside of the valve. Valve will have an extension stem which extends to a minimum of two (2) feet below the ground. The valve shall be as manufactured by American Darling.

B. Air and Vacuum Release Valve.

1. Air and vacuum release valve shall be designed to operate (open) while pressurized, allowing entrained air to escape through the air release orifice. Valve shall operate from 0 through 250 psi, close watertight when liquid enters even when fluid is rising without pressure, allow air to enter in the event of a vacuum.
2. Valve body shall be stainless steel (316Ti).
3. Valve shall be equipped with an stainless steel isolation device.
4. Float to be derlin and spindle shall be stainless steel (316Ti).
5. Valve shall be supplied with a flushing attachment consisting of a bronze or stainless steel shut-off valve, quick connect couplings and rubber hose for backwashing with clear water.
6. Valve for the raw wastewater pump station discharge piping shall be a 2" H-TEC (986 w/ Isolation Device).

C. Mechanical Couplings.

1. General: Steel mechanical couplings of the gasketed, sleeve type shall be furnished and installed as required. The coupling shall be of the proper diameter to make a tight joint. The coupling shall not have stops. All couplings shall be for 150 psi working pressure.

2. Material: Each coupling shall consist of one middle ring of a thickness and length suitable for the proposed application and test pressures; two followers; two rubber compounded wedge section gaskets and sufficient trackhead bolts to properly compress the gaskets.

3. Manufacturer.
   a. American Darling.
   b. Mueller.

D. Valves Boxes.

1. All valves buried in the ground where applicable shall be provided with cast iron extension type valve boxes of the roadway type.

2. The valve boxes shall be of three-piece construction, and shall be of the screw type.

3. The valve boxes shall have a 5 1/4-inch shaft, and shall be furnished with covers. Cover will be marked “SEWER”.

4. The valve boxes shall be hot coated inside and out with a tar or asphalt compound.

5. Acceptable Manufacturers.

a. Bingham and Taylor, Culpeper, VA.

b. BIBBY-STE-CROIX Foundries, Inc., PA.

E. Miscellaneous Valves and Piping (Inside Air Release Chamber and Flushing Manhole).

1. Lever operated ball valve will be bronze suitable for 225 pounds of service. Valve shall be one piece body design, blowout proof stem, reinforced Teflon seats and seals, threaded ends and lever operated. Valve will be manufactured by Stockham, NIBCO or Crane.

2. All piping, couplings and unions shall be stainless steel.

PART 3 – EXECUTION

3.1 LAYING PIPE

A. General

1. All new sewers are to have a minimum depth of 8 feet from top of pipe unless approval is otherwise granted by the Authority. All new force mains are to have a minimum depth of 5 feet, from top of pipe, unless approval is granted by the Authority. Maximum depth for sewers is to be twenty (20) feet unless prior approval is obtained from the Authority.

2. Following trench excavation, pipe laying shall proceed upgrade with pipe laid carefully, hubs upgrade, spigot ends fully centered into adjacent hubs, and true to lines and grades given.

3. Each section of pipe shall rest upon 6 inches of approved stone pipe bedding for the full length of its barrel, with recesses excavated to accommodate bells and joints. Each pipe shall be firmly held in position so that the invert forms a continuous grade with the invert of the pipe previously placed.

a. Utilize portable laser to establish grades of sewers, laser shall be used in accordance with manufacturer’s written instructions.

(1) Grade shown on Drawings is that of Sewer invert. Tolerance ±¼-inch.

4. Under no conditions shall pipe be laid in water, on subgrade containing frost, and/or when trench conditions are unsuitable for such work. In all cases, water

shall be kept out of the trench until concrete cradles, supports, encasement or saddles, where used, and materials in the joints have hardened.

5. Any pipe that has its grade or joint disturbed after laying shall be taken up and relaid. Any section of pipe already laid and found to be defective shall be taken up and replaced with new pipe.

6. Walking or working on top of the completed pipeline, except as may be necessary in backfilling or tamping, shall not be permitted until the trench has been backfilled to a height of at least 2 feet over the top of the pipeline.

7. Maintain pipelines free and clear of debris during the progress of the work.

8. At times when pipelaying is not in progress, the open ends of the pipe shall be closed by watertight plug.

9. Diversion of Sewage during Construction

   a. Sewage flowing in existing sewer shall be temporarily plugged or diverted around or through the construction by means of bypass pumping, fluming or any other means acceptable to Engineer.

      (1) If bypass pumping is required, provide stand-by pump equivalent to the largest bypass pump in service.

   b. At completion of each work day tie sewage back into existing sewer. Tie-in shall be covered so there is no visible sewage.

   c. Prior to beginning work, Contractor shall have on hand all requird materials necessary to accomplish the work.

   d. Contractor shall be responsible for any property damage caused by sewage handling.

10. Contractor shall maintain a log of service connection locations and lateral pipe lengths, sizes and depths. The locations shall be based upon sewer line stationing and shall indicate if the lateral is in service or plugged.

B. PVC Pipe

1. Inspect pipe and fittings for defects or damage prior to lowering into the trench.

2. Install PVC pipe and fittings in accordance with manufacturer's written instructions.

3. Do not kick or throw PVC pipe and fittings into the trench.

4. Use of hydrohammer for compaction will not be permitted within four (4) feet of the top of the pipe.

3.2 TWO-WAY CLEANOUTS AND CLEANOUTS

A. Service Laterals and Building Sewers

1. All service laterals and building sewers shall have cleanouts located not more than 90 feet apart.

B. Change in Direction

1. Cleanouts shall be installed in accordance with the International Plumbing Code requirements except maximum spacing between cleanouts shall be 90 feet. Access shall be provided to all cleanouts.

C. Traffic Boxes

1. Traffic boxes shall be installed on all cleanout stacks located in grass areas or paved areas.

3.3 CONCRETE FOUNDATIONS

A. Where required by Engineer, or where shown on the Drawings, pipe shall be placed on a formed concrete cradle, or unformed concrete shall be placed around pipes for bedding and encasement.

B. Concrete cradles shall consist of structures requiring forms and be composed of concrete, built-in trenches to support pipes, and to the dimensions shown on the Detail Drawings.

C. Concrete bedding and encasement shall be composed of concrete placed in trenches, without forms as pipe bedding, or encased around pipes, to the dimensions and in the locations indicated on the Detail Drawings.

3.4 AUTHORITY

A. The Authority reserves the right to retest at the Developer's expense, any piping throughout the duration of the Construction Period.

B. Make repairs to piping found defective by such Authority conducted tests.

C. The Authority will make a final inspection of the installed sewer system upon completion of the street construction, including paving. This inspection will be made to verify final grade of manholes frames and covers and that the interior of the manholes are clean and free from leaks. The Contractor will clean and televise the sanitary sewers and provide video documentation to the Authority.

D. The warranty period will begin with all conditions being satisfactory to the Authority in its final inspection and Dedication.

E. Eighteen (18) months from the Authority's final inspection and approval of the Developer installed sewer extension, a reinspection will be performed to verify that the manholes and sewer mains continue to be free of leaks and defects. Defects found shall be repaired as if under the terms of the original contract.

END OF SECTION 02700

TABLE 1
AIR TEST TABLE

SPECIFICATION TIME REQUIRED
FOR SIZE AND LENGTH OF PIPE INDICATED

Pipe Diameter (in.)	Minimum Time (min:sec)	Length for Minimum Time (ft.)	Time for Longer Length (sec × Length, ft.)			Specification Time for Length (l) Shown (min:sec)							
						100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.
4	1:53	597	0.19	×	Length	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427	×	Length	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.76	×	Length	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187	×	Length	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709	×	Length	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	1.671	×	Length	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846	×	Length	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235	×	Length	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837	×	Length	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653	×	Length	14:25	21:38	28:51	36:04	43:16	50:30	57:42	46:54

SECTION 02720 – SERVICE LATERAL AND BUILDING SEWER INSTALLATION

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Installation of sanitary sewer service laterals and building sewers.

1.2 DEFINITIONS

A. Service Lateral: That part of the sewer pipe extending from the sewer main to a point near the end of right-of-way. The Quarryville Borough Authority (Authority) requires this pipe to be six (6) inches in diameter. The service lateral installation shall be subject to the inspection and approval of the Authority.

B. Building Sewer: That part of the sewer pipe that extends from the end of the building to the upstream end of the service lateral. Authority requires this pipe to be at least six (6) inches in diameter. The building sewer installation shall be subject to the inspection and approval of the Authority.

C. The service connection is the point between the service lateral and the building sewer pipes. This connection is typically at the curb line and/or right-of-way line.

D. All pipe material will be SDR 35 PVC except if pipe has less than three (3) feet of cover which is located in an area where any type of vehicular traffic will occur, then the pipe material must be made of Ductile Iron.

1.3 QUALITY ASSURANCE

A. Piping and specials specified herein shall be essentially the standard products of manufacturers who have been regularly engaged in the successful production of high quality materials of this type for at least ten (10) years, have supplied such materials for at least five (5) years of the 10-year period, and have at least five (5) installations in successful operation for at least five (5) years.

B. Repair or replace defective piping or specials.

C. Pipe Acceptance Tests

1. General

   a. Laterals shall be tested for leakage between test tees after lateral installation has been completed. The allowable leakage rate shall be zero.

   b. All laterals shall be inspected prior to air testing. All visible or detectable leaks shall be repaired before air testing begins. The line acceptance tests shall be made after backfilling has been completed.

   c. The Contractor shall repair all visible and detectable leaks or defects of any nature.

2. Testing Equipment (Supplied by Contractor)

a. Air Testing

(1) Air testing shall be performed utilizing test equipment consisting of an air compressor and storage tank of adequate capacity; an air control panel equipped with all necessary piping, valves and pressure gauges to control the rate at which the air flows to the test section and to monitor air pressure inside the test section; and all required plugs. To prevent overloading the test section with the full pressure of the compressor, the test equipment must be provided with an approved pressure relief device set to blow out at 10 psi. An extra pressure gauge of known accuracy shall also be provided to frequently check the test equipment gauges. The air testing equipment and all accessories shall be subject to approval of Authority.

3. Cleaning (Performed by Contractor)

a. No debris, silt or other material shall enter the lateral. It shall be the responsibility of the Contractor to have the pipe cleaned at the time of air testing. If required, the pipe shall be cleaned by hydro flushing with water or by passing through the pipe a full gauge squeegee in a manner approved by the Authority.

4. Air Testing Procedure

a. All wyes, tees, sweeping tees or end of lateral and/or building sewer placed for future connection shall be plugged with flexible caps, or acceptable alternate, securely fastened to withstand the internal test pressure. Plugs or caps shall be readily removable.

b. Testing of any sewer may not be conducted backfill and compaction completed. Each pipe section shall be tested with low pressure air at 5 psi greater than the average back pressure of any groundwater that may submerge the pipe. At least two (2) minutes shall be allowed for temperature stabilization, adding only the amount of air required to maintain pressure. Test shall be allowed to run for five (5) minutes.

c. Repair and retest sections of lateral not meeting test requirements.

d. Air testing shall be performed utilizing test equipment consisting of an air compressor and storage tank of adequate capacity; an air control panel equipped with all necessary piping, valves and pressure gauges to control the rate at which the air flows to the test section and to monitor the air pressure inside the test section; and all required plugs. The pressure gauge for measuring internal pipe pressure shall be an oil-filled gauge measuring from zero to 10 psi, in one-pound increments. To prevent overloading the test section with the full pressure of the compressor, the test equipment must be provided with an approved pressure relief device set to blow out at 10 psi. An extra pressure gauge of known accuracy shall also be provided to frequently check the test equipment gauges. The air testing equipment and all accessories shall be subject to approval by Authority.

D. Minimum Testing Requirements

1. Contractor shall take care to securely fasten and brace all line plugs in the pipe section being tested so that none of the plugs are suddenly released when the compressed air is applied to the pipe section.

2. Contractor shall be responsible for any damages caused by the internal pressurizing of the sewer line.

3. All gauges, air piping manifolds and valves of the air testing equipment shall be located above ground at the top of the trench.

4. Special care shall be exercised during removal of plugs. The pressure in the piping of the test section shall be completely relieved before any plug shall be removed.

1.4 SUBMITTALS

A. Submit shop drawings or catalog cuts, as appropriate, for materials listed under Article 2.1 of the Section. Submit only those materials that are actually to be used in the Work. These materials generally include the following:

1. Pipe and Fittings

2. Cleanout caps

3. Cast Iron Protection Castings

4. Gaskets, couplings, adapters and other appurtenances.

B. Make submittals to Authority prior to start of construction.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle piping, fittings and appurtenances in accordance with manufacturer's recommendations, and in such manner as to protect the materials from damage.

B. Pipe and related materials shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such material be dropped or skidded against pipe already on the ground.

C. Pipe and related materials shall at all times be handled with care to avoid damage. The interior shall be kept free from dirt and foreign matter. All pipe and appurtenances shall be carefully lowered or raised into place with suitable equipment in a manner that will prevent damage to the material. Under no circumstances shall pipe or accessories be dropped or dumped.

D. All lumps, blisters and excess coating shall be removed from the ends of each pipe. The joints shall wire brushed and wiped clean and dry, and free from oil and grease before the pipe is installed.

PART 2 – PRODUCTS

2.1 MATERIALS

A. PVC pipe (6-inch Diameter)

1. Pipe and Fittings

a. Unplasticized polyvinyl chloride (PVC) gravity sewer pipe and fittings with integral wall bell and spigot joints meeting ASTM D3034 specification for Type PSM PVC Sewer Pipe and Fittings, Standard Dimension Ratio (SDR) 35, or ASTM F 789. (For gasket joints only)

b. The pipe shall be joined with an integral bell, bell-and-spigot type rubber gasketed joint. Rubber gasket shall conform to ASTM F 477. The rubber gasket shall be compressed radially on the pipe spigot to form a watertight seal in accordance with ASTM D3212.

c. Fittings shall be made of PVC having a cell classification of 12454B or 12454C (only) as defined in ASTM D1784.

d. Pipe stiffness at 5 percent deflection shall be 46 psi for all pipe diameters when tested in accordance with ASTM D2412.

2. Saddles

a. Approval from the Authority for the use of a saddle must be obtained prior to installation. The use of saddles will be on a case by case basis. The typical connection to the sanitary sewer main will be by cutting the pipe and installing a WYE connection.

b. All holes cut into the mainline shall be cored by using a coring machine.

c. Gasketed PVC bell inlet connection with stainless steel bands, clamps, bolts and fittings.

d. PVC material shall conform to ASTM D3034, SDR 45.

e. All tee saddles shall bear the manufacturer’s identifying mark and size.

f. Approved products and manufacturers.

(1) Sealtite by General Engineering Company, Frederick, MD.

(2) Engineer approved equal.

B. Schedule 40 PVC with Solvent Weld Joints (Schedule 40 PVC will only be used when directed by the Authority.)

1. Pipe and Fittings

a. Unplasticized polyvinyl chloride (PVC) gravity sewer pipe and fittings shall conform to ASTM D1784 and ASTM D2466, respectively. Jointing shall conform to ASTM D2672.

b. Pipe joints shall be made in accordance with ASTM D2855. Cement shall be in accordance with ASTM D2564.

c. All joints shall be primed with cleaner and cemented. Primer (cleaner) shall be tinted to ensure complete coverage of the joint connection.

d. All joints shall have a minimum set time prior to backfilling. Minimum set times are as follows.

(1) 30 minutes minimum @ 60 to 100°F

(2) 1 hour minimum @ 40 to 60°F

(3) 2 hours minimum. @ 20 to 40°F

(4) 4 hours minimum @ 0 to 20°F

2. Schedule 40 pipe shall only be used to repair existing schedule 40 pipe.

C. Cast Iron Pipe (6-Inch Diameter)

1. Pipe and Fittings

a. Cast iron gravity sewer pipe and fittings of either "Service Weight" or "Extra Heavy" with integral wall bell and spigot joints meeting ASTM A74 specification for cast iron gravity sewer pipe and fittings.

b. Pipe shall be joined with an integral bell, bell-and-spigot type rubber gasket joint conforming to ASTM C564. Rubber gasket shall be compressed radially on the pipe spigot to form a watertight seal.

c. Fittings shall be made of either "Service Weight" or "Extra Heavy" cast iron and shall be of the bell-and-spigot type having a rubber gasket, which meets ASTM A74, and creating a watertight seal.

D. Rigid Pipe Couplings

1. SDR 35 PVC in-line rigid pipe couplings with rubber gaskets.

2. Fittings manufactured in accordance with ASTM D3034 and D1784.

3. Rubber gaskets for fitting shall conform to ASTM F477.

4. Approved manufacturers.

a. GPK Products, Inc., Fargo, ND

b. Plastic Trends, Inc, MI

c. Or equal

E. Flexible Pipe Couplings with Anti-Shear Stainless Steel Collar: Provide flexible pipe couplings with anti-shear stainless steel collar designed for differing pipe material

connection; and for transition/reducing conditions of differing pipe material connections. Flexible rubber couplings without an anti-shear stainless steel collar are not permitted. Flexible rubber couplings are not permitted for use in re-connecting SDR 35 PVC pipe to SDR 35 PVC pipe.

1. Coupling Construction: Virgin PVC material which meets the performance requirements of Commercial Standard Specification CS 226-59. Couplings designed for pipe outside diameter coupling shall incorporate recesses to contain the stainless steel bands. Couplings provided with pre-assembled type 305 stainless steel bands.

2. Acceptable Manufacturers:

    a. FERNCO Inc., Distributed by the General Engineering Company

    b. Or equal

F. Cleanouts

1. Construction shall be in accordance with latest International Plumbing Code.

2. Test tees shall be installed as indicated on the Building Sewer Detail and the appropriate Service Lateral Detail.

3. Cleanouts shall be installed at all changes in vertical and horizontal directions greater than 45°. Where changes in direction are less than 45°, cleanouts shall be located every ninety (90) feet.

4. On new service lateral construction and/or lateral replacement test tees shall be installed as indicated on the Detail Drawings.

5. All cleanout piping (vertical stack piping) shall be the same pipe size as the service lateral or building sewer.

6. Cleanouts shall have a threaded cap or plug.

7. All cleanouts shall have a cast iron cleanout box and cover plate over it.

H. Cast Iron Cleanout Covers

1. Cleanout cover shall be cast iron.

2. Acceptable Manufacturers

    a. East Jordan Iron Works, Inc., Model No. 1565

    b. Or approved equal

PART 3 – EXECUTION

3.1 LAYING PIPE

A. There shall be a 10-foot horizontal separation between water service and service lateral/building sewer. Sanitary sewer laterals shall be located a minimum of fifteen (15) feet from the property line unless otherwise approved.

B. Service Laterals shall be installed a minimum of five (5) feet from any street tree or street light.

C. Where building sewer penetrates foundation wall, a wall sleeve 2 times the diameter of the building sewer shall be used. The gap between the wall sleeve and building sewer shall then be made watertight.

D. Pipe to pipe connections shall be made in accordance with Pipe Reconnection Detail.

E. Following trench excavation, pipe laying shall proceed upgrade with pipe laid carefully, hubs upgrade, spigot ends fully centered into adjacent hubs, and true lines to grades given.

F. Provide test tees as indicated on Detail Drawings.

G. Each Section of pipe shall rest upon the pipe bed for the full length of its barrel, with recessed excavated to accommodate bells and joints. Each pipe shall be firmly held in position so that the invert forms a continuous grade with the invert of the pipe previously placed.

1. Lateral pipe having an inside diameter of 6 inches shall be laid at a grade not less than 1/8 inch per foot (1%).

H. Under no conditions shall pipe be laid in water, on subgrade containing frost and/or when trench conditions are unsuitable for such work. In all cases, water shall be kept out of the trench until concrete cradles, supports, encasements or saddles, where used, and materials in the joints, have hardened.

I. Any pipe that has its grade or joint disturbed after laying shall be taken up and relaid. Any section of pipe already laid and found to be defective shall be taken up and replaced with new pipe.

J. Walking or working on top of the completed pipeline, except as may be necessary in backfilling or tamping, shall not be permitted until the trench has been backfilled to a height of at least 2 feet over the top of the pipeline.

K. Maintain pipelines free and clear of debris during the progress of the Work.

L. At time when pipe laying is not in progress, the open ends of the pipe shall be closed by watertight plug.

M. Inspect pipe and fittings for defects or damage prior to lowering in the trench.

N. Install pipe and fittings in accordance with manufacturer’s written instructions.

O. Use of a hydro-hammer for compaction shall not be permitted within a minimum of 4 feet of the top of the pipe.

P. Install pipe couplings and adapters in accordance with manufacturer’s written instructions.

Q. When placing a stub out of the two-way cleanout located at the Curb Line and/or Right-of-Way line, so as to be behind future utilities, terminate with a bell end and plug.

R. Two separate Building sewers may be laid in the same ditch provided they are three (3) feet apart. However, two different utilities may not be laid in the same ditch.

S. The Developer, as part of the sanitary sewer construction, shall install the Service Lateral to the curb line and/or rights-of-way line and install the 2-Way cleanout at no cost to the Authority. On an existing sewer main, the Service Lateral and/or Building Sewer does not exist then it shall be the responsibility of the property owner to install and pay for the installation from the main to the building.

T. All Building Sewers shall be installed at the property owner's expense. Said Building Sewers heretofore and hereafter installed shall be maintained by and at the sole expense of the property owner.

3.2 CONNECTION OF NEW SERVICE LATERAL TO EXISTING SEWER MAIN

A. Connection of the service lateral to the sewer main shall be made by removing a section of the sewer main and replacing it with an SDR 35 PVC wye branch connection or sanitary tee and then reconnecting this to the sewer main with rigid PVC gasketed couplings.

B. Pipe to pipe connections shall be made in accordance with Pipe Reconnection Detail.

C. Test tees for air testing the service lateral and/or building sewer shall be installed at the service connection between the building sewer and the service lateral or at the right-of-way line.

D. All sewer laterals shall pass an air test before Authority acceptance.

3.3 CLEANOUTS

A. All service laterals and building sewers shall have cleanouts located not more than 90 feet apart. The first cleanout should be located at the curb line and/or at the edge of the Right-of-way.

B. Changes in direction.

1. Cleanouts shall be installed in accordance with latest International Plumbing Code and as indicated on the details. Access shall be provided to all cleanouts.

2. All cleanouts are to have a cast iron protection casting installed regardless of location in paved areas or unpaved areas.

3.4 CLEANING

A. No debris, silt or other material shall be allowed in the lateral. If required, the pipe shall be cleaned by hydro-flushing with water or by passing through the pipe a full gauge squeegee in a manner approved by the Authority.

3.5 AIR TESTING

A. Air testing shall be performed utilizing test equipment consisting of an air compressor and storage tank of adequate capacity; an air control panel equipped with all necessary piping, valves and pressure

gauges to control the rate at which the air flows to the test section and to monitor the air pressure inside the test section; and all plugs required. The pressure gauge for measuring internal pipe pressure shall be oil-filled gauge measuring from zero to 10 psi, in one (1) pound increments. To prevent overloading the test section with the full pressure of the compressor, the test equipment must be provided with a pressure relief device set to blow out at 10 psi. An extra pressure gauge of known accuracy shall also be provided to frequently check the test equipment gauges. The air testing equipment and all accessories shall be subject to approval by the Authority.

B. Immediately following the pipe cleaning, the pipe installation between the sweeping and sanitary tees shall be tested with low-pressure air at 4 psi in excess of the ground water pressure above the top of the lateral. (Pressure should not exceed 5 psi above the ground water pressure.) At least 2 minutes shall be allowed for temperature stabilization, add only the amount of air required to maintain pressure.

C. The pipe shall hold the required test pressure for five (5) minutes, excluding the two (2) minutes stabilization, if any air had to be added.

D. Repair and retest sections of lateral not meeting test requirements.

3.6 CONNECTION OF SUMP PUMPS TO THE SANITARY SEWER

A. Any device, including sump pumps, roof leaders, etc. capable of transmitting ground or surface water into the sanitary sewer system, is prohibited.

B. Any sump pump connected to the sanitary sewer system must be a sealed sump. The sump must have a solid concrete base, or be enclosed in a PVC or Fiberglass enclosure that makes the sump pump incapable of pumping groundwater. Sump pumps used for drainage of washing machines, dehumidifiers, air conditioning units, etc. may be connected to the sanitary sewer system provided the owner can demonstrate that it is a sealed system with no chance of groundwater infiltration. (This connection is only permitted for existing homes connecting to the sanitary sewer.)

END OF SECTION 02720

SECTION 02721 – GREASE INTERCEPTOR

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Installation of Building Sewer grease interceptor.

1.2 RELATED WORK

A. Section 02221 – Trenching

B. Section 02720 – Service Lateral and Building Sewer Installation

1.3 QUALITY ASSURANCE

A. Grease interceptors specified herein shall be essentially the standard products of manufacturers who have been regularly engaged in the successful production of high quality materials of this type for at least ten years, have supplied such materials for at least five years of the ten year period, and have at least five installations in successful operation for at least five years.

B. Repair or replace defective grease interceptor components and piping.

1.4 SUBMITTALS

A. Submit shop drawings or catalogue cuts, as appropriate, for materials listed. Submit only those materials that are actually to be used in the work. These will usually be as follows:

1. Manufacturer shop drawing of grease interceptor.

2. Gaskets, couplings, adapters and other appurtenances.

3. Manhole covers and frames.

4. Stone certification.

B. Make submittals prior to start of construction. Make submittals to Engineer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle the grease interceptor and appurtenances in accordance with the manufacturer's recommendations, and in such manner as to protect the materials from damage.

B. The grease interceptor shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall the grease interceptor be dropped or skidded against materials already on the ground.

C. The grease interceptor shall at all times be handled with care to avoid damage. The interior shall be kept free from dirt and foreign matter. The grease interceptor shall be carefully lowered or raised into place with suitable equipment in a manner that will prevent damage to the material. Under no circumstances shall the grease interceptor be dropped or dumped.

D. The grease interceptor and appurtenances shall be thoroughly inspected for defects prior to being installed. Any defective, damaged or unsound material shall be repaired or replaced.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Grease Interceptors

1. Grease interceptors shall be constructed of reinforced concrete in accordance with ASTM C478.

2. Manhole entry shall have cast iron frame and cover with reinforced concrete base and risers in accordance with the latest edition of the Authority's Standard Construction and Material Specifications for Sewer Collection System.

3. Sizing of grease interceptors shall be based on wastewater flows and grease retention capacity. The minimum size of a grease interceptor is 1,000 gallons.

4. Inlet and outlet of grease interceptors shall be properly baffled.

5. Inlet and outlet of grease interceptors shall be designed to prohibit access by insects and vermin.

6. The detail drawing for the standard minimum size commercial grease trap is provided at the end of these Standard Specifications.

7. Acceptable manufacturers.

a. Monarch Products Company, Inc.

b. Or Equal

PART 3 – EXECUTION

3.1 GREASE INTERCEPTOR INSTALLATION

A. Grease interceptors shall be located within 20 to 30 feet from the plumbing fixtures to be served.

B. Grease interceptors shall be located outside the rear of the building and in non-traffic areas. Where an interceptor must be located in a traffic area, the interceptor shall have a cover designed for heavy traffic loading.

C. Grease interceptors shall be buried so as to intercept the Service Lateral. Toilets, urinals and other similar fixtures shall not discharge to the grease interceptor and sampling manhole.

D. The manhole entry of the grease interceptor shall be finished to grade.

E. The inlet, outlet and baffle fittings shall be of a Tee design with a vertical extension of 12 inches from the tank floor and reaching well above the water line.

F. A sampling manhole shall be placed after the grease trap discharge but before any public or private wastewater is combined with the proposed establishment's wastewater. The sampling manhole will be used to sample the discharge of the wastewater leaving the proposed establishment to determine if the grease and oil concentration is in excess of the limits set forth by the Fats, Oil and Grease Ordinance. For sampling manhole requirements, refer to the Detail Drawings attached and the Authority's Standard Construction and Material Specifications for Sewer Collection System.

G. The interceptor shall be accessible at all times to the respective Borough or Township Plumbing Inspector and Authority personnel.

END OF SECTION 02721

SECTION 02722 - LINING OF BUILDING SEWERS AND LATERALS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work includes rehabilitation of existing building sewers and laterals by lining. This document is provided by Dillsburg Area Authority for use by Property Owners and their Contractors should they choose to use this method. The standards in this document must be followed for design and construction. Use of this document for any other purpose other than preparation of plans for submittal to Dillsburg Area Authority or for construction of sanitary sewers in the Authority's service area is forbidden.

1.2. DEFINITIONS

A. Cured-in-Place Liner - Resin impregnated, flexible tube with integral 360° "T" at the service lateral to mainline sewer connection. Tube is inserted from the mainline sewer into an existing sanitary sewer service lateral (with resin and host pipe contacting) and subsequently cured. When cured, the finished liner is continuous and tight fitting to prevent leakage between the host pipe and the liner, and provides a jointless pipe-within-a-pipe.

B. Cured-in-Place Liner for Laterals Entering Manholes - Resin impregnated, flexible tube shall be installed for service laterals entering manholes. Tube is inserted from the manhole into an existing sanitary sewer service lateral (with resin and host pipe contacting) and subsequently cured. When cured, the finished liner is continuous and tight fitting to prevent leakage between the host pipe and the liner, and provides a jointless pipe-within-a-pipe.

C. Host Pipe - Existing gravity sanitary sewer service lateral to be internally rehabilitated by installation of a cured-in-place liner.

1. 3. SUBMITTALS

A. The Contractor shall submit the following:

1. Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of liners.

2. Description of process to be used.

3. Television inspection reports and video tapes made before and after liner installation.

1.4. PERMITS

A. Due to the special circumstances of lining, Property Owner must pick up the Sewer Repair Permit at the Authority office. Permits will not be issued to the Contractor.

PART 2 - PRODUCTS

2.1 LINER

A. General Design/Installation Characteristics:

1. The liner shall be one piece consisting of the service lateral/building sewer portion and the mainline 360° "T" portion. The liner shall extend from the insertion point in the mainline sewer to the observation tee or termination point in the service line without joints. The finished installation shall provide a verifiable non-leaking connection at the interface of the mainline and service line.

2. The liner shall be one piece and shall extend from the insertion point in the manhole to the observation tee or termination point in the service line without joints. The finished installation shall provide a verifiable non-leaking connection at the interface of the manhole and service line.

3. The liner shall be continuous in length having uniform wall thickness to provide complete structural integrity. The liner design shall have sufficient strength to support all imposed loads, including dead loads, live loads, and groundwater pressure.

4. The installed liner shall match the configuration of the host pipe, including bends and transitions. The liner shall be able to negotiate pipeline bends of 45° with minimal wrinkling and without splitting or rupturing.

5. Installation and processing shall cause no degradation of the physical properties of the liner, including the continuous lateral connection.

B. Structural Properties:

1. The cured liner shall have as a minimum the structural properties listed below:

Flexural Strength	ASTM D-790	4,500 psi
Flexural Modulus	ASTM D-790	250,000 psi

C. Liner Tube:

1. The tube shall consist of one or more layers of absorbent textile that is needle punched felt or circular knit that may contain fiberglass and meets the requirements of ASTM F1216 and specification D5813, sections 6 and 8. The main sheet and lateral tube shall be constructed to withstand installation pressures and to have sufficient strength to bridge missing pipe segments and flexibility to fit irregular pipe sections. The tube shall be compatible with the resin system used. This coating shall form the inner layer of the finished pipe. The tube shall be fabricated to a size that, when installed, will tightly fit the internal circumference and the length of the host pipe. Allowance shall be made for circumferential stretching during inversion.

2. The outside layer of the tube (before inversion) and the interior of the main sheet (before inflation) shall be coated with an impermeable, translucent flexible membrane.

3. The interface of the main sheet and tube shall be vacuum tested with 10 in. HG by the manufacturer to verify a leak free connection.

4. The main sheet and lateral tube shall be a one-piece assembly formed into the appropriate tee or wye shaped fitting. The main sheet and lateral tube shall be surrounded by a second impermeable, flexible translucent membrane (bladder) that will contain the resin and facilitate the vacuum impregnation and monitoring the resin saturation during wet out.

5. The tube shall be the minimum length to effectively span the distance between the insertion and termination points, in accordance with actual distances as field verified by the Contractor prior to impregnation of the liner tube.

6. The tube shall be fabricated to accommodate transitions in the host pipe without compromising the specified structural properties of the cured pipeliner.

7. The outside of the tube shall be marked for distance at regular intervals along its entire length, not to exceed five (5) feet.

D. Resin:

1. Resin and hardener that are compatible with the inversion process shall be used. The resin shall be able to cure in the presence of water. The initiation temperature for cure shall be less than 180° F.

2. The resin shall be a corrosion resistant polyester, vinyl ester, epoxy resin or silicate and catalyst system that when properly cured within the composite pipe assembly meets the requirements of ASTM F-1216 as well as the physical properties herein.

3. For design purposes, a 50-year time dependent flexural modulus shall be determined in accordance with ASTM D2290 with a minimum test duration of 10,000 hours.

E. Acceptable lateral lining Manufacturers:

1. LMK T-Liner.

2. BLD Service Connection Lateral.

3. Or a preapproved equal.

2.2. HYDROPHILIC SEALS

A. Insignia Hydrophilic O-Rings: Two hydrophilic O-Rings, or BLD equivalent product, shall be installed at the terminal end of the lateral liner and on both ends of the 360° "T" portion within the mainline liner as in the Details.

B. Insignia TM Hydrophilic Connection Hat: Gasket to be installed at the intersection of the lateral liner and the main and liner for LMK products. Use an equivalent manufacture approved hydrophilic material for the BLD products. Reference details at end of this section.

C. Insignia End Seal Sleeve: A seamless molded flange-shaped gasket to be installed within the lateral when the lateral enters a manhole. Both ends of the lateral that enters a manhole must have seals; at the end entering the manhole (end seal sleeve) and at the end where it terminates at the observation tee (o-rings) Use an equivalent manufacture approved hydrophilic material for the BLD lateral system.

D. See attached details for installation of LMK and BLD systems.

PART 3 - EXECUTION

3.1. PREPARATION

A. Cleaning: The host pipe and manhole, if applicable, shall be thoroughly cleaned to remove all internal foreign materials that would prevent proper installation of the liner.

B. Due to the nature of the work, perform pre-renewal CCTV to confirm existing pipe has no depressions or obstructions that would prevent the lining. Confirm these findings with the AUTHORITY prior to repairs being made.

1. Refer the following to Authority for resolution:

a. Pipe with offsets, sags, missing or collapsed pipe, etc. Pipe with these defects must be externally repaired.

b. Connections with less than 2 percent slope.

C. See Section 1 – General Instructions paragraph 1.16 for items required prior to lining.

3.2. INSTALLATION

A. General:

1. The Contractor shall install and process the cured-in-place liner and seals in accordance with the manufacturer's specific detailed instructions.

2. The completed liner shall fit tightly against the inside wall of the host pipe and be locked into the joints of the host pipe.

B. Resin Impregnation:

1. Unless otherwise approved by the AUTHORITY/Engineer, the liner tube shall be impregnated ("wet-out") with resin using a vacuum pump under controlled conditions and calibration rollers specified by the manufacturer. Thorough saturation of the liner tube with resin shall be visibly evident.

2. The volume of resin used shall be sufficient to fill all voids in the tube material at nominal thickness and diameter, and seal the ends at the insertion and termination points. The volume shall be adjusted by adding excess resin in accordance with the manufacturer's recommendations to account for the change in resin volume due to polymerization and to allow for any migration of resin into the cracks and joints of the host pipe.

C. Insertion:

1. The lateral tube and inversion bladder shall be inserted into the launching hose in accordance with Practice F1216. No dry or unsaturated area in the main sheet or lateral tube shall be acceptable upon visual inspection. The main bladder and flat textile sheet (main liner tube) shall be wrapped around a launching device, formed into a tube and secured. The main sheet shall be properly aligned with the bladder so the opening of the main sheet aligns with the opening of the main bladder and wrapped around the 360° "T" launching device. CCTV must verify proper placement of the main sheet prior to inflation.

2. Apply hydrophilic sealant on the backside of the connection a minimum of one-inch wide bead. Use Adeka Ultra Seal P201A or equal.

3. The main bladder shall be inflated causing the main sheet to unwrap and expand; pressing the main tube firmly into contact with the main pipe and embedding the flange shaped gasket or hydrophilic seal between the main tube and the main pipe at the lateral opening. The lateral tube is inverted through the main tube aperture by the action of the lateral bladder extending into the lateral pipe to the termination point of the new double sweeping tee. The bladder assembly shall extend beyond each end of the liner, so the liner remains open-ended and no cutting shall be required.

4. In accordance with ASTM 2561, lateral liners less than 50' in length must terminate no more than 18 inches from the double sweeping tee. Lateral liners greater than 50' in length must terminate no more than 36 inches from the double sweeping tee.

D. Curing:

1. After inversion is completed, the "wet-out" tube shall be either heat cured using suitable heat source equipment or ambient cure. Pressure is maintained pressing the liner firmly against the inner pipe wall until the liner is fully cured. The curing of CIPP shall take into account the existing pipe material, the resin system, and the ground conditions.

2. If heat cured, the temperature must be monitored and logged at the upstream end of the lining. The heat source temperatures shall be monitored and logged during the cure and cool down cycles. The cure temperature and cure time shall be as determined by the pipeliner manufacturer and the manufacturer's recommended cure schedule shall be followed and submitted.

3. If heat cured, the liner material shall be cooled to 100 degrees Fahrenheit or less before relieving pressure on the liner.

E. Finish:

1. The finished CIPP shall be a continuous homogenous liner assembly located at the main/lateral interface and extending into the lateral pipe to the double sweeping tee or otherwise specified distance. The CIPP shall be smooth with minimal wrinkling. It shall be free of dry spots, lifts, and delamination. The CIPP shall include a textile

taper at each end providing a smooth transition to the host mainline liner for accommodating video equipment and maintaining proper flow in the mainline.

2. There should be no resin slugs left behind in the mainline or lateral. Resin slugs must be removed by the Contractor at no cost to the AUTHORITY.

F. In the presence of the AUTHORITY's authorized representative/inspector, televise the liner immediately after installed.

G. No pipeliner protrusions into the mainline sewer are permitted. Protrusions shall be remedied by the Contractor at no additional cost to the AUTHORITY.

3.3. INSPECTION AND TESTING

A. Inspections by the AUTHORITY are required for installation, testing and post installation video. All testing shall be performed with an inspector present. Property Owner shall schedule the inspection with the Contractor and AUTHORITY. If inspection cannot be completed at scheduled inspection time a re-inspection must be scheduled for the following day. Complete visual inspection of installation and testing is required. Pictures/video of installation are not acceptable in lieu of the visual inspection.

B. Observed groundwater infiltration of the Liner is zero.

C. Acceptance Test (Air Test):

1. General:

a. Lined pipes shall be air tested after they are installed and allowed to cure but no longer than 5 working days after they are installed, as described in this section.

b. Air test must include the tee portion in the main and entire liner.

c. All wyes, tees, and or ends of pipe shall be plugged with flexible-joint caps, or acceptable alternate, securely fastened to withstand the internal test pressure. Plugs or caps shall be readily removable.

d. The lined pipe shall be tested with low pressure air to 4 psig. [Or, if groundwater conditions are known, the test pressure shall be determined as follows:

Test pressure = H/2.31 + 5 psig, where H is the depth of groundwater over pipe.

e. Insert solid balls into 6" observation tees on the downstream side.
Install solid ball into the upstream side and downstream side of the mainline.

f. Inflate line from the downstream manhole. To proper pressure. Maximum test pressure shall be 10 psig.

g. At least 2 minutes shall be allowed for temperature stabilization, adding only the amount of air required to maintain pressure.

h. The lined pipe shall hold the required test pressure for 3 minutes after the initial 2 minutes allowed for stabilization.

i. ASTM 2561 permits a drop of 0.5 psi. Anything in excess of this drop is considered a failed test.

2. Air Testing Equipment:

a. Air testing shall be performed utilizing testing equipment consisting of an air-compressor and storage tank of adequate capacity; an air control panel equipped with all necessary piping, valves and pressure gages to control the rate at which the air flows to the test section and to monitor the air pressure inside the test section; and all required plugs. In order to prevent overloading the test section with the full pressure of the compressor, the test equipment must be provided with an approved pressure relief device set to blow out at 10 psi. An extra pressure gage of known accuracy shall also be provided so that the gages of the test equipment can be frequently checked.

b. All gages shall be oil filled and shall read to 1/10 increments.

D. Any defective work shall be repaired at the Contractor's expense and retested. When the pipeline fails to meet test requirements specified previously, comply with the following procedures:

1. Determine source or sources of leakage.

2. Repair or replace defective material, and if a result of improper workmanship, make corrections in the presence of the AUTHORITY.

3. Conduct additional test required to demonstrate that pipeline meets specified tests requirements.

3.4. POST-INSTALLATION VIDEO INSPECTION

A. To document the quality of the installation, the Contractor shall perform a closed-circuit television inspection, in the presence of an Inspector.

END OF SECTION

SECTION 02723 - PIPE BURSTING OF BUILDING SEWERS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work includes rehabilitation of existing Building Sewers by pipe bursting. This document is provided by the Dillsburg Area Authority for use by Property Owners and their Contractors should they choose to use this method. The standards in this document must be followed for design and construction. Use of this document for any other purpose other than preparation of plans for submittal to Dillsburg Area Authority or for construction of sanitary sewers in the Authority's service area is forbidden.

1.2. SUBMITTALS

A. The Contractor shall submit the following:

1. Shop drawings, catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings.

2. Description of process to be used.

1.3. PERMITS

A. Due to the special circumstances of pipe bursting, Property Owner must pick up the Sewer Repair/Modification Permit at the Authority office. Permits will not be issued to the Contractor.

PART 2 - PRODUCTS

2.1. PIPE

A. For Pipe Bursting: Polyethylene Plastic Pipe shall be high density polyethylene pipe (HDPE) and meet the applicable requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter or AWWA C906, ASTM D1248 Polyethylene Plastics Extrusion Materials for Wire and Cable and ASTM D3350 Polyethylene Plastics Pipe and Fittings Materials.

1. The replacement piping shall be a minimum of 6-inch from the main to the Right-of-Way. Piping from the Right-of-Way to the house shall be a minimum of 4-inch or the same nominal size as the existing piping.

2. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

3. Dimension Ratios: The minimum wall thickness of the polyethylene pipe shall be a minimum DR 17.

4. Material color shall be black on the outside with a green stripe or solid black.

5. Pipe shall be one continuous piece; no fusions are permitted without prior approval from AUTHORITY.

B. For reconnections and cleanouts: PVC Pipe (4 or 6-inch diameter):

1. Unplasticized polyvinyl chloride (PVC) gravity sewer pipe and fittings with integral wall bell and spigot joints meeting ASTM D3034 specification for Type PSM PVC sewer pipe and fittings, Standard Dimension Ratio (SDR) 35, SDR 26, or ASTM F789. (For gasket joints only.)

2. The pipe shall be joined with an integral bell, bell-and-spigot type rubber gasketed joint. Rubber gasket shall conform to ASTM F 477. The rubber gasket shall be compressed radially on the pipe spigot to form a watertight seal in accordance with ASTM D3212.

3. A 6-inch cleanout shall be located at the Right-of-Way line and a 4-inch cleanout shall be located at the house.

4. Cleanouts shall be of the PVC two-way type as manufactured by GPK or Plastic Trends, or Vac-a-Tee by LMK Technologies.

2.2. FITTINGS

A. Use HDPE fittings that conforms to cell classification number PE3608, PE4608 or PE4710 as indicated in ASTM F714. The pipe fittings shall be manufactured with an SDR 17 and in compliance with ASTM D2683.

B. Use PVC SDR 35 Fittings on PVC pipe. Fittings shall be made of PVC having a cell classification of 12454B as defined in ASTM D1784.

C. Use Schedule 40 to SDR 35 adapter for reconnection to interior plumbing and connecting HDPE to SDR 35 pipe: SDR 26 PVC fitting “long neck” as manufactured by Multi Fittings or GPK.

D. Flexible Pipe Couplings with Anti-Shear Stainless Steel Collar (only for pipes 6-inches and smaller for reconnection to non PVC or Schedule 40 pipe):

1. Provide flexible pipe couplings with anti-shear stainless steel collar designed for differing pipe material connection; and for transition/reducing conditions of differing pipe material connections. (Flexible-couplings are not permitted for connecting pipe of like materials.)

2. Coupling Construction: Virgin PVC material which meets the performance requirements of Commercial Standard Specification CS 226-59. Couplings designed for pipe outside diameter coupling shall incorporate recesses to contain the stainless steel bands. Couplings provided with pre-assembled type 305 stainless steel bands and screws.

3. Acceptable Manufacturers:

a. FERNCO Inc., Distributed by the General Engineering Company.

b. Or Equal.

PART 3 - EXECUTION

3.1. PREPARATION

A. Cleaning: Clean existing piping interior prior to bursting. Keep open ends of piping and pipe attachment openings capped or plugged until actual connection or actual pipe testing.

B. Due to the nature of the work, perform pre-renewal CCTV to confirm existing Building Sewer has no depressions or obstructions that would prevent the bursting. Confirm these findings with the AUTHORITY prior to repairs being made.

1. Refer the following to Authority for resolution:

a. Pipe with offsets, sags, missing or collapsed pipe, etc. Pipe with these defects must be externally repaired.

b. Connections with less than 2 percent slope.

C. See Section 1 – General Instructions paragraph 1.16 for items required prior to pipe bursting.

D. Before any excavation is done for any purposes, the Contractor shall contact the appropriate One Call agency for determining field locations of existing utilities.

3.2. CONSTRUCTION METHODS – PIPE BURSTING

A. Use proper and suitable tools and appliances for the proper and safe handling, and installation of pipes.

B. The rehabilitation of the existing sanitary sewers by pipe bursting and installation of new HDPE pipe shall be done by use of pneumatic, static or hydraulic bursting head, with pipe splitters. Bursting head is directionally guided by host sewer main and towed under tension by winch, chain or rod assembly. New pipe is towed immediately behind bursting head.

C. Insertion pits shall be of sufficient length to allow the bursting head and new HDPE pipe to enter the host pipe at an angle that will maintain the grade of the existing sanitary sewer.

D. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing facilities, and to protect the pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances will the pipe be stressed beyond its yield stress.

E. The installed pipe shall be allowed the manufacturer’s recommended amount of time, but not less than four (4) hours, for cooling and relaxation due to tensile stressing prior to sealing of the annulus or backfilling of the launching and pull pits.

3.3. INSPECTION AND TESTING

A. Inspections by the AUTHORITY are required for installation, testing and post installation

video. All testing shall be performed with an inspector present. Property Owner shall schedule the inspection with the Contractor and AUTHORITY. If inspection cannot be completed at scheduled inspection time a re-inspection must be scheduled for the following day. Complete visual inspection of installation and testing is required. Pictures/video of installation are not acceptable in lieu of the visual inspection.

B. General Requirements for Testing: Conduct test specified herein so that each Building Sewer pipe bursted is tested to the satisfaction of the AUTHORITY. Tests shall be conducted in the presence of the AUTHORITY:

1. Provide tools, materials, apparatus and instruments necessary for pipeline testing.

2. The testing procedure will need to include the observation tee and stack pipe and the building sewer cleanout and stack pipe if applicable.

3. If the connection to the existing main is being replaced, the tee and pipe reconnections to the main must be tested, except if connecting into a line that is ACP or VCP. Air testing requirements are identified in Section 02700 and Detail Drawings.

C. Testing Equipment: Control valve and test gauge apparatus shall be located above grade during the testing to allow for observation by the AUTHORITY:

1. Use testing apparatus equipped with necessary piping, control valves and gauges to control pressure within piping test section and to monitor pressures throughout the test.

2. To prevent accidental overloading of piping test section, provide testing apparatus with an approved pressure relief device set to relieve at 10 psi. An extra pressure gauge of known accuracy shall also be provided so that the gauges of the test equipment can be frequently checked. All gauges shall be oil filled and shall read to the 1/10 psi increment

3. The test gauge shall be in satisfactory operating condition and recently calibrated. Gauge shall read in one-tenth increments and be liquid filled.

D. Air Acceptance Test: After installation is complete perform a low pressure air line acceptance test in accordance with the Standards listed herein and the following:

1. Test the seal plugs before actual use by testing plugs outside the trench in a short length of pipe pressurized to maximum anticipated testing pressure. Plugs shall hold and be properly braced, and show no movement. All Building Sewers to be tested from 6-inch observation tee.

2. Introduce low-pressure air slowly into sealed pipeline until internal air pressure meets the following requirements. Introduce air until the pressure stabilizes (2 minutes) after which the test period shall begin. Test pressure shall be 5 psig.

(Or, if groundwater conditions are known, the test pressure shall be determined as follows:

Test Pressure = 5 psig + $\frac{H}{2.31}$

where H = depth of groundwater above the pipe in feet.)

a. A successful test is when no drop in pressure (no loss of air at all) is observed.

3. Building Sewer:

a. Insert 6" solid ball in downstream side of observation tee making sure that it is all the way past the T into the 6" pipe.

b. Insert 6" test ball into the top of the 6" observation tee.

c. Insert 4" solid ball into the upstream side of the Building cleanout making sure that it is all the way past the T into the 4" pipe as close to the reconnection point as possible. Testing from inside of the house is permitted if a Building cleanout is not present. If a Building cleanout is not present, and it is not possible to test from inside of the house, a Building cleanout must be installed per the specifications.

d. Insert 4" solid ball into the top of the 4" Building cleanout, if present.

e. Insert 4" solid balls into the top of any remaining intermediate cleanouts, if present.

f. Inflate line to proper pressure. Make sure air source (i.e. air compressor, air tank etc.) is disconnected from the test ball once proper pressure is achieved.

g. Wait for allotted time making sure that there is 0 PSI drop.

h. Deflate line. Make sure liquid filled pressure gauge returns to 0 PSI.

E. Any defective work shall be repaired at the Property Owner's expense and retested. When the pipeline fails to meet test requirements specified previously, comply with the following procedures:

1. Determine source or sources of leakage.

2. Repair or replace defective material, and if a result of improper workmanship, make corrections in the presence of the AUTHORITY.

3. Conduct additional test required to demonstrate that pipeline meets specified tests requirements.

END OF SECTION

DIVISION 11
EQUIPMENT

SECTION 11330 – ABOVE GROUND PUMP STATIONS

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Above Ground Pump Station and Accessories.

B. Pump Force Main.

1.2 REQUIREMENTS FOR ABOVE GROUND PUMP STATIONS

A. Above Ground pump stations shall meet the following requirements:

1. Receive station approval from Authority's Engineer.

2. The Authority has preferences to the types of pumps used for above ground stations. The Developer is reminded to consult with the Authority prior to design of any station.

3. Meet the requirements set forth in this Section and in the Manual.

B. Above Ground Pump Station Applications

1. The Developer shall submit for approval by the Engineer/Authority an summary of information containing the following information:

a. Applications can be obtained from the Authority.

b. Name and address of developer.

c. Project location.

d. Name of manufacturer and model number of equipment to be used.

e. Site plan drawings showing the location of proposed pump station and location of the proposed force main.

PART 2 – MATERIALS

2.1 ABOVE GROUND PUMP STATION

A. General

1. The station shall meet at a minimum all the design criteria as indicated in the DEP Domestic Wastewater Facilities Manual.

2. A minimum of two (2) pumps shall be provided. However, pumping capacity must be provided so that if the largest pump were out of service the peak flow would still be pumped. Pumps shall be of the suction lift variety if feasible.

3. Pre-cast concrete wet well with a lockable stainless steel access hatch. The wet well shall also include a stainless steel ladder with an attached safety device.

4. Heated brick and block building with exterior lighting.

5. Shingled roof.

6. Lifting devices including beam and/or a removable hoist for removal of pumps.

7. Emergency backup power with an automatic transfer switch.

8. Emergency dialer system with phone service.

9. Visible exterior alarm light.

10. Water service both inside and outside of the building.

11. All sewage piping including suction and discharge shall be cement-lined class 52 ductile iron pipe.

12. All force main piping shall be cement-lined class 52 ductile iron pipe with restrained joints.

13. Mercury bubbler level control system with an emergency high-level float.

14. Air release valve(s) as required.

15. Provisions for odor control such as a chemical pump and chemical injection system.

16. All other reasonable requests of the Authority.

B. Submittals

1. Design calculations indicating adequate pump capacity for future conditions. The Engineer shall review and provide approval of the design calculations to assure adequate pump capacity.

2. Site plan and elevation drawings showing:

   a. Location of building(s), structural and architectural details and sections, mechanical, HVAC and electrical drawings and geotechnical reports.

   b. Location and elevations of gravity sewers to the station.

   c. Location and elevations of the force main.

   d. Location and elevations of any air release valves that may be necessary.

3. Calculations justifying pump horsepower and impeller diameter selection.

4. Calculations justifying the anti-flotation system.

5. Shop drawings on all equipment and materials to be provided in the station.

PART 3 – EXECUTION

3.1 START-UP TESTING

A. The Developer is responsible for all start up testing of the new station as well as training of Authority personnel prior to acceptance of the station.

END OF SECTION 11330

SECTION 11400 – SUBMERSIBLE GRINDER PUMP STATIONS

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Submersible Grinder Pump Station and Accessories.

B. Grinder Pump Force Main.

1.2 REQUIREMENTS FOR SUBMERSIBLE GRINDER PUMP STATIONS

A. Submersible grinder pump stations shall meet the following requirements:

1. Receive Grinder Station approval from Authority's Engineer.

2. Meet the requirements set forth in this Section and in the Manual.

B. Grinder Pump Station Applications:

1. Details for submersible grinder pumping station are included in this manual.

2. For each project where the use of grinder pumps has been proposed, the Developer shall submit for approval by the Engineer an application containing the following information:

a. Applications can be obtained from the Authority.

b. Name and address of developer.

c. Project location.

d. Name of manufacturer and model number of equipment to be used.

e. Site plan and elevation drawings showing the location of building(s) using grinder pump stations, location and elevations of gravity sewers to the grinder pump stations, elevations of the top and the base of each grinder pump station, and location and elevations of the pressure sewers.

f. Calculations justifying pump horsepower and impeller diameter selection.

g. Calculations justifying the anti-flotation system.

PART 2 – MATERIALS

2.1 SUBMERSIBLE GRINDER PUMP STATION

A. General:

1. Simplex grinder pump unit shall be used at each residential property location.

2. Grinder pump station shall be installed in a fiberglass-reinforced polyester basin for outdoor installation only. Indoor installation will not be permitted.

3. Grinder pump station shall consist of submersible grinder pump and motor, complete with fiberglass basin, junction box and all internal wiring, slide away mounting system, mercury float switch system, high water alarm, piping and valves, and motor controlled.

4. A control panel shall be provided for each unit and installed on the exterior of each home.

5. The manufacturer of the grinder pump station shall be:

   a. Hydromatic Pump Co. Division:

      500 East 59th Street
      Davenport, Iowa 52808
      (319) 391-8600
      Pump Model SPG 200 or SPGL 200

   b. Peabody Barnes

      651 North Main Street
      Mansfield, OH 44902
      (419) 522-1511
      Pump Model SGV201-MS

   c. Environment One:

      2773 Balltown Road
      Niskayuna, NY 12309
      (518) 346-6161
      GP 2000 Series

   d. Or equal, which must be approved by the Authority.

6. Abbreviations:

   a. ANSI: American National Standard Institute

   b. ASTM: American Society for Testing Materials

   c. AWWA: American Water Works Association

   d. AASHTO: American Association of State Highway and Transportation Officials

B. Grinder Pump and Accessories:

1. Grinder Pump

a. The pump unit shall be driven by a minimum 2 HP 3,450 RPM motor. The Developer shall submit calculations justifying the pump horsepower and impeller diameter selected.

b. The grinder shall be capable of shearing and reducing to a fine slurry all material normally found in domestic sewage. Impeller and pump housing shall be designed with passages capable of passing all materials macerated by the grinder assembly without clogging or nuisance roping within the pump chamber. Pump discharge shall be 1¼ inches.

c. Major components of the pump end, such as casing, impeller, seal plate and intermediate housing, shall be of ASTM class 30 cast iron construction. Pump shaft and hardware shall be 300 series stainless steel.

2. Grinder Assembly:

a. The combination centrifugal pump impeller and grinder unit shall be attached to the common motor and pump shaft made of 416 stainless steel. The grinder unit shall be on the suction side of the pump impeller and discharge directly into the impeller inlet leaving no exposed shaft to permit packing of ground solids. The grinder shall consist of two stages. The cutting action of the second stage shall be perpendicular to the plane of the first cut for better control of the particle size. The grinder shall be capable of grinding all materials found in normal domestic sewage, including plastics, rubber, sanitary napkins, disposable diapers and wooden articles into a finely ground slurry with particle dimensions no greater than ¼ inch. Both stationary and rotating cutters shall be made of 440C stainless steel hardened to Rockwell 55C or 60C and ground to close tolerance.

3. Pump Motor:

a. The pump motor shall be a submersible type, full 2 horsepower, 3450 RPM, suitable to operate on a 230 volt, 60 Hz, single phase service. Stator windings shall be of proper size to drive the pump at any point on the pump curve. Single phase motor shall have start winding as well as run winding thermal protection to prevent stator burn out under high torque starting or operating conditions.

b. The motor shall be oil filled to lubricate upper and lower motor ball bearings as well as to act as a cooling medium for the stator.

c. The motor shall be provided with an electric sensing probe to detect any water leakage past the lower seal before damage is done to the motor. The seal probe circuit sensitivity shall not be affected by cable length between the motor and the seal probe circuitry in the control panel.

d. The stator windings shall be mounted in a corrosion-resistant, hermetically sealed submersible type housing. The Stator windings shall have Class B insulation, (130°C or 266°F), NEMA L design or MG1 (single phase) and shall be potted in a heat-dissipated epoxy, forming a high strength leak

proof assembly to prohibit liquid or other contaminants from entering the windings.

e. The motor shall be provided with a heat sensor thermostat in the motor windings to detect an overheat condition and stop the pump. When the temperature drops to a safe level, the pump will automatically reset.

f. Motor power and control wires shall be sealed between the motor and terminal housings to prevent oil from entering the terminal housing as well as to act as a secondary barrier in the event water enters the terminal housing. A watertight compression type fitting shall provide further protection for each cable.

g. Motor housing, terminal housing, and end plate shall be constructed of cast iron of no lesser grade than Class 30. Motor shaft and hardware shall be 416 stainless steel.

4. Pump Suspension System:

a. The pump suspension system shall enable the pump to be removed from the basin by lifting the grinder pump unit only. Systems requiring removal of pump hardware or breaking of unions (or couplings) will not be acceptable. Removal of grinder pump shall consist of:

(1) Removing basin cover.

(2) Shutting isolation valve.

(3) Lifting out pump assembly.

(4) Removing pump cables form easily accessible waterproof junction box.

b. Mounting system shall be serviceable without entering the basin to replace or adjust components mounted on the bottom of the basin.

c. The slide rail assembly shall consist of 304 stainless steel upper guide rail brackets with the slide rail assembly of 14 gauge 304 stainless steel. The stationary and movable portions of the hydraulically sealed discharge coupling assembly shall be machined cast iron. The upper guide rail bracket shall mount to the basin wall and position the upper end of the stainless steel guide rail while the discharge pipe positions the lower end of the guide rail.

d. Stainless steel guide brackets shall be attached to the pump for positioning of the unit on the guide rail during installation or removal of the unit within the basin.

5. Level Control:

a. Level control shall be by means of mercury float switches, single action design, capable of withstanding water penetration under 25 feet of water with at least a 3 to 1 safety factor. Float switches shall be mounted firmly in place in such a way that prevents tangling or fouling in the basin.

b. Two float switches shall be used to control level; one for pump turn on, and one for pump turn off. A third switch shall be provided for high water alarm.

6. Junction Box:

a. NEMA 4X watertight junction box shall be installed in the basin for connection of the pump and control wiring. The box shall be constructed of self-extinguishing ABS plastic with minimum wall thickness of 3/16 inch. The box cover shall be bolted on with stainless steel fasteners and sealed with a neoprene gasket. Individual corrosion-resistant and liquid tight cable connectors constructed of thermoplastic with neoprene bushing and sealing ring shall be provided. The box and all connections shall be completely watertight and shall be capable of withstanding an external liquid pressure of 10 PSI. The junction box and fittings shall be of waterproof design. All fittings and hardware shall be of non-corrosive construction.

b. Conduit and wiring between basin and control panel shall be installed in accordance with National Electric Codes and all electrical codes.

c. The junction box shall be mounted within easy reach from ground level and must open in such a manner that all connections within can be viewed from the surface without leaning into the basin.

C. Valves, Fittings and Piping:

1. Valves, fittings and piping shall conform with Figures 1 and 2 and meet or exceed properties provided herein.

a. Influent connection shall be a four (4)-inch cast iron or thermoplastic caulking hub shipped loose for field mounting by the installer. The hub shall be designed to be installed without personnel having to enter the basin. The hub shall be beveled approximately 3° to accommodate the gravity pipe. The influent hub shall have a textured surface in order to provide better caulking adhesion.

b. The discharge piping shall consist of 1-1/14 inch schedule 40 stainless steel pipe or SCH 80 PVC. A ball check valve shall be installed between the pump discharge and the movable fitting.

c. The design of the check valve shall be such that the ball shall not impede flow through the valve. The operating flow area shall be equal to the nominal size of the valve. The ball shall clear the waterway providing “full

flow" equal to the diameter of the pump discharge piping. It shall be non-clog in design. The ball shall be resistant to material normally found in sewage. The body and access plug shall be gray cast iron, ASTM Class 30 or better.

d. The movable fitting shall be positive seal, slide design having a working pressure rating of no less than 150 psi. The movable fitting, when in position shall be held against the stationary fitting by the construction of the stainless steel rail, aligning the movable fitting for proper sealing of the two surfaces under pressure. A stainless steel lifting cable with a minimum breaking strength of 2,100 pounds shall be provided for pump installation and removal.

e. A 1¼-inch bronze gate valve shall be installed in the discharge piping to provide shut-off capabilities during pump removal, and shall be fitted with an integral stainless steel extension handle. The extension handle shall extend up to within six (6) inches of the top of the basin and shall be secured at the top of the basin with a stainless steel bracket.

f. A flushing connection shall be provided in the discharge line past the check and isolation valves. The connection shall include a 1¼-inch bronze gate valve, 1¼-inch stainless steel pipe and a 1¼-inch female "Ever-Tite" quick disconnect coupling. The connection point shall be 6 inches below the top of the basin. The flushing valve shall be furnished with a handle of identical construction to that furnished for the isolation valve.

D. Grinder Pump Station Basin:

1. The basin shall be constructed of fiberglass-reinforced polyester with molded top flange and bottom. The basin shall be free of imperfections, sound, watertight and of high quality workmanship. The polyester laminates shall provide a balance of mechanical, chemical and electrical properties to insure a long life. They must be impervious to microorganisms, mildew, mold and fungus, and non-corrosive inside and outside when installed in soils deleterious to metal or concrete structures.

2. The basin shall have a minimum diameter of 36 inches and have other dimensions as shown in the Detail Drawings. Basin shall have a minimum storage capacity of 250 gallons.

3. Basin wall thickness shall be suitable to withstand wall collapse under a hydrostatic pressure of 120 pounds per cubic foot. Basin walls and bottom must be capable of withstanding at least two times the actual imposed loading at basin depth.

4. An anti-flotation collar or bottom plate shall be furnished on the basin. The bottom plate shall be at least six (6) inches larger in diameter than the basin bottom. The bottom shall be an integral part of, and permanently bonded to, the basin.

5. The fiberglass basin shall be equipped with a steel cover coated with a high temperature baked epoxy green-colored paint. Covers shall be securely held in

place by a minimum of six (6) stainless steel bolts threaded into stainless steel inserts in the top collar of the basin. The basin cover shall be provided with a padlock of the solid rustless design with a hardened steel shackle and zinc coating. The padlock shall be keyed to the Authority system.

6. Each basin shall be furnished with a 2-inch PVC rainproof vent, with the opening covered with a corrosion resistant screen. The vent shall be installed in the basin cover and terminate in a down turned position.

E. Controls:

1. Control Components:

a. The control components for operation and protection of the grinder pump station shall consist of the following:

(1) Control transformer for supplying 24 volt A.C. power for all control apparatus plus an adequate amount of additional power for external alarm devices. The transformer shall have secondary protection accessible without opening the inner swing panel.

(2) A power disconnect with an operator handle extending through the inner swing panel without exposing live parts inside the control enclosure.

(3) Short circuit, lightning, overload and motor running overload protection, which meet the National Electric Code standards.

(4) Locked rotor protection for de-energizing the pump motor to protect the run windings of all motors and start windings of single phase motors. The circuitry shall contain a manual reset and shall not be subject to nuisance trips even during periods of power failure.

(5) Motor start and under voltage release by means of an open frame, across the line magnetic motor contactor with contacts made of silver cadmium oxide.

(6) A “Manual-Off-Automatic” selector switch shall be provided within the control panel for operating the pump manually when in “Manual”, pump disable when in “Off”, and normal operation when in “Automatic” position. The selector switch shall not disable the alarms under any condition.

(7) Pump run light to indicate the pump motor has been energized.

(8) Mercury Float switch mounted in the basin which energizes the high water light, alarm light and alarm.

(9) Solid-state moisture sensing device to detect moisture signal from pump, which energizes seal failure light and alarm light.

(10) A 24 volt A.C. 25 watt flashing alarm light with a red globe shall be included and mounted in a manner to prevent rain water from standing or collecting in any gasketed area of the fixture.

(11) A 24 volt A.C. alarm horn with a rainproof conduit box and mounting fixture shall be included which is rated at a minimum of 106 DB at one (1) foot. A panel-mounted switch shall permit silencing of an external alarm device as well as a test mode to assure the alarm device is operable.

(12) Overload reset device operable without opening the inner swing panel.

b. The control assembly shall be completely factory wired except for power feed lines, motor connections and mercury float switches. Wiring shall be done in accordance with all applicable standards set forth by the National Electric Code and shall be color coded and numbered as indicated on factory wiring diagrams.

c. All components shall be electrically grounded to a common ground screw mounted on the removable back panel. Upon installation of the control assembly, and before connection of any power feed lines, installer shall extend a grounding wire from the control panel main ground screw to external ground in accordance with NEC and local electrical codes.

2. Control Enclosure:

a. The pump control enclosure shall be of fiberglass or stainless steel construction designed for corrosion resistance in compliance with NEMA 4X standards. The enclosure shall have a full inner swing panel mounted on a continuous piano type hinge. The inner swing panel shall be fabricated from steel having a minimum thickness of 0.06 inches (16 gauge). The inner swing panel shall have provisions for mounting all basic controls and instruments. It shall have a minimum horizontal swing of 90 degrees and shall be held in closed position by quarter-turn door latches. The outer door shall have a minimum horizontal swing of 180 degrees and shall be held in a closed position by a padlock keyed to the Authority system. The outer door shall be mounted on a stainless steel continuous hinge and have a seal around its entire perimeter.

b. The enclosure shall have a removable back panel of a minimum thickness of 0.078 inches (14 gauge), secured to the enclosure on collar studs or weld nuts. The back panel shall be pre-drilled and tapped to accept mounting of control components. Self-tapping screws shall not be used to mount any component.

c. The enclosure shall be mounted at a position where it is visible from the sewage grinder pump station.

2.2 PRESSURE PIPE (FORCE MAIN)

A. General”

1. Pressure pipe shall be polyethylene plastic pipe of 1¼-inch in diameter.

2. Pressure pipe to DR 26.

3. Schedule 40 or Schedule 80 PVC is not permitted.

4. Approved Manufacturers:

a. Plexco Plastic Piping Systems

b. Engineer Approved equal

PART 3 – EXECUTION

3.1 INSTALLATION

A. Grinder Pump Station:

1. The Developer shall submit the following to the Authority for approval:

a. Site plan showing location of grinder pump station, routing of all piping and electrical wiring.

b. Manufacturer’s catalog data to demonstrate compliance with specifications and figures.

c. Installation details.

2. The grinder pump station shall be installed at a location to be determined by the property owner or Developer.

3. The depth of the grinder pump station will be dependent upon the location and depth of the existing house service. The influent to the basin shall be set so that a minimum grade of two percent for the new gravity service line can be maintained. The minimum total unit depth from the invert of the sump to the top of the entry hatch shall be no less than six (6) feet and no greater than twelve (12) feet. The top of the station shall be 6 inches above final grade.

4. All grinder pump stations shall be installed on a bed consisting of AASHTO No. 8 or No. 57 Coarse Aggregate and shall have a concrete anti-flotation collar poured around the bottom. The basin shall be set on a concrete pad with the anti-flotation collar secured to the concrete with bolts or steel clips; or, the concrete shall be poured around the perimeter of the basin above the anti-flotation collar. In either case, the Contractor shall submit calculations justifying the method chosen and the volume of concrete to be used.

5. The remaining excavated area shall be backfilled to six (6) inches below grade with excavated material containing no soil lumps, stones, concrete or foreign

objects larger than one (1) inch in maximum dimension. Six (6) inches of topsoil with seed and supplements shall be placed to grade the surrounding area.

6. If the excavated material does not meet the requirements described above, a backfill material consisting of AASHTO No. 8 or No. 57 Coarse Aggregate shall be used to a point six (6) inches below the finished grade.

7. The Developer shall schedule an inspection by the Authority before beginning work, before backfilling equipment and piping and at completion of work. The installation shall be approved by the Authority. The Developer shall be responsible for complete and approved installation.

8. Pressure sewer shall be hydrostatically tested by the installer to the satisfaction of the Engineer in accordance with the procedures and requirements established in the sewer manual.

9. Electrical system shall meet all of the latest requirements of the National Electric Code and the public utility furnishing power to the system. Nothing contained in this manual shall be construed to conflict with these requirements and should a conflict occur, these requirements shall apply.

B. Pressure Pipe:

1. Pressure sewer shall be hydrostatically tested by the installer to the satisfaction of the Engineer in accordance with the procedures and requirements established in the sewer manual.

2. Pipe to be installed with appropriate bedding and backfill as indicated on the Sewer Detail Drawings.

3. Connections to manholes shall be made via core-drill and installation of rubber boot.

4. Connections to sewer mainline will only be reviewed on a case by case basis by the Engineer.

END OF SECTION 11400

SEWER DETAIL DRAWINGS

QUARRYVILLE BOROUGH AUTHORITY
STANDARD DETAILS

MANHOLES DETAILS: (MH)

TRENCH DETAILS: (TR)

SEWER PIPING DETAILS: (SEW)

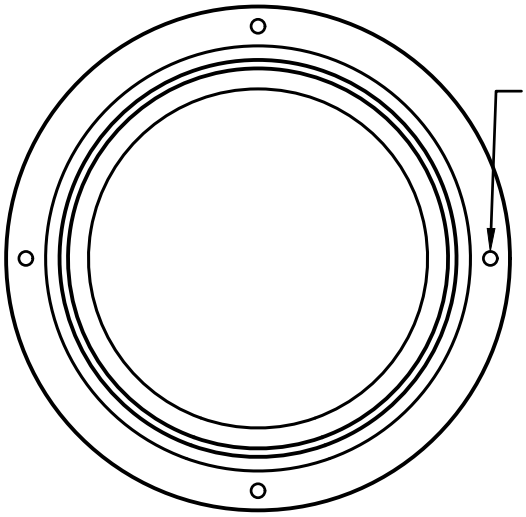
BUILDING SEWER/SERVICE LATERAL DETAILS: (LAT)

LOW PRESSURE SANITARY SEWER DETAILS: (LP)

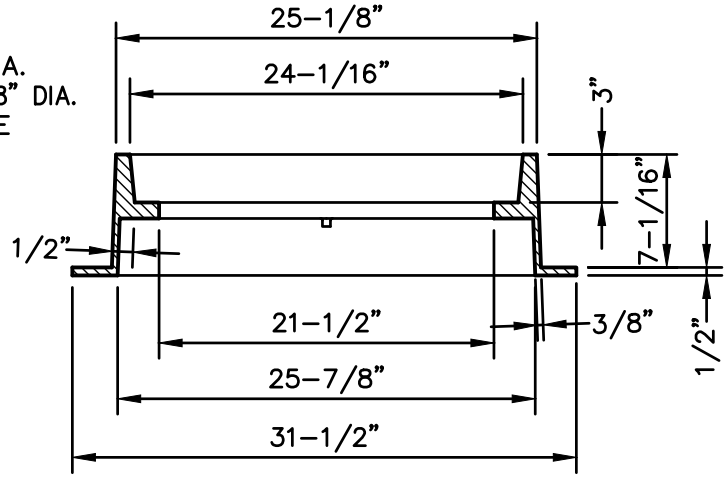
GREASE INTERCEPTOR DETAILS: (GR)

FORCE MAIN DETAILS: (FM)

PUMPING STATION DETAILS: (PS)

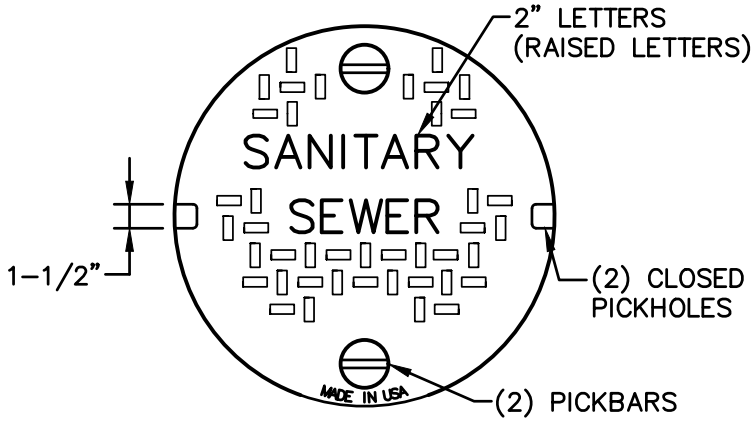


PLAN



SECTION

MANHOLE FRAME DETAIL



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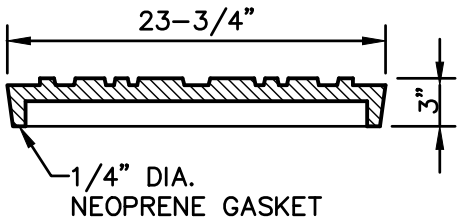
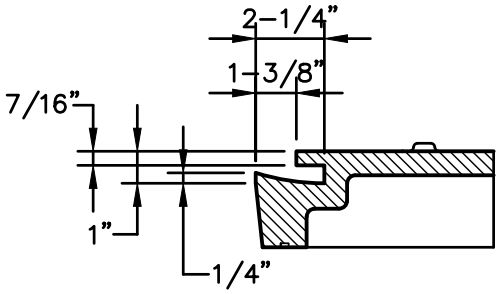
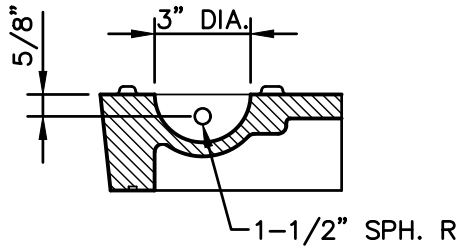


SECTION



PICKHOLE DETAIL



PICKBAR DETAIL

MANUFACTURER: EAST JORDON IRON WORKS – FRAME 1835Z1, COVER 1835A1GS

FILE NAME: MH-5-FRAME&COVER.dwg

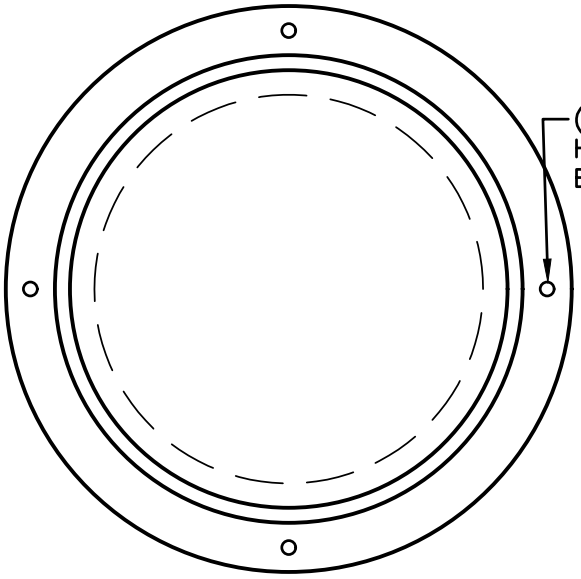
STANDARD DETAILS

HEAVY DUTY SELF SEALING MANHOLE FRAME AND COVER

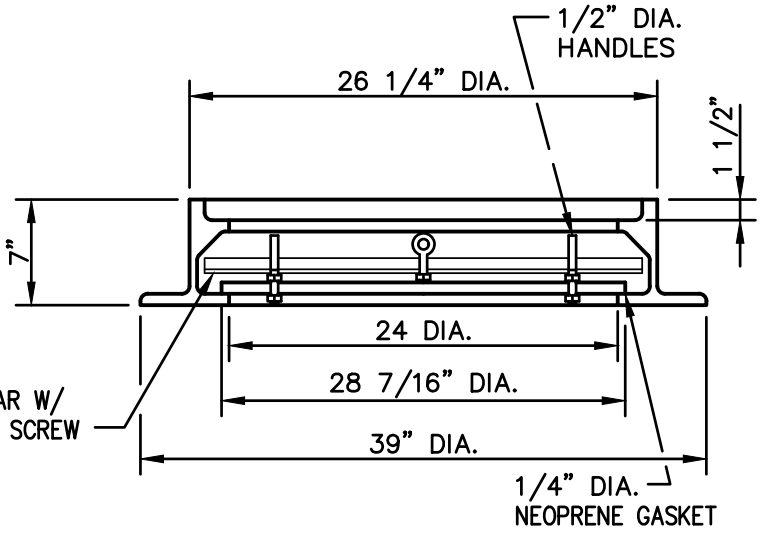
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-1

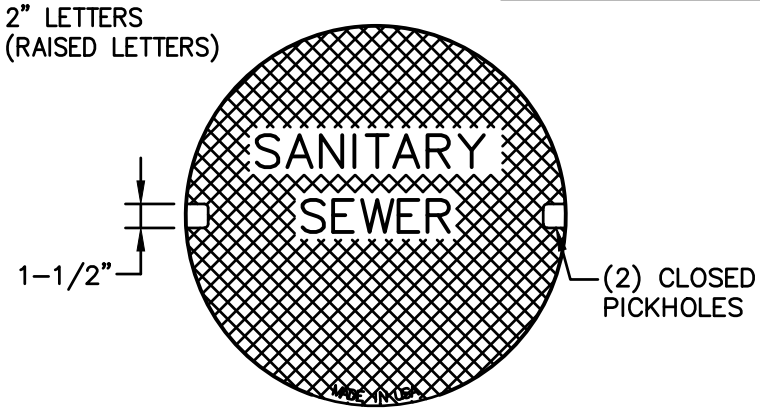


PLAN

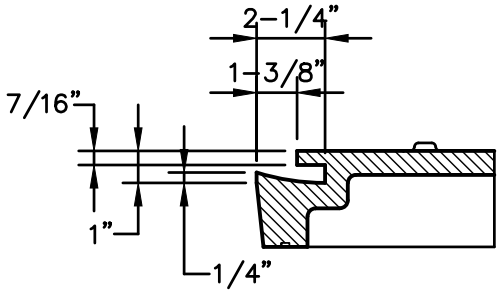


SECTION

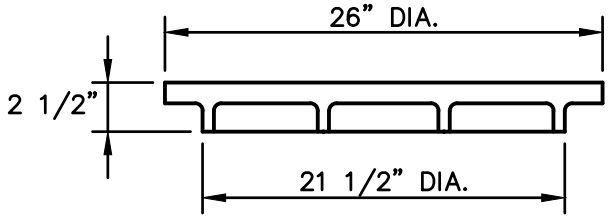
MANHOLE FRAME DETAIL



PLAN



PICKHOLE DETAIL



SECTION

MANUFACTURER: EAST JORDAN IRON WORKS MODEL #1040

FILE NAME: MH-6-CASTIRON_WT.dwg

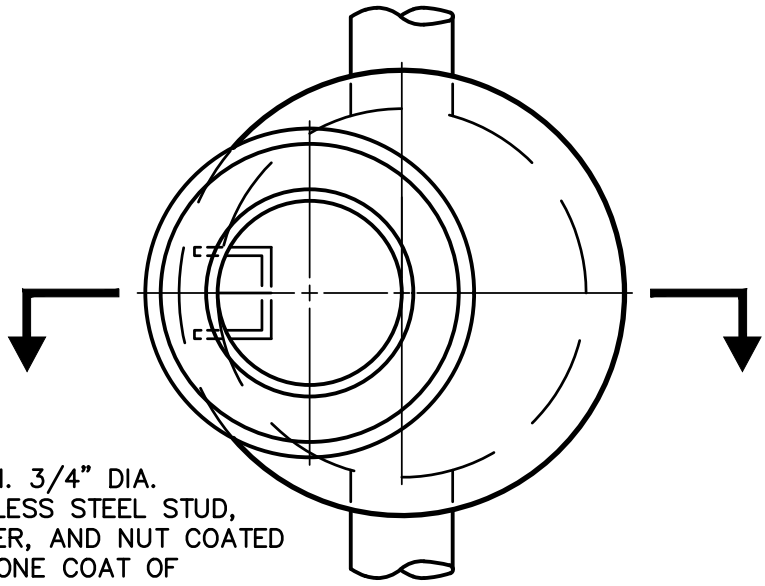
STANDARD DETAILS

HEAVY DUTY WATER TIGHT MANHOLE FRAME AND COVER

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-2

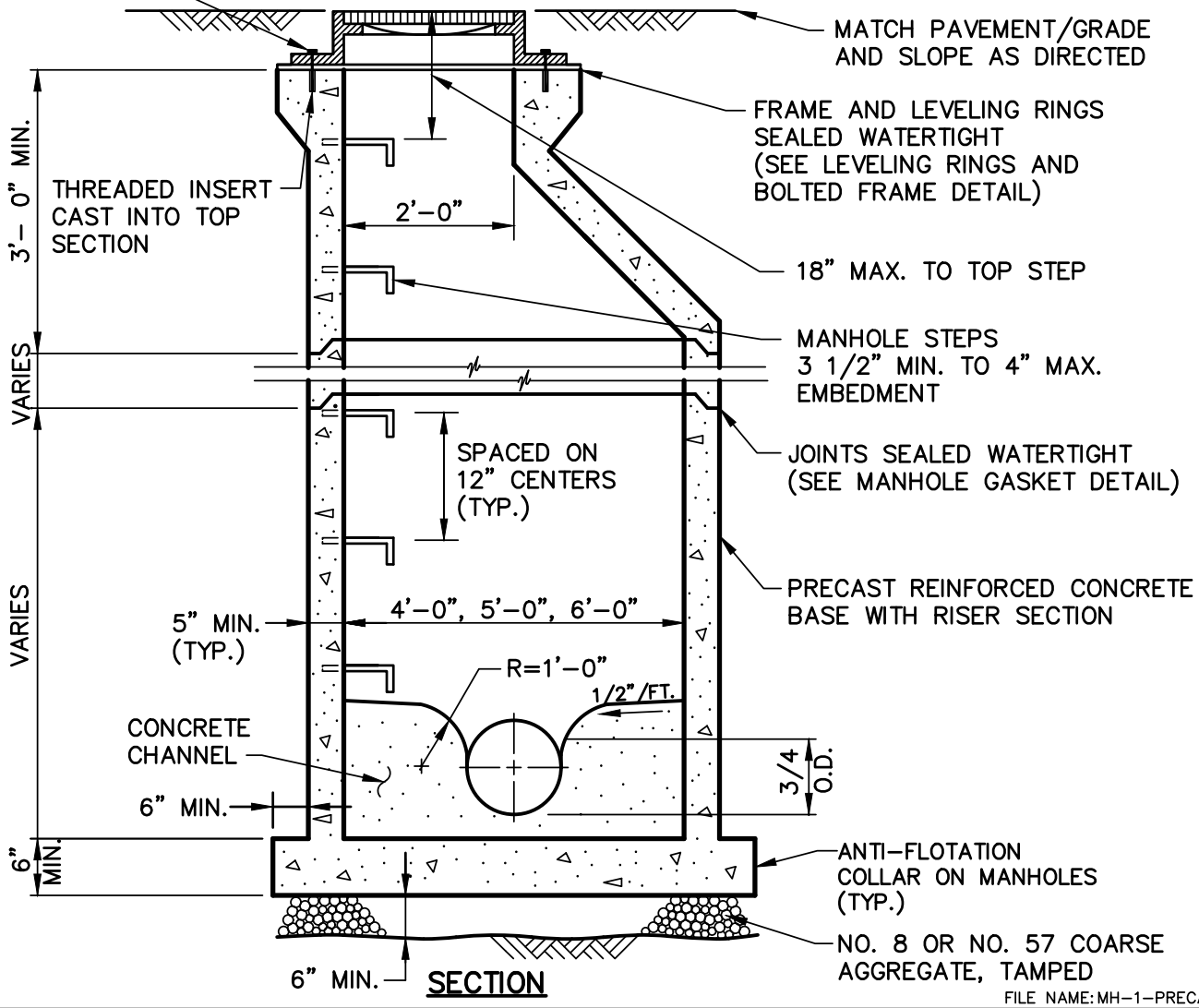


4" MIN. 3/4" DIA. STAINLESS STEEL STUD, WASHER, AND NUT COATED WITH ONE COAT OF STANDARD ASPHALT INSTALLATION

PLAN

NOTES:

1. BOLTING OF MANHOLE FRAME AND COVER NOT REQUIRED FOR MANHOLES INSTALLED IN PAVED SURFACES.
2. ALL STONE GRADATIONS ARE AASHTO CLASSIFICATION.
3. PIPES SHALL PROTRUDE 2" INSIDE MANHOLE WALL.
4. MANHOLE FRAMES SHALL BE SET WITH PREFORMED PLASTIC GASKET (RUB-R-NEK) PRIOR TO RESTORATION TO PREVENT FILTRATION.
5. MINIMUM DEPTH TO TOP OF PIPE WILL BE 8 FEET.



SECTION

FILE NAME: MH-1-PRECAST.dwg

STANDARD DETAILS

PRECAST CONCRETE MANHOLE WITH PRECAST CONCRETE BASE

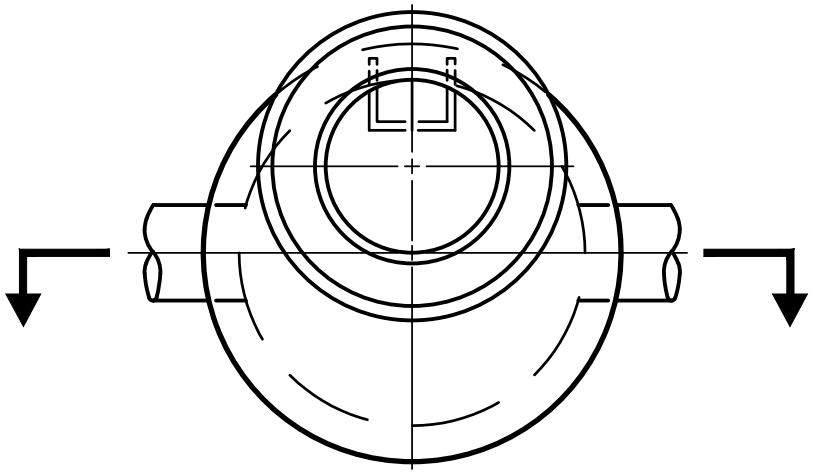
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

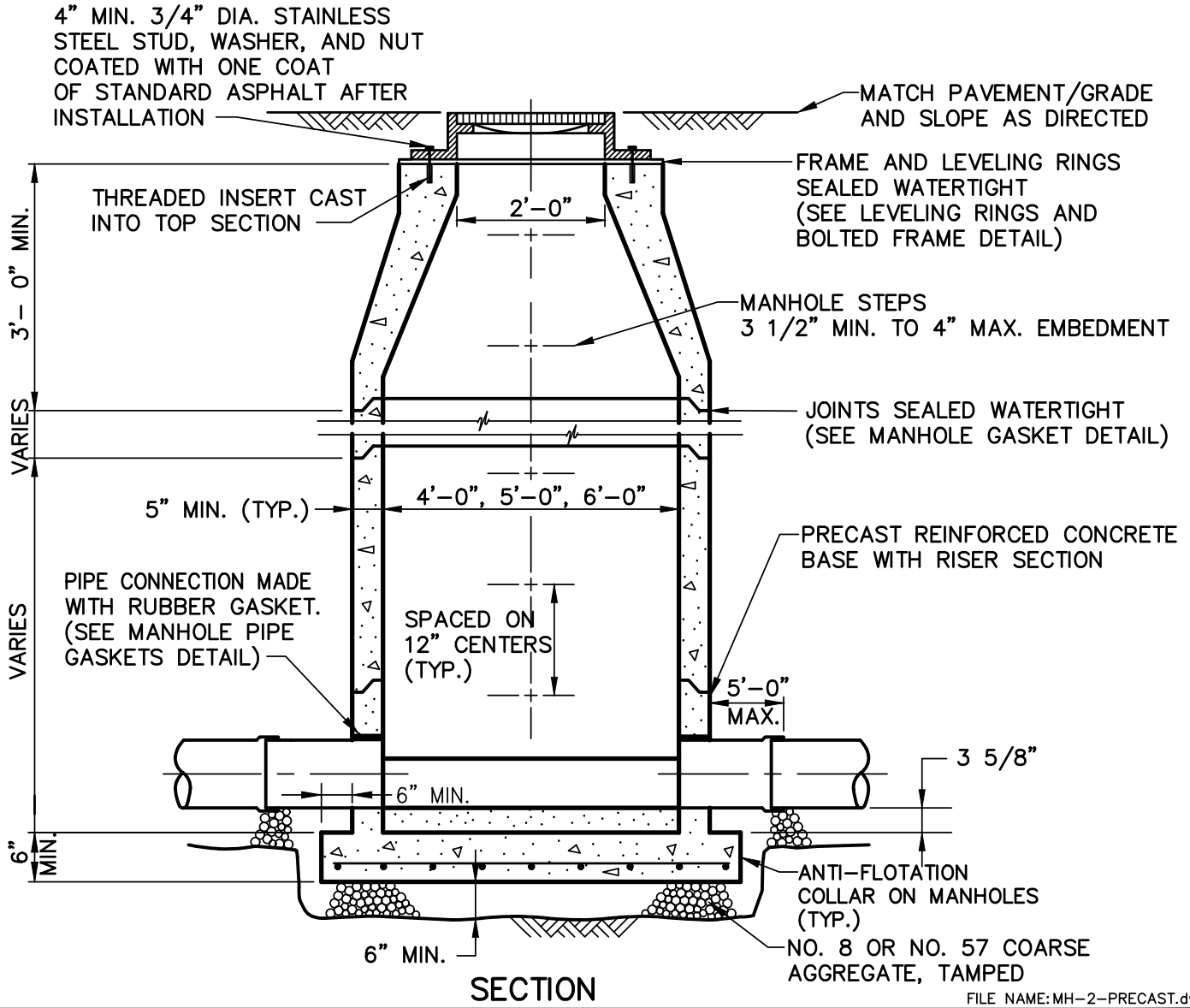
SCALE	DWG. NO.
NO SCALE	MH-3

NOTES:

1. BOLTING OF MANHOLE FRAME AND COVER NOT REQUIRED FOR MANHOLES INSTALLED IN PAVED SURFACES.
2. ALL STONE GRADATIONS ARE AASHTO CLASSIFICATION.
3. PIPES SHALL PROTRUDE 2" INSIDE MANHOLE WALL.
4. MANHOLE FRAMES SHALL BE SET WITH PREFORMED PLASTIC GASKET (RUB-R-NEK) PRIOR TO RESTORATION TO PREVENT FILTRATION.
5. MINIMUM DEPTH TO TOP OF PIPE WILL BE 8 FEET.



PLAN



SECTION

FILE NAME: MH-2-PRECAST.dwg

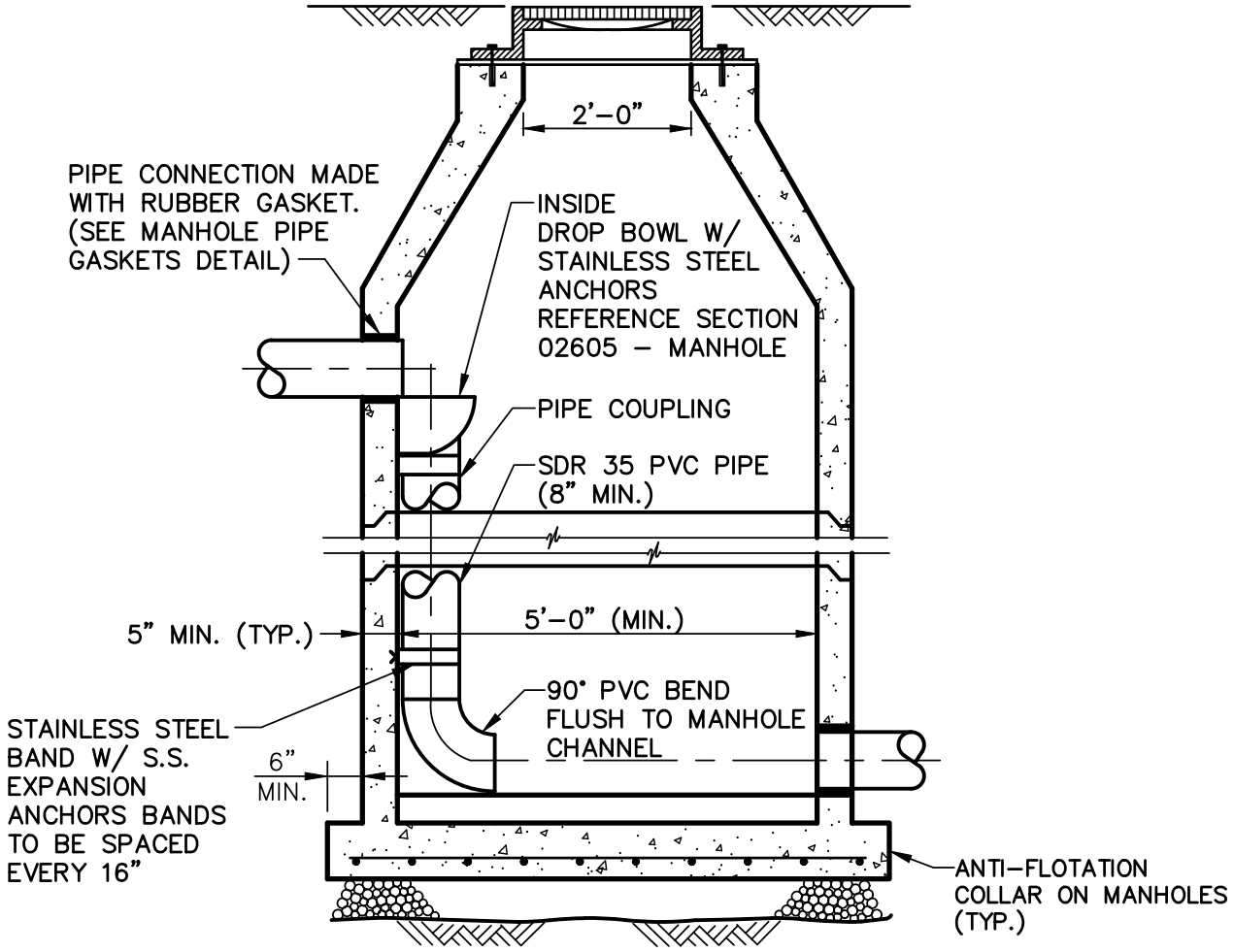
STANDARD DETAILS

PRECAST CONCRETE MANHOLE WITH PRECAST CONCRETE BASE

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-4



SECTION

FILE NAME: MH-3-INSIDEDROP.dwg

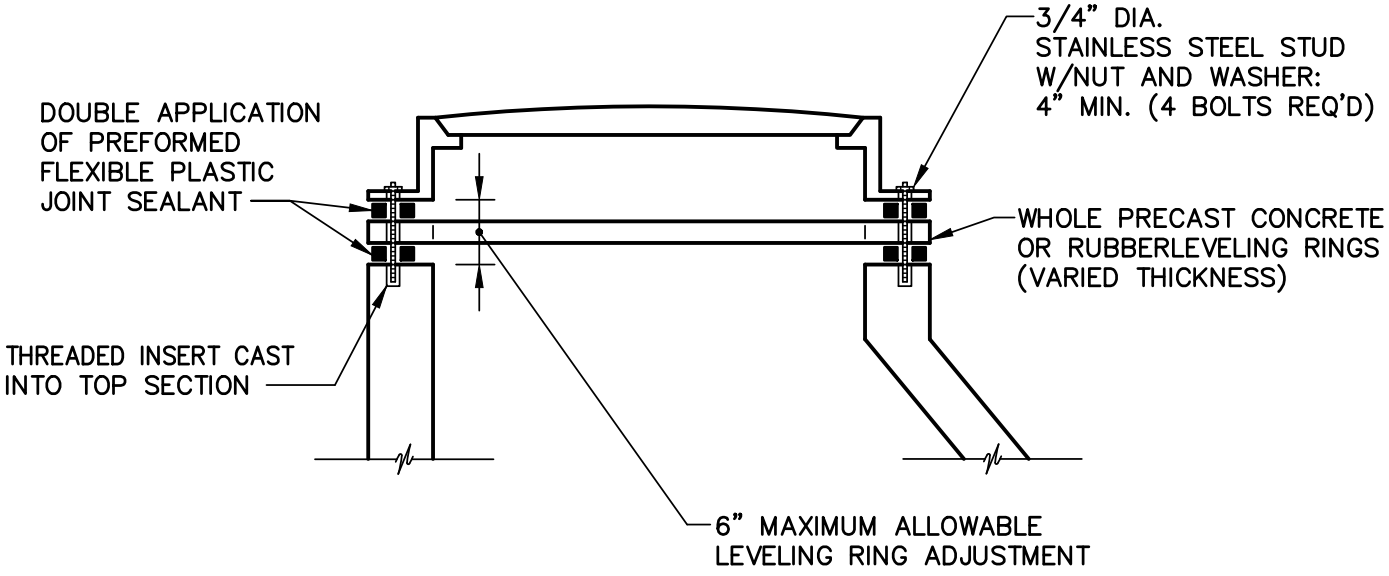
STANDARD DETAILS

INSIDE DROP MANHOLE

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-5



SECTION

NOTES:

1. TO BE USED ONLY IN ROW AREAS. NOT TO BE USED IN PAVED AREAS.

FILE NAME: MH-9-BOLTEDFRAME.dwg

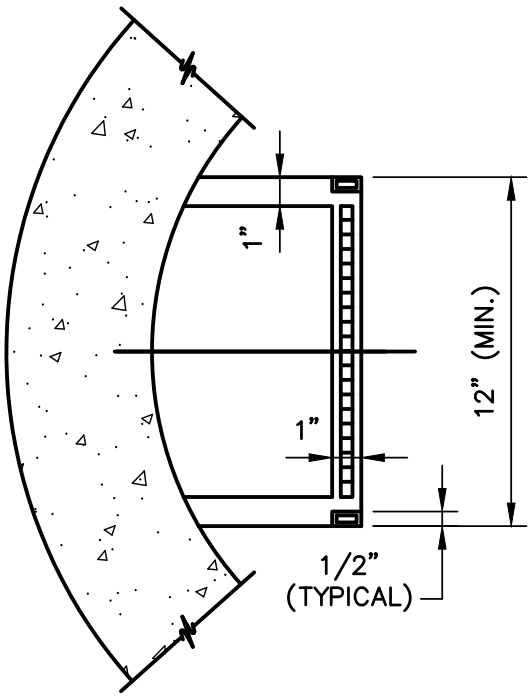
STANDARD DETAILS

LEVELING RINGS AND BOLTED FRAME DETAILS

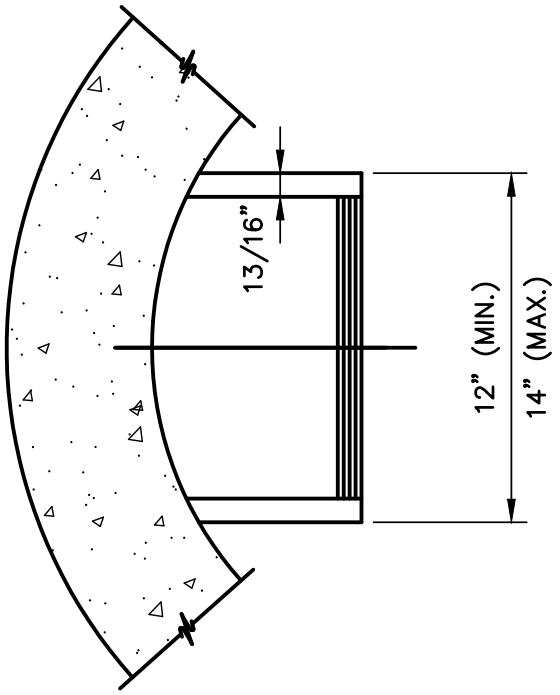
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

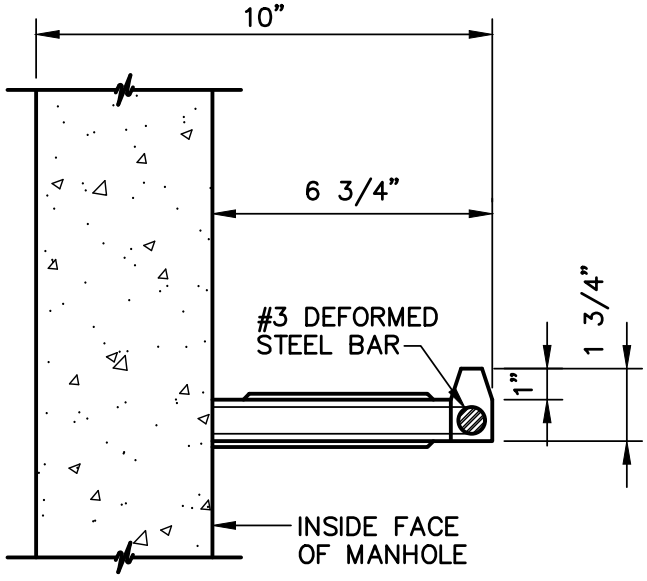
SCALE	DWG. NO.
NO SCALE	MH-6



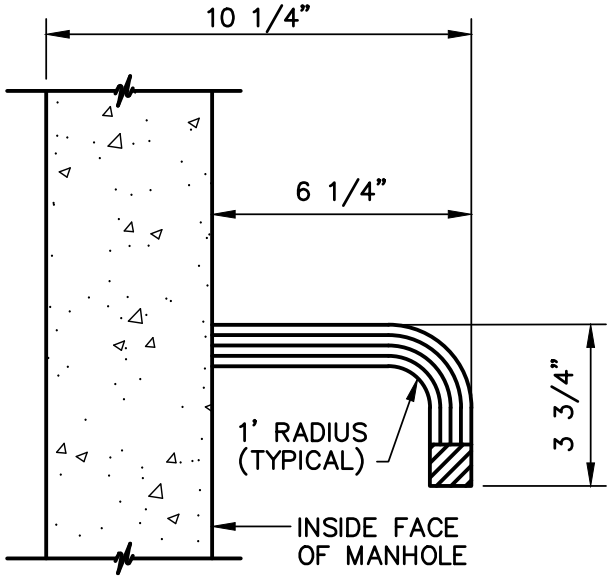
PLAN



PLAN



SECTIONAL ELEVATION
REINFORCED PLASTIC



SECTIONAL ELEVATION
ALUMINUM

FILE NAME: MH-4-STEPS.dwg

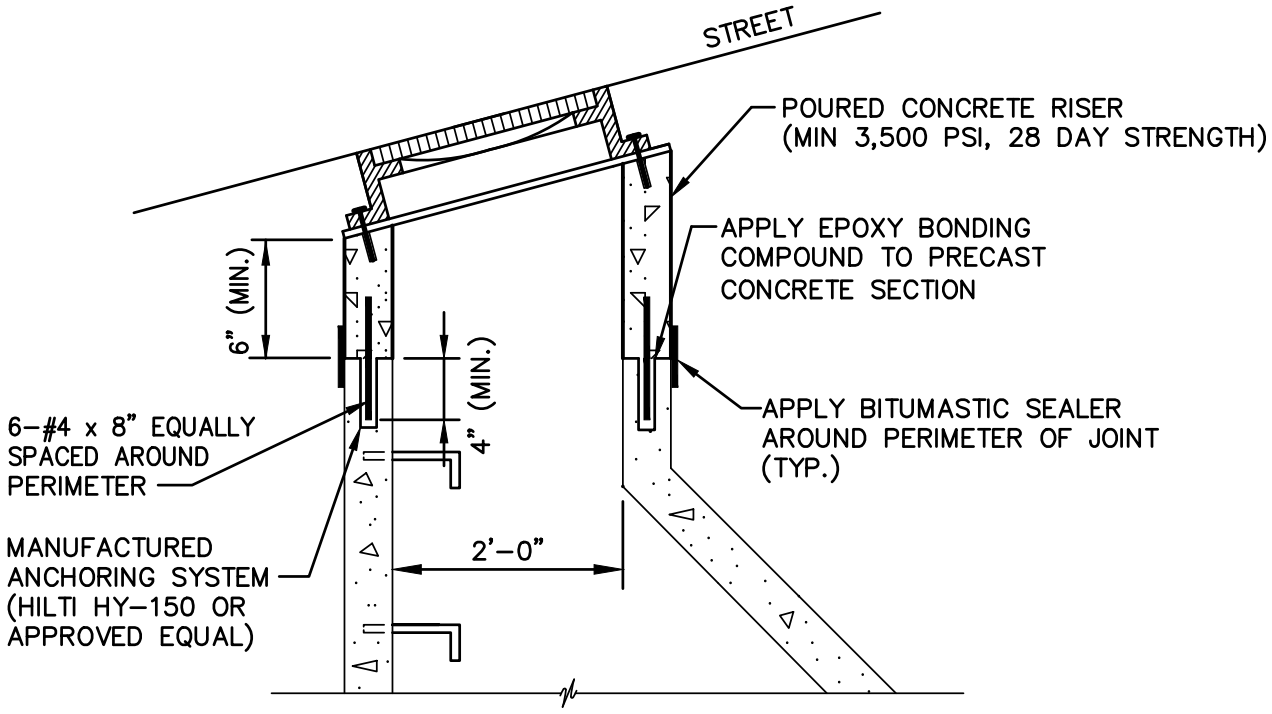
STANDARD DETAILS

MANHOLE STEPS

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-7



SECTION

NOTE:

1. TO BE USED ONLY AFTER CONSULTATION WITH AUTHORITY OR IT'S ENGINEER WHERE SLOPES OF STREETS ARE 4% OR GREATER.
2. INSTALL EXTRA STEPS AS NECESSARY. MAX LENGTH TO FIRST STEP TO BE 18"

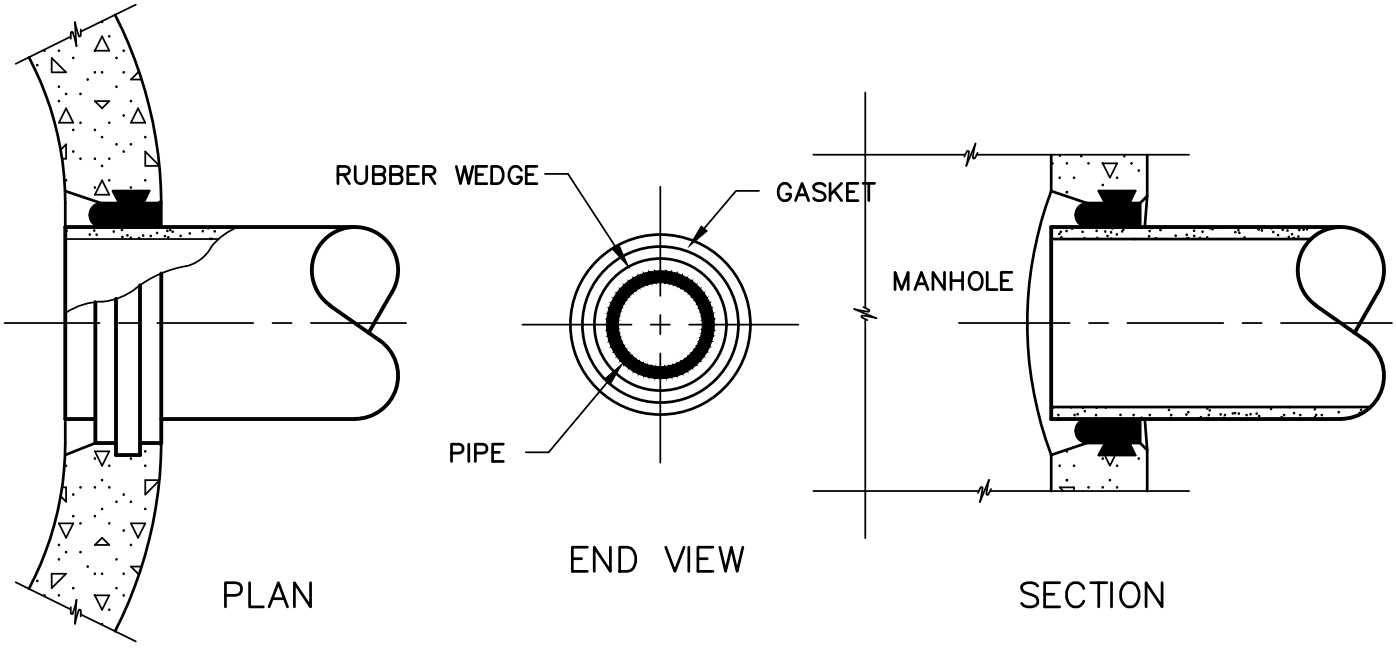
STANDARD DETAILS

POURED CONCRETE RISER FOR STREET GRADES OF 2% OR GREATER

QUARRYVILLE BOROUGH AUTHORITY

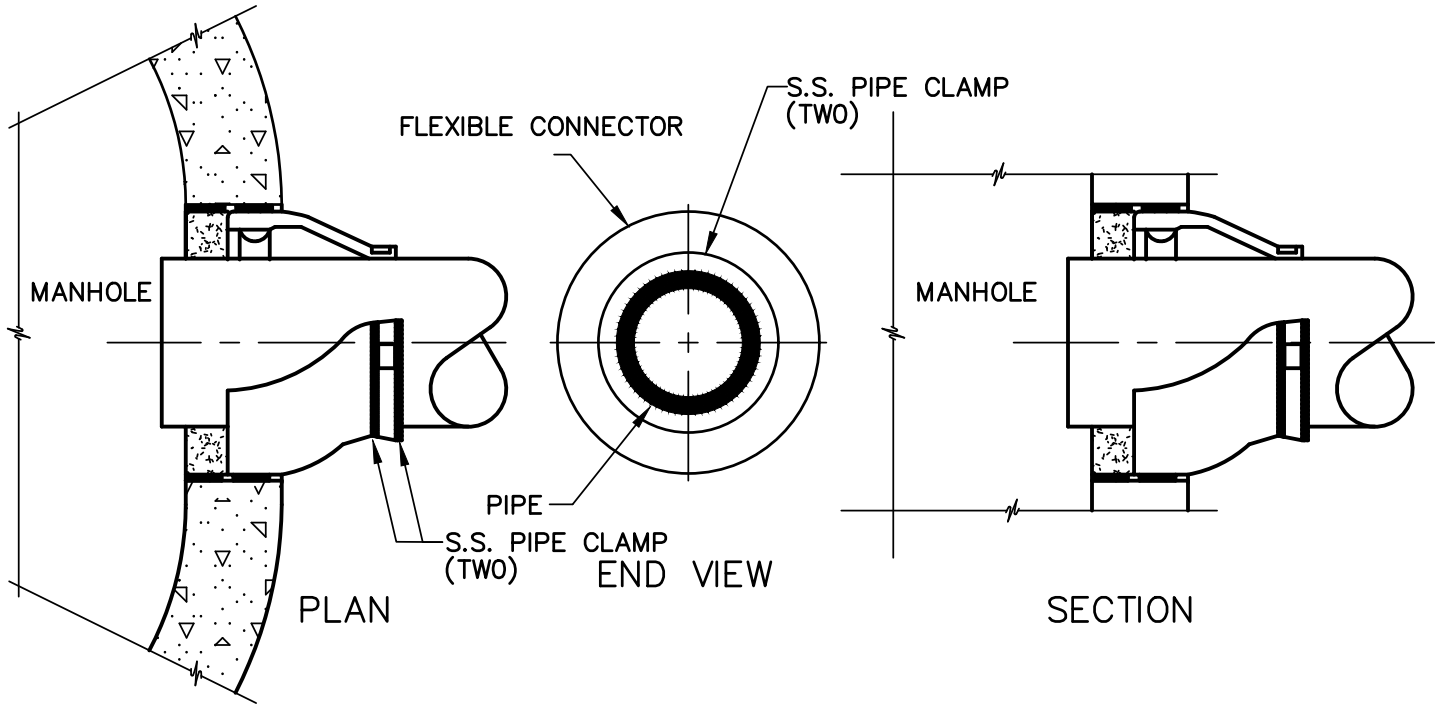
DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-8



TYPE 1

RUBBER GASKET CAST INTO
PRECAST PIPE OPENINGS



TYPE 2

FLEXIBLE CONNECTOR WITH KORBAND
AND TWO STAINLESS STEEL CLAMPS

FILE NAME: MH-11-PIPEGASKETS.dwg

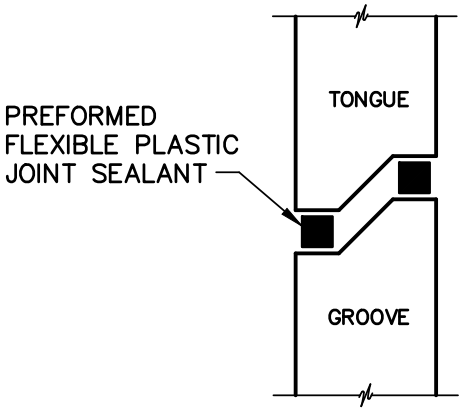
STANDARD DETAILS

MANHOLE PIPE GASKETS

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-9



SECTION

FILE NAME: MH-8-GASKET.dwg

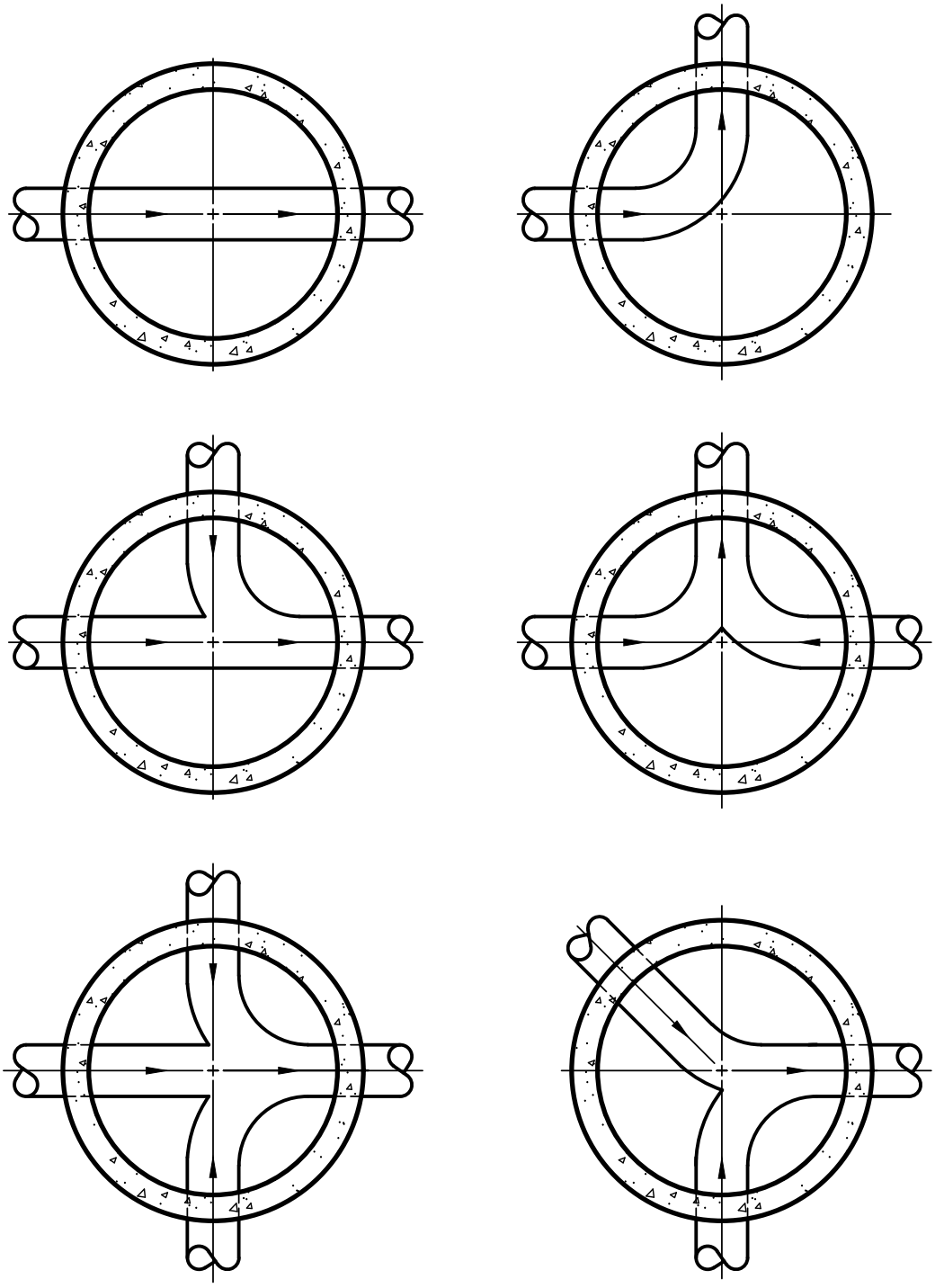
STANDARD DETAILS

MANHOLE SECTION JOINT SEAL

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-10



NOTE:

1. IF ANGLES ARE LESS THAN 90 DEGREES A 5 FOOT OR LARGER DIAMETER MANHOLE WILL BE USED.

FILE NAME: MH-7-CHANNELS.dwg

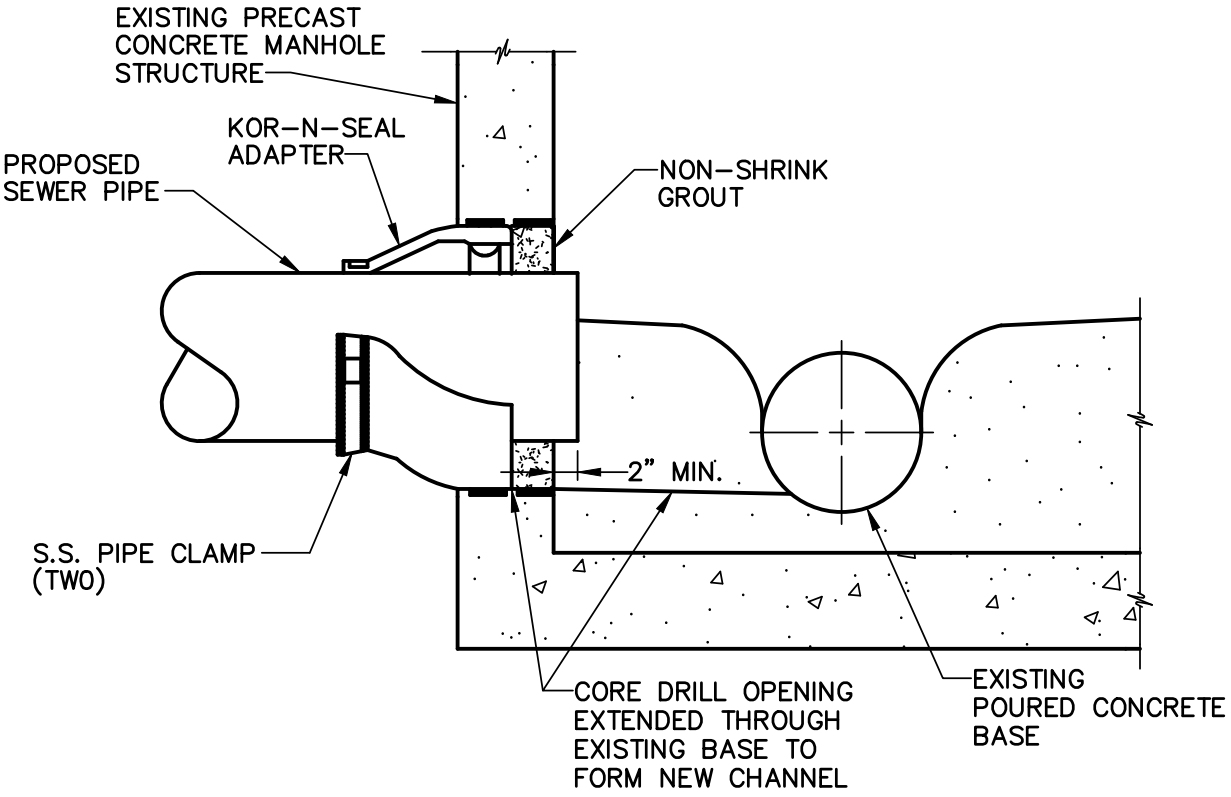
STANDARD DETAILS

TYPICAL PLAN OF MANHOLE CHANNELS

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-11



KOR-N-SEAL DETAIL

NOTE:

1. NEW PIPE CHANNEL RECONSTRUCTION IN ACCORDANCE WITH AUTHORITY REQUIREMENTS.

FILE NAME: MH-12-KORNSEAL.dwg

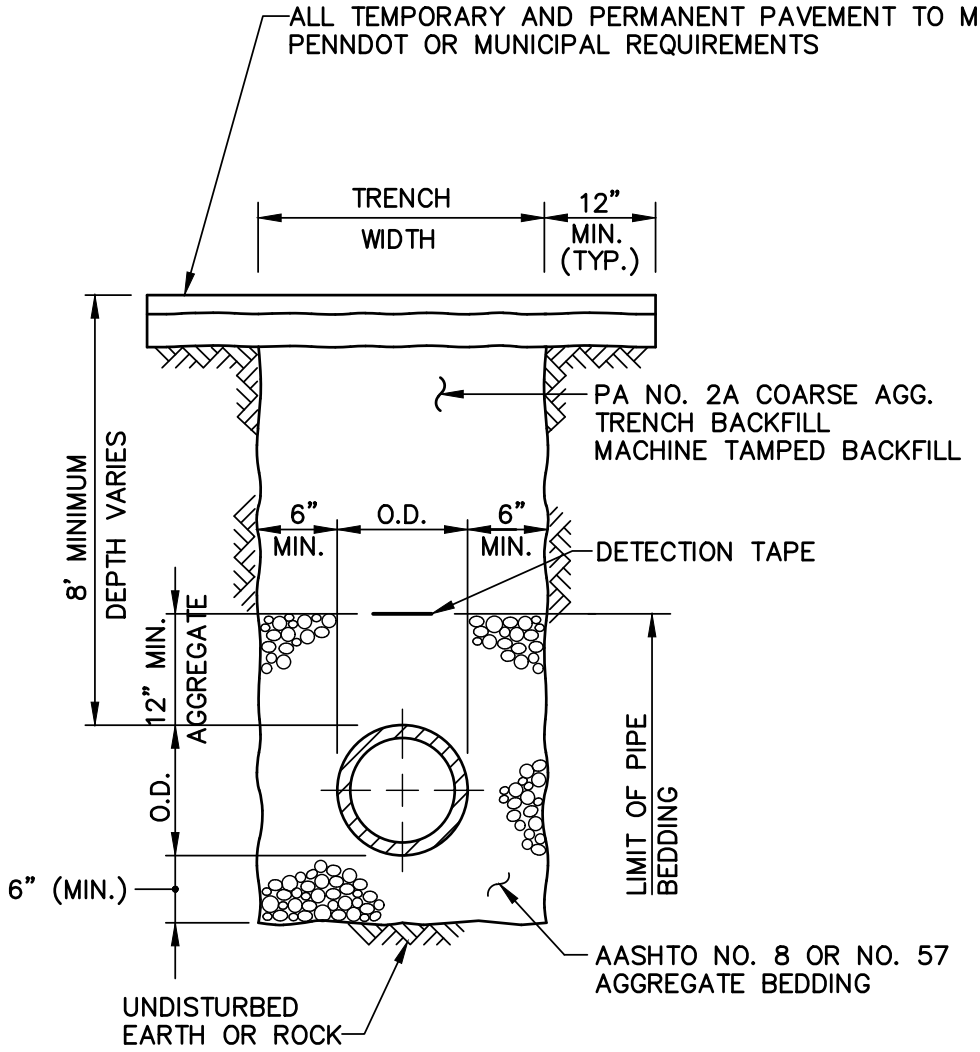
STANDARD DETAILS

MANHOLE PIPE ADAPTERS

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	MH-12



LOCAL ROADS

NOTES:

1. WHEN IN PAVED AREAS SUCH AS DRIVEWAYS OR PARKING LOTS, PAVING RESTORATION SHALL BE IN ACCORDANCE WITH CONTRACT DOCUMENTS.
2. NO BACKFILL MATERIAL LARGER THAN 6–INCHES WILL BE PROVIDED.
3. MINIMUM DEPTH OF COVER FOR FORCE MAIN WILL BE 5 FEET.
4. MINIMUM DEPTH OF COVER FOR GRAVITY SEWER WILL BE 8 FEET.
5. SLAG AND/OR SLAG MIXTURE WILL NOT BE ALLOWED AS BACKFILL.

FILE NAME: TRENCH–1–PAVED.dwg

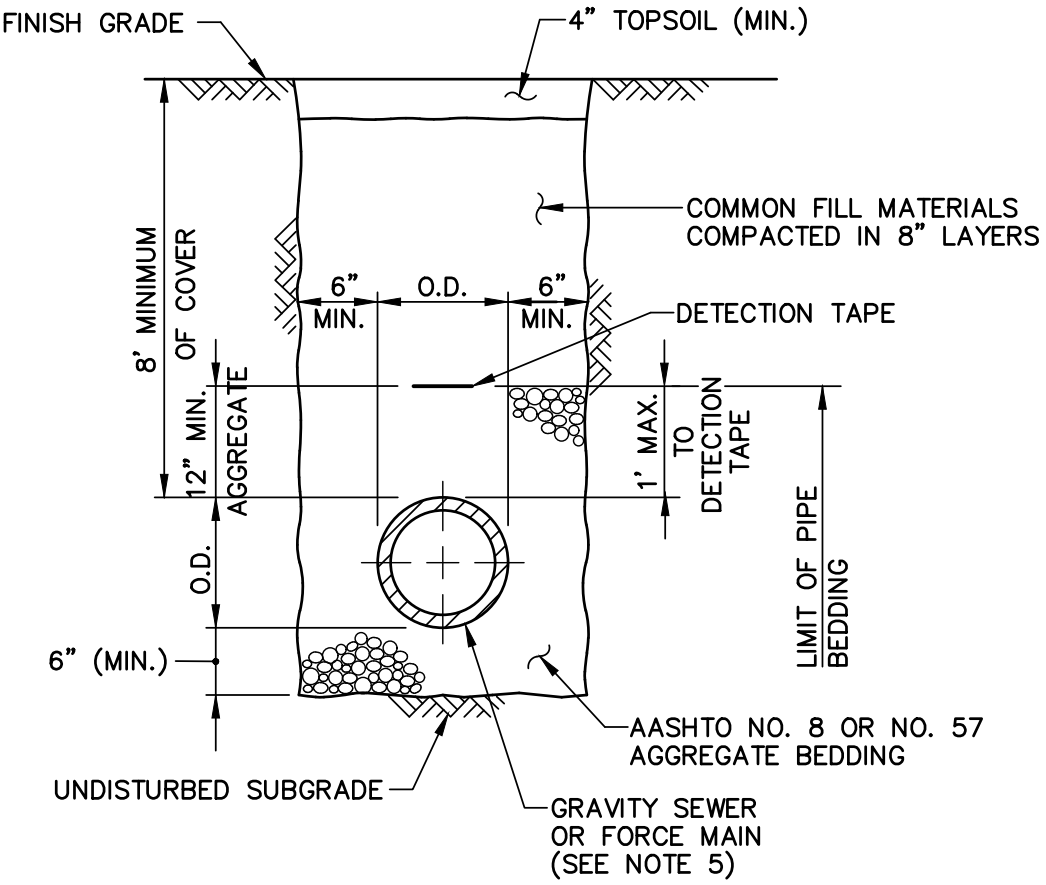
STANDARD DETAILS

TRENCH DETAIL IN PAVED AREAS

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	TR–1



NOTES:

1. WHEN IN PAVED AREAS SUCH AS DRIVEWAYS OR PARKING LOTS, PAVING RESTORATION SHALL BE IN ACCORDANCE WITH CONTRACT DOCUMENTS.
2. NO BACKFILL MATERIAL LARGER THAN 6–INCHES WILL BE PROVIDED.
3. MINIMUM DEPTH OF COVER FOR FORCE MAIN WILL BE 5 FEET.
4. MINIMUM DEPTH OF COVER FOR GRAVITY SEWER WILL BE 8 FEET.
5. FOR FORCE MAIN SEE FORCE MAIN LOCATOR ASSEMBLY DETAIL FM–3.

FILE NAME: TRENCH–2–UNPAVED.dwg

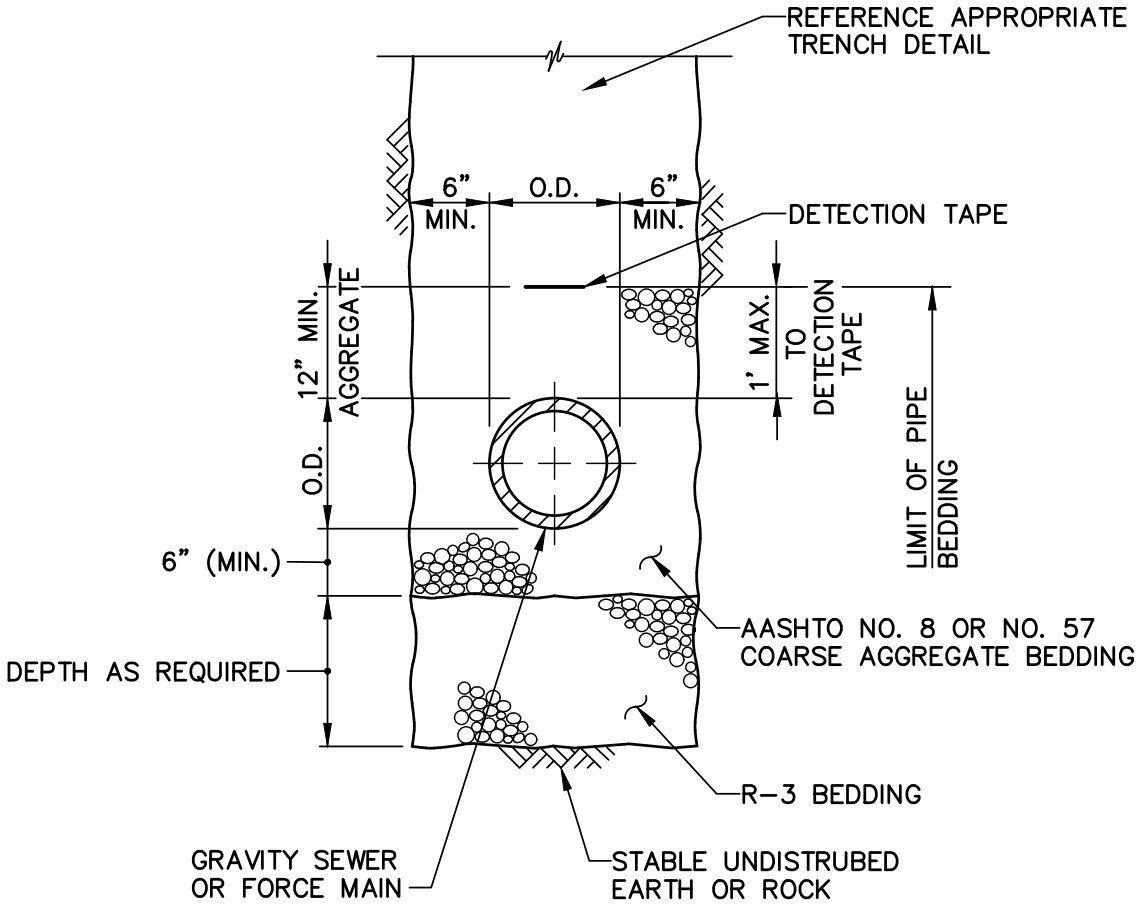
STANDARD DETAILS

TRENCH DETAIL IN UNPAVED AREAS

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	TR–2



FILE NAME: TRENCH-3-UME.dwg

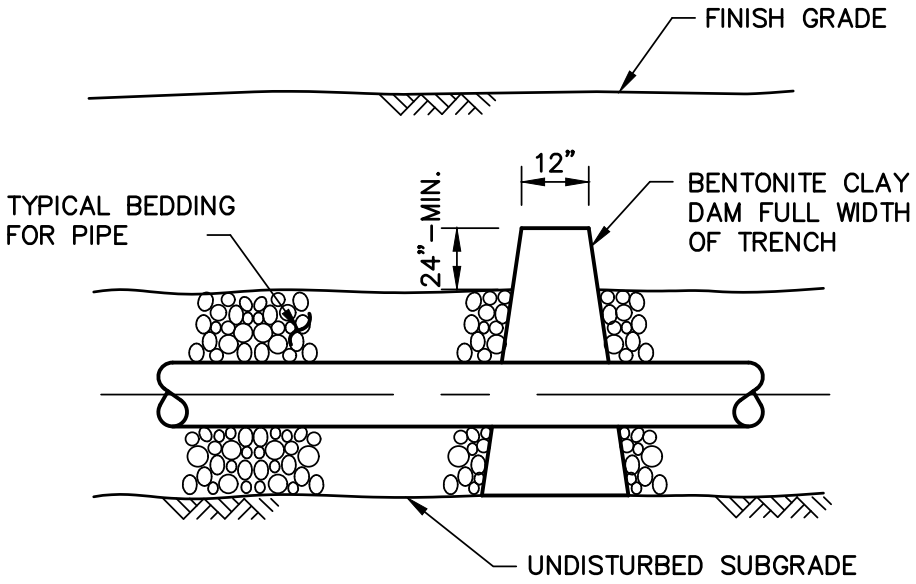
STANDARD DETAILS

UNSUITABLE MATERIAL EXCAVATION

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	TR-3



NOTE:

1. HEIGHT OF CLAY DAM TO BE DETERMINED IN THE FIELD.

FILE NAME: TRENCH–4–CLAYDAM.dwg

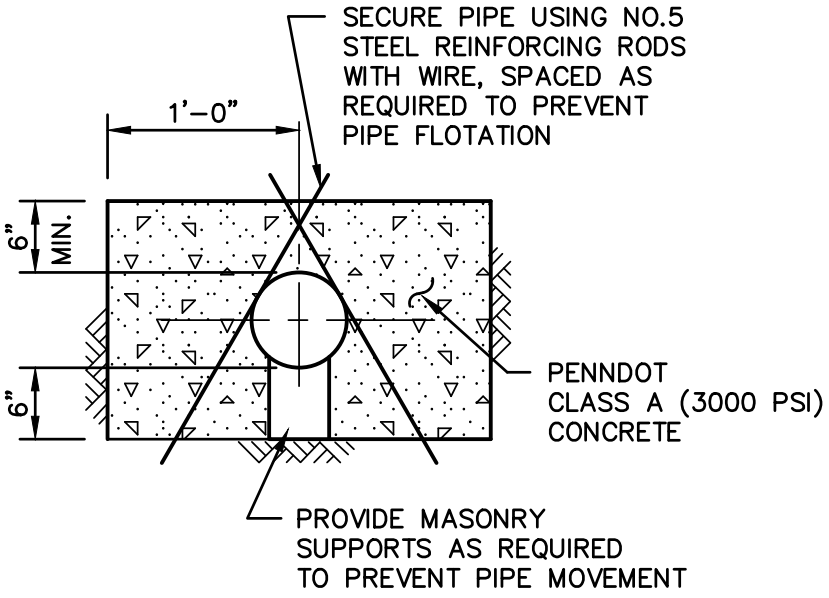
STANDARD DETAILS

BENTONITE CLAY DAM DETAIL

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	TR–4



FILE NAME: TRENCH-5-ENCASEMENT.dwg

STANDARD DETAILS

CONCRETE ENCASEMENT DETAIL

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	TR-5

NOTE: RECONNECTIONS TO BE AIR TESTED IN ACCORDANCE WITH SPECIFICATIONS.

MECHANICAL JOINT COUPLINGS TO BE SMITH-BLAIR OR APPROVED EQUAL

FILE NAME: SEW-1-PIPERECONN.dwg

STANDARD DETAILS

PIPE RECONNECTION DETAIL

QUARRYVILLE BOROUGH AUTHORITY

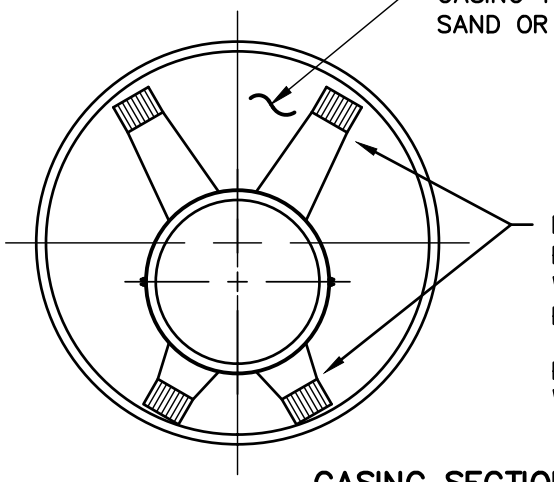
DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	SEW-1

STANDARD DETAILS

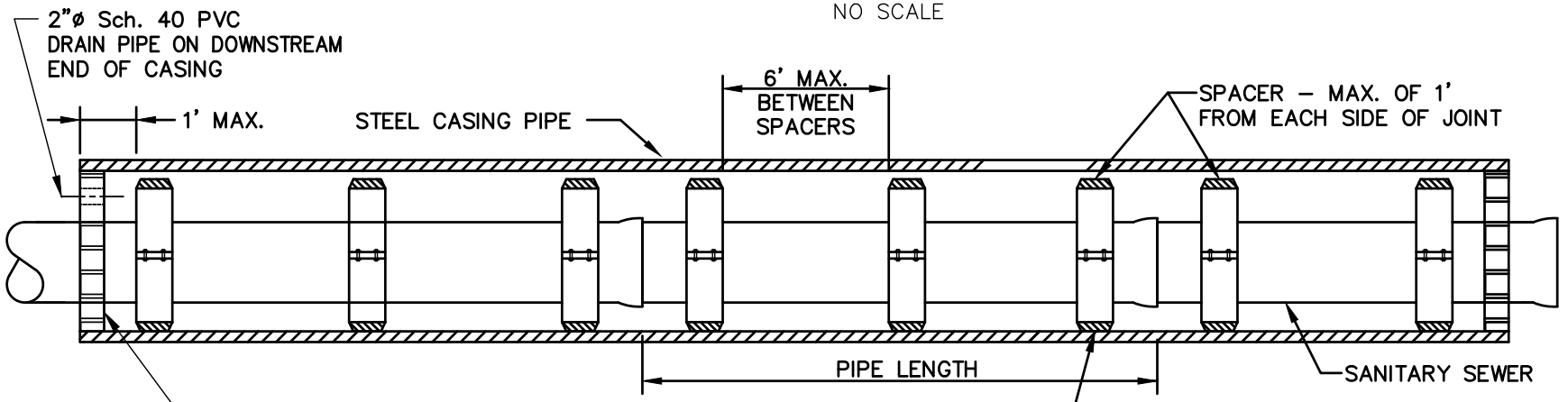
CASING DETAILS FOR PIPE BORINGS/TUNNELS

QUARRYVILLE BOROUGH AUTHORITY



CASING SECTION

NO SCALE



CASING ELEVATION

NO SCALE

NOTES:

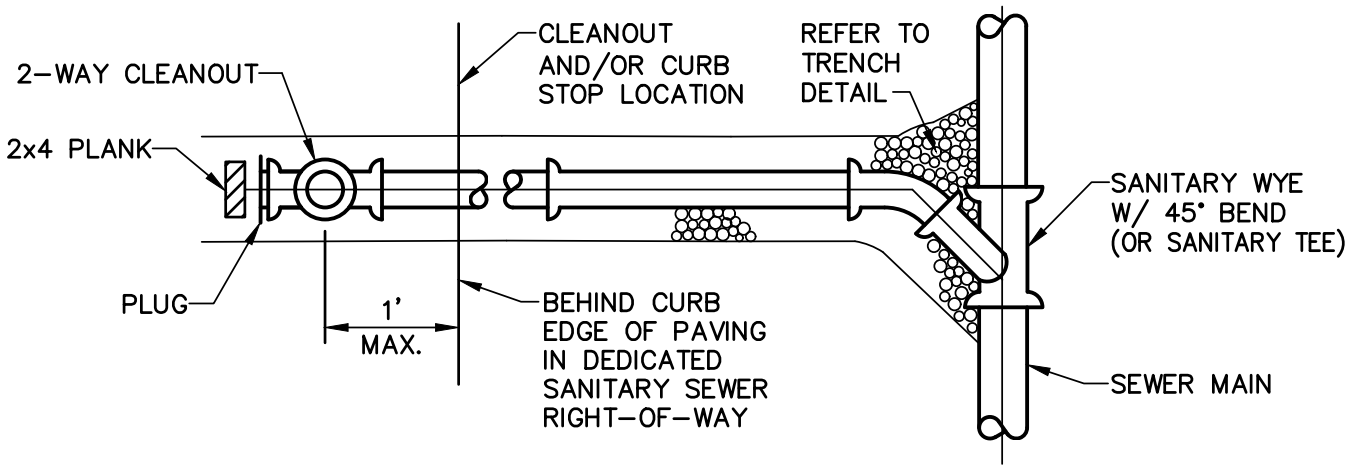
1. MINIMUM CASING SIZE WILL BE 36-INCH DIAMETER
2. CASING PIPE TO BE INSTALLED AT THE SAME SLOPE AS THE SANITARY SEWER

REVISIONS	DATE
DWG. CREATED	3/14
DWG. REVISION	4/22

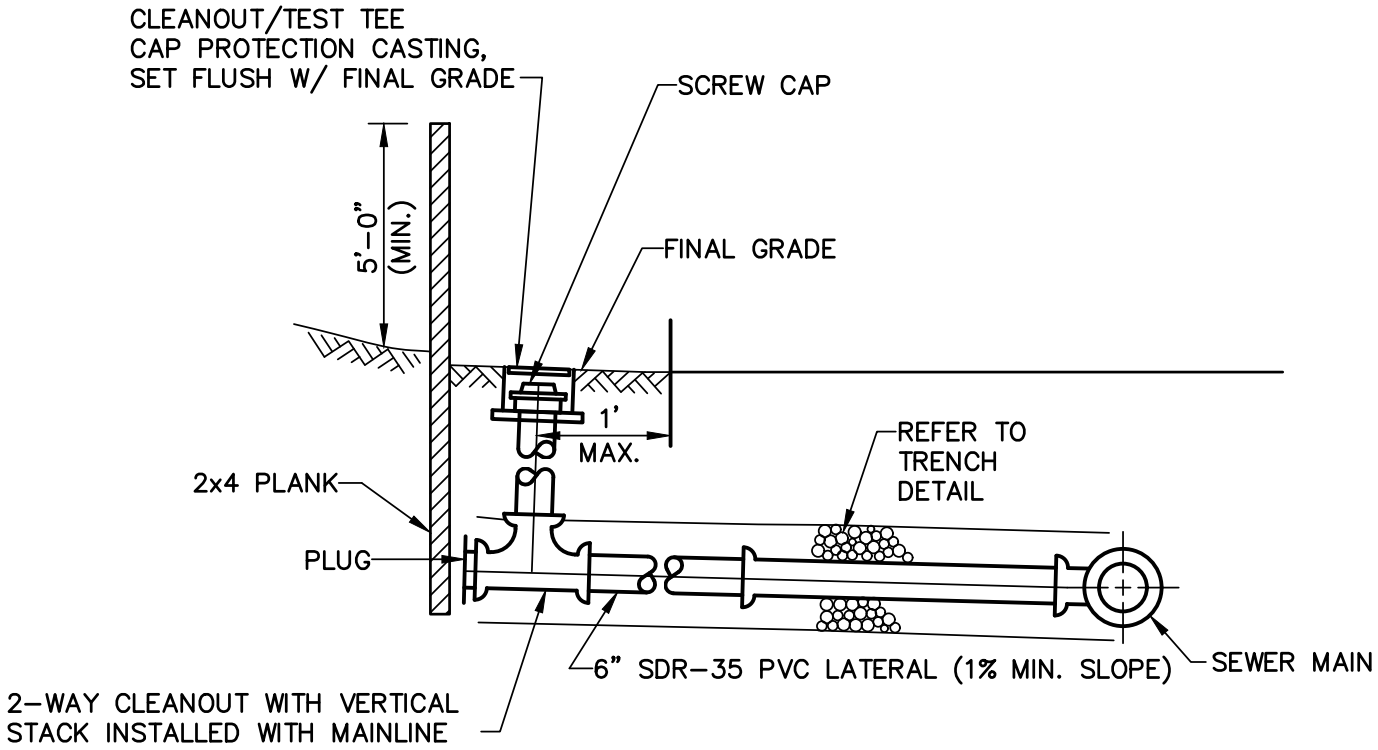
SCALE: NO SCALE

DWG. NO. SEW-2

FILE NAME: SEW-2-PIPECASING.dwg



PLAN



SECTION

NOTES:

1. CURB CLEANOUT NOT TO BE LOCATED IN SIDEWALK, DRIVEWAYS OR BENEATH OTHER CURBLINE UTILITIES.

FILE NAME: LAT-1-SHALLOW.dwg

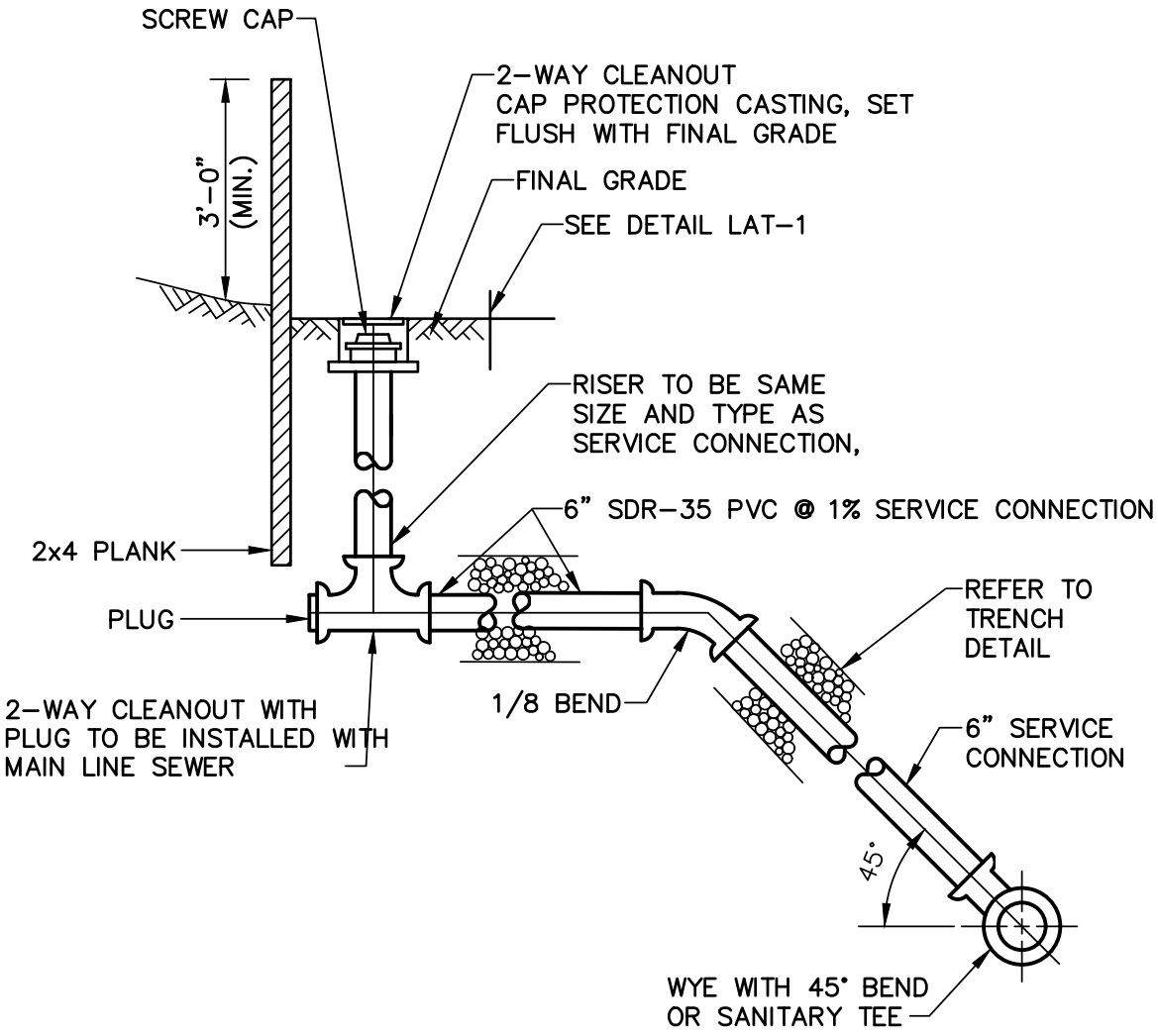
STANDARD DETAILS

SERVICE LATERAL - SHALLOW SEWER

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT-1



ELEVATION

NOTES:

1. CURB CLEANOUT NOT TO BE LOCATED IN SIDEWALK, DRIVEWAY OR BENEATH OTHER CURBLINE UTILITIES.

FILE NAME: LAT-2-DEEP.dwg

STANDARD DETAILS

SERVICE LATERAL - DEEP SEWER

QUARRYVILLE BOROUGH AUTHORITY

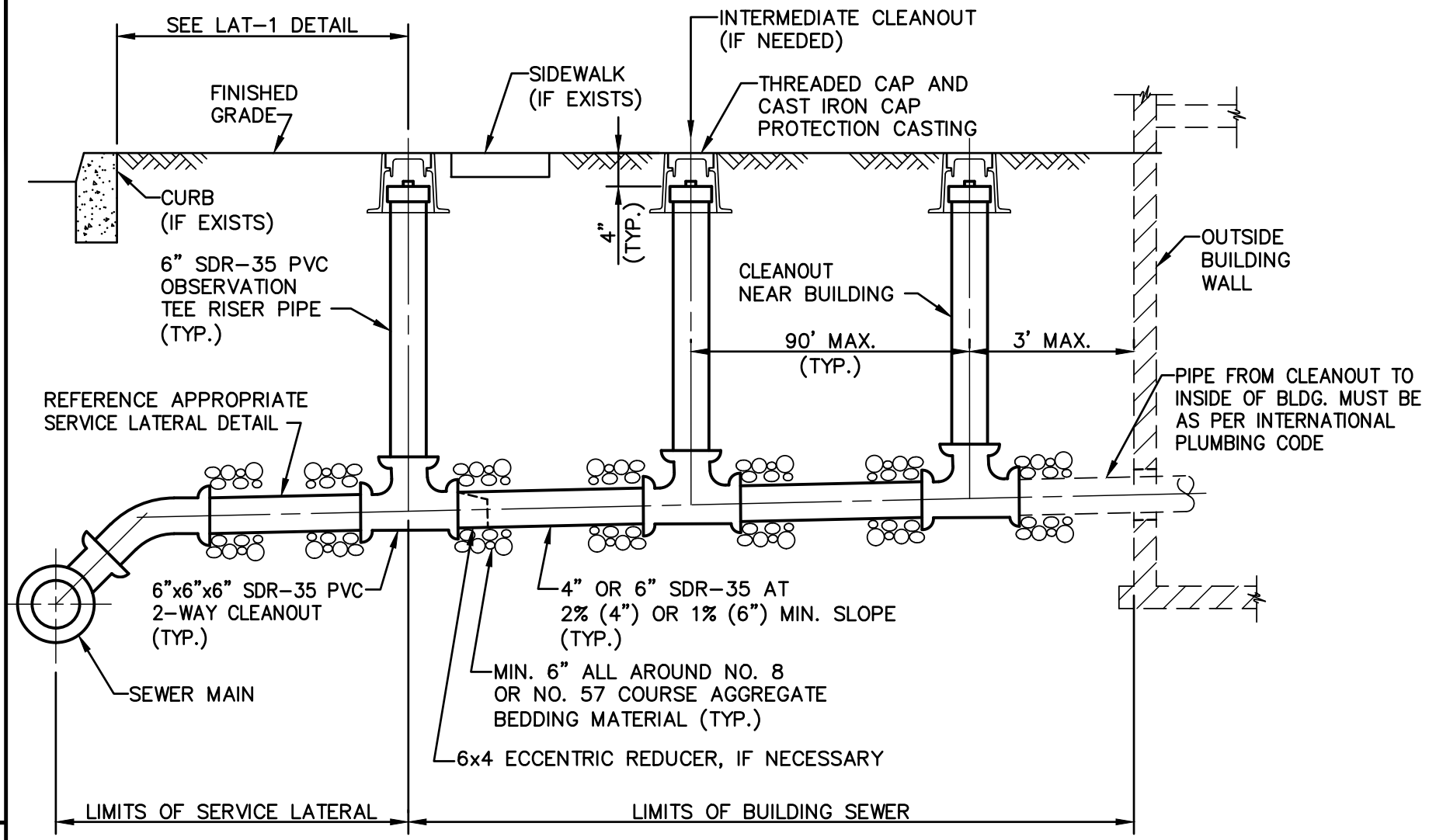
DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT-2

STANDARD DETAILS

BUILDING SEWER

QUARRYVILLE BOROUGH AUTHORITY



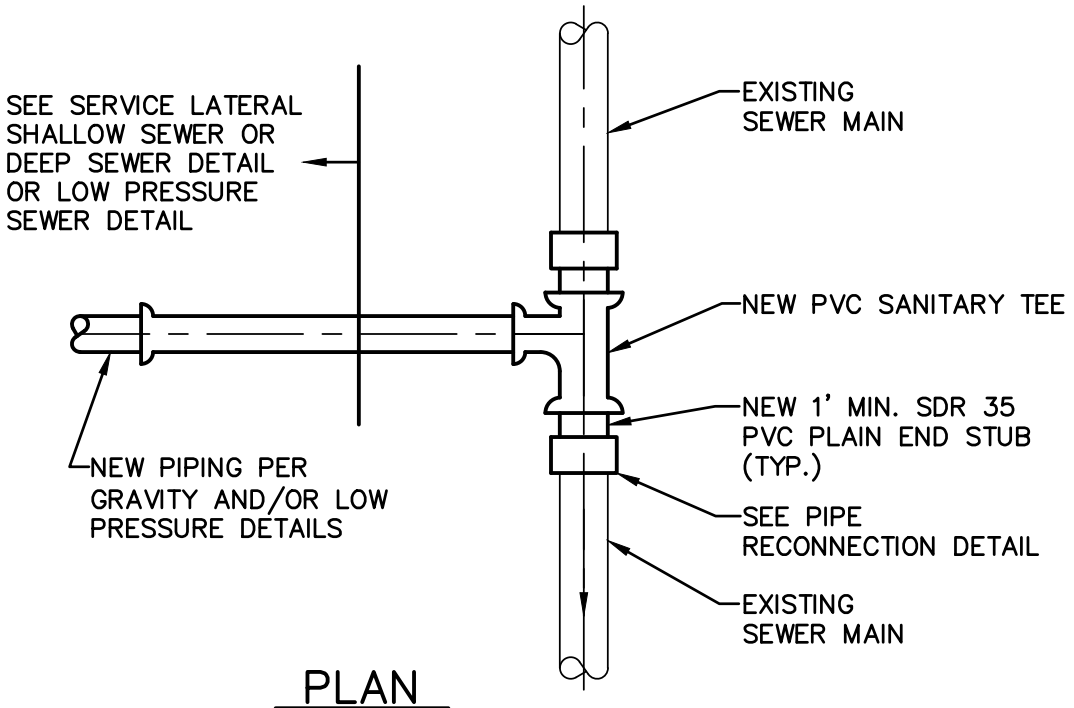
ELEVATION

NOTES:

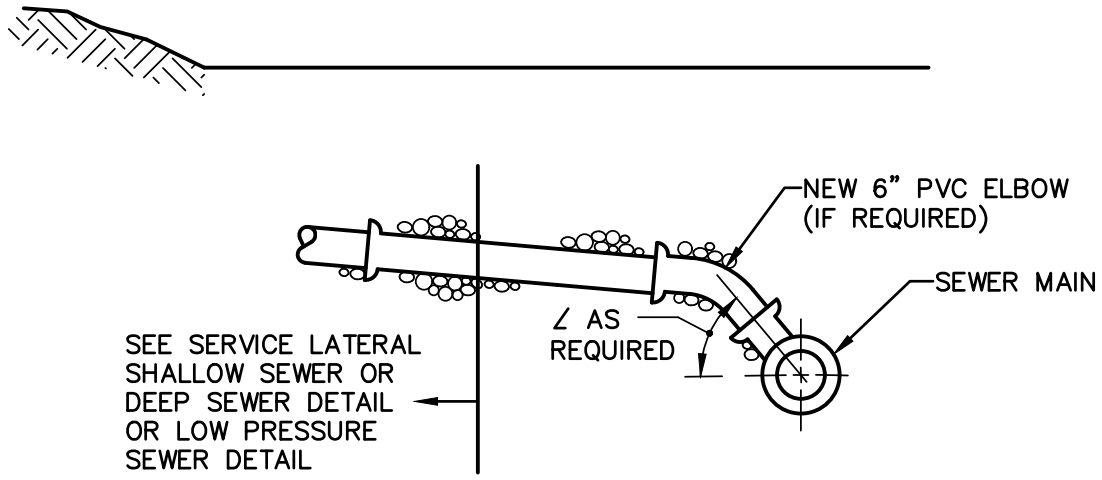
1. PIPE SIZES AND MATERIALS TO BE IN ACCORDANCE WITH AUTHORITY REQUIREMENTS.
2. CLEANOUT/TEST TEE SPACING IS 90' MAXIMUM.
3. ANY PIPE LESS THAN 3 FEET OF COVER SHALL BE DUCTILE IRON.
4. THERE SHALL BE A 10 FOOT HORIZONTAL SEPARATION BETWEEN WATER SERVICE AND SERVICE LATERAL/BUILDING SEWER.

SCALE	DWG. REVISION	DWG. CREATED	REVISIONS	DATE
NO SCALE				3/14
FILE				4/22
LAT-3				

FILE NAME: LAT-3-BLDGSEWER.dwg



PLAN



ELEVATION

NOTES:

1. EXISTING MAIN SEWER TO BE SAW CUT.

FILE NAME: LAT-4-CONNTOMAIN.dwg

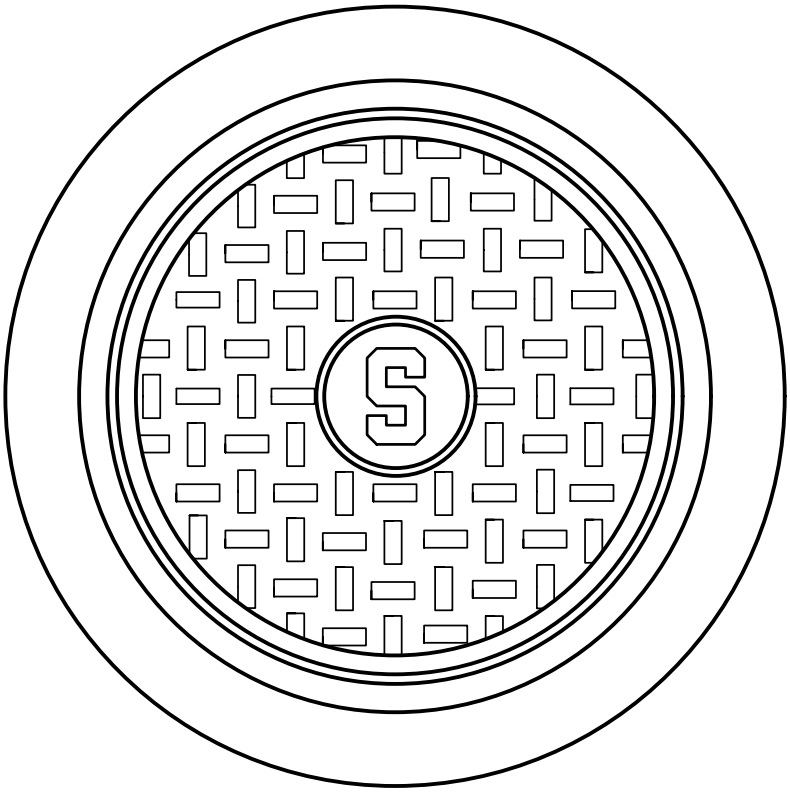
STANDARD DETAILS

SERVICE LATERAL CONNECTION TO EXISTING SEWER MAIN

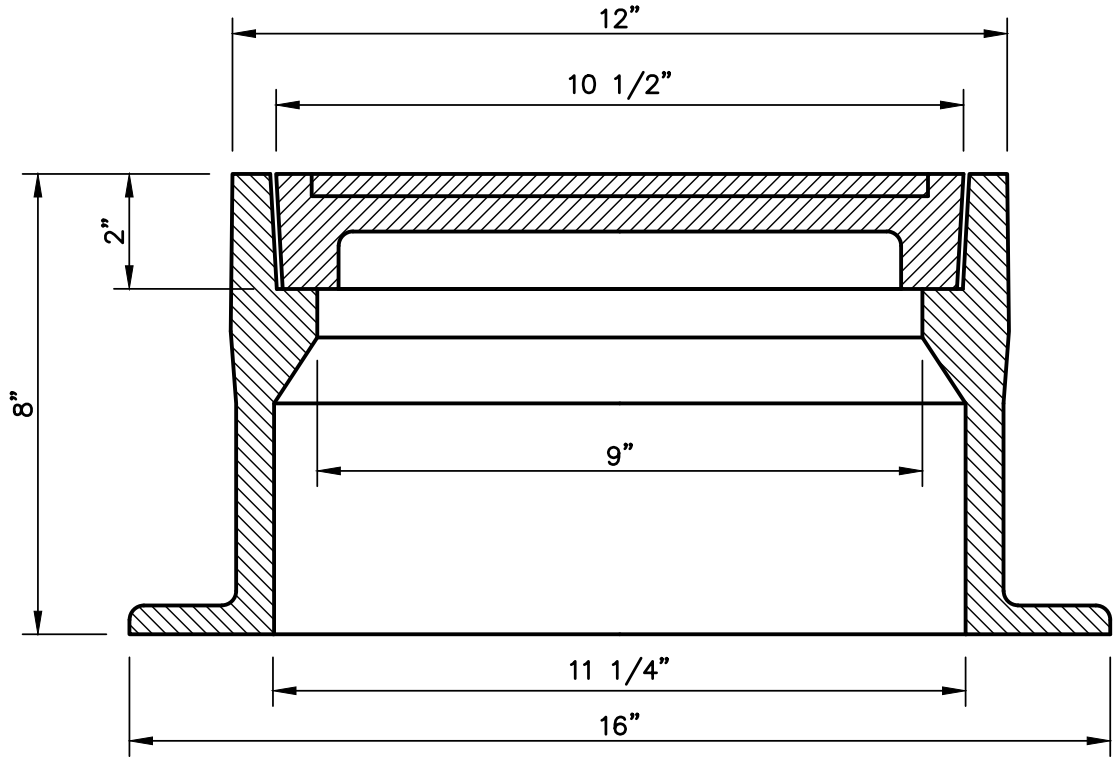
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
10/12	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT-4



PLAN



SECTION

FILE NAME: LAT-5-CLEANOUTCAP.dwg

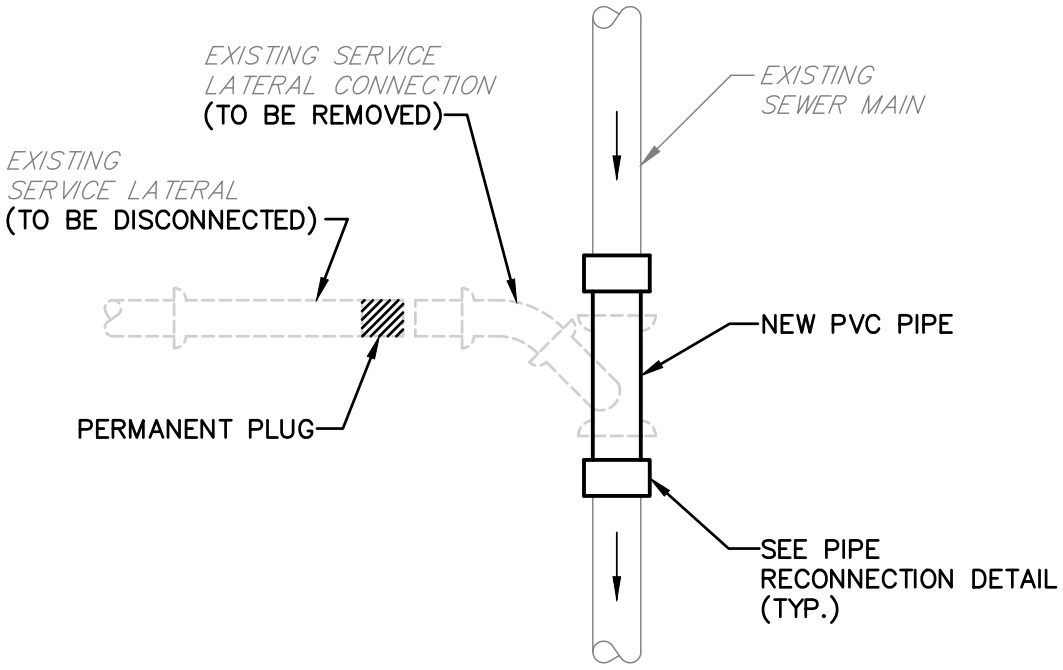
STANDARD DETAILS

CLEANOUT/TEST TEE CAP PROTECTION CASTING

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
10/12	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT-5



PLAN

NOTES:

1. EXISTING MAIN SEWER TO BE SAW CUT.

FILE NAME: LAT-6-DISCONNECTION.dwg

STANDARD DETAILS

SERVICE LATERAL DISCONNECTION FROM EXISTING SEWER MAIN

QUARRYVILLE BOROUGH AUTHORITY

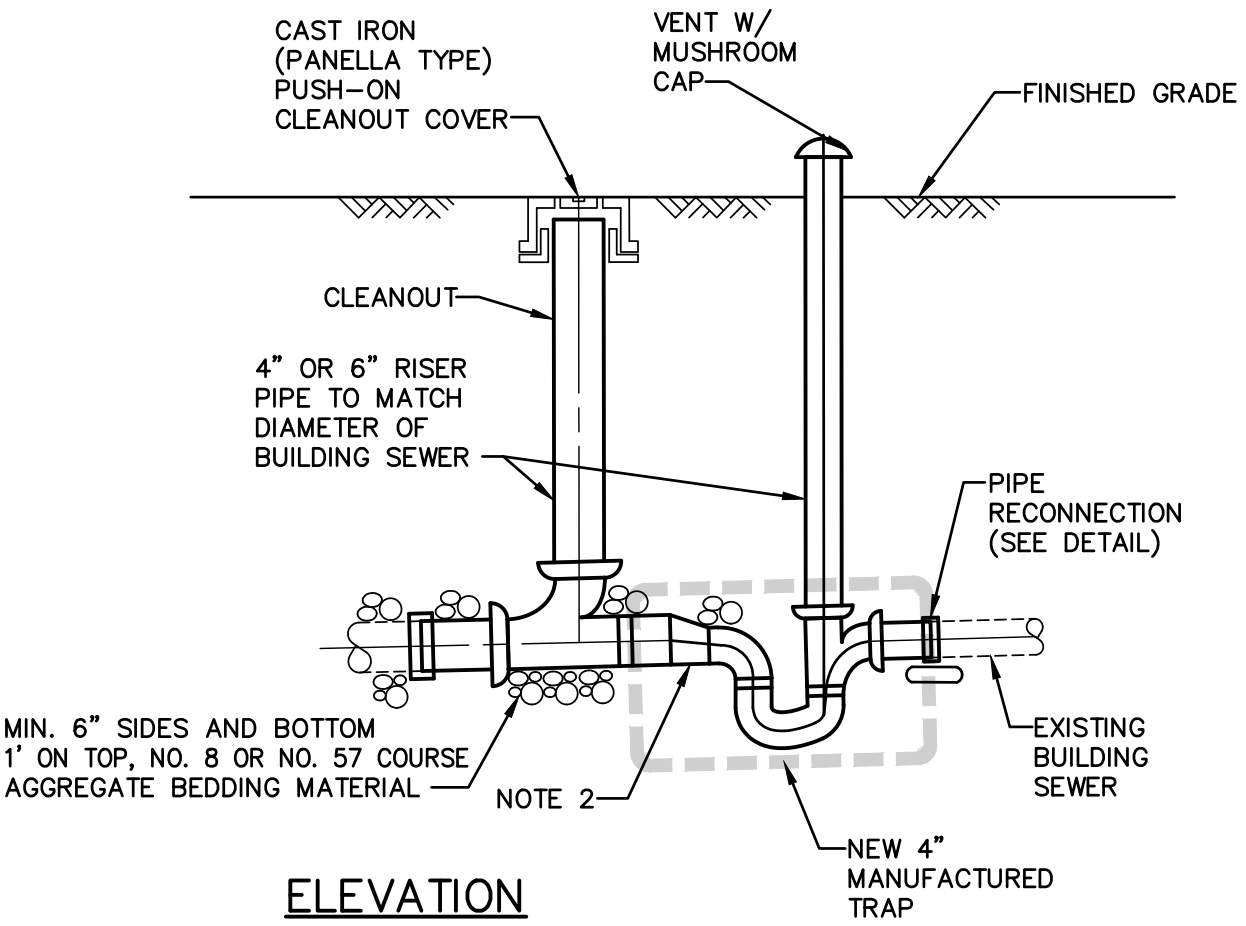
DATE	REVISIONS
12/13	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT-6

CLEANOUT/TRAP/VENT DETAIL

STANDARD DETAILS

QUARRYVILLE BOROUGH AUTHORITY



ELEVATION

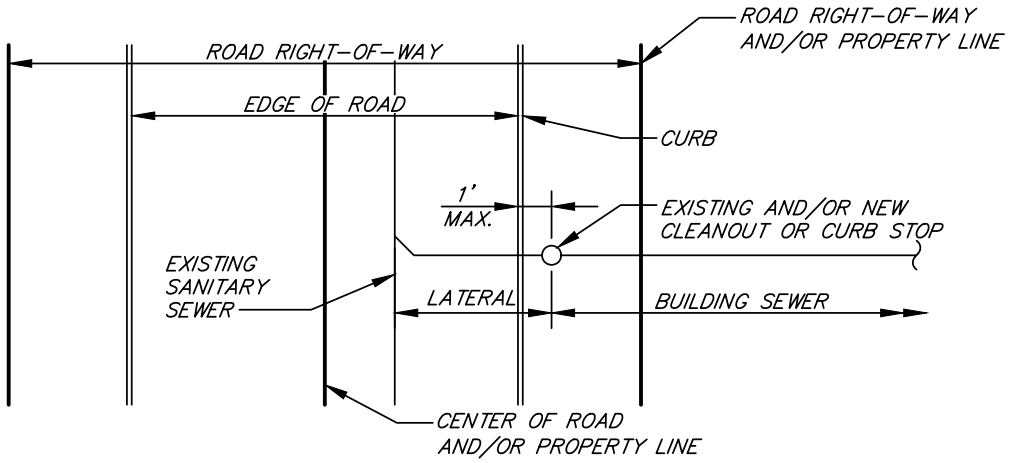
NOTES:

1. PIPE SIZES AND MATERIALS TO BE IN ACCORDANCE WITH AUTHORITY REQUIREMENTS.
2. FOR 4" BUILDING SEWER, USE ECCENTRIC 4"x6" ADAPTER FITTING FOR TRANSITION TO SWEEPING TEE (4"x6" FLEXIBLE COUPLING NOT ALLOWED).
3. ANY PIPE LESS THAN 3 FEET OF COVER, LOCATED IN A TRAFFIC OR DRIVEWAY AREA, SHALL BE CAST IRON OR DUCTILE IRON.

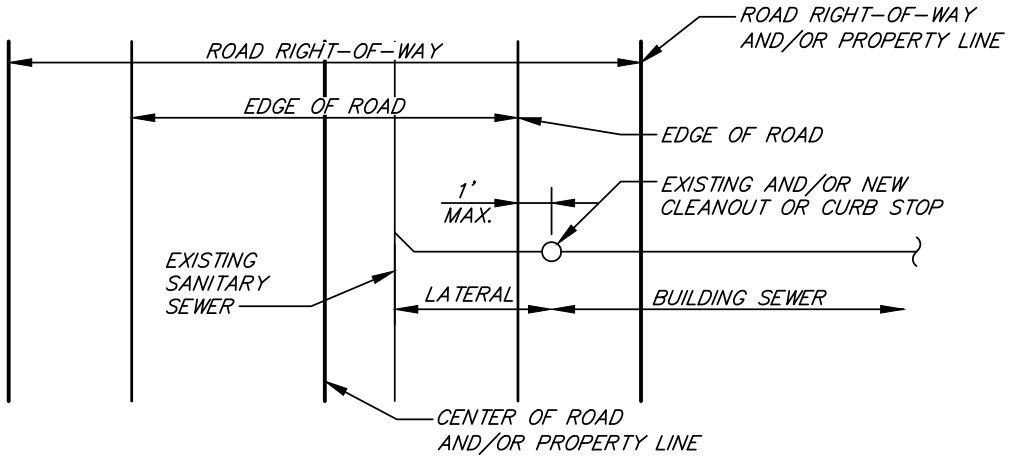
REVISIONS	DATE
DWG. CREATED	3/14
DWG. REVISION	4/22

SCALE	DWG. NO.
NO SCALE	LAT-7

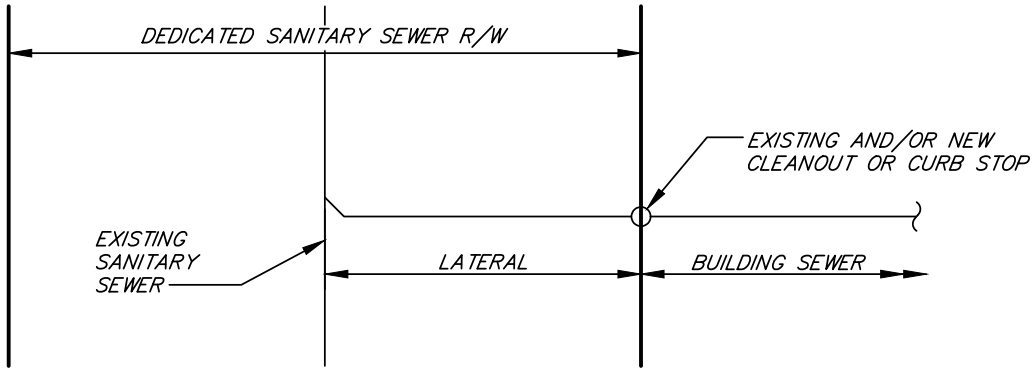
FILE NAME: LAT-7-CO-TRAP-VENT.dwg



TYPICAL PLAN - CLEANOUT WITH CURB



TYPICAL PLAN - CLEANOUT WITH EDGE OF ROAD



TYPICAL PLAN - CLEANOUT IN DEDICATED SANITARY SEWER R/W

FILE NAME: LAT-8-CLEANOUT-LOC.dwg

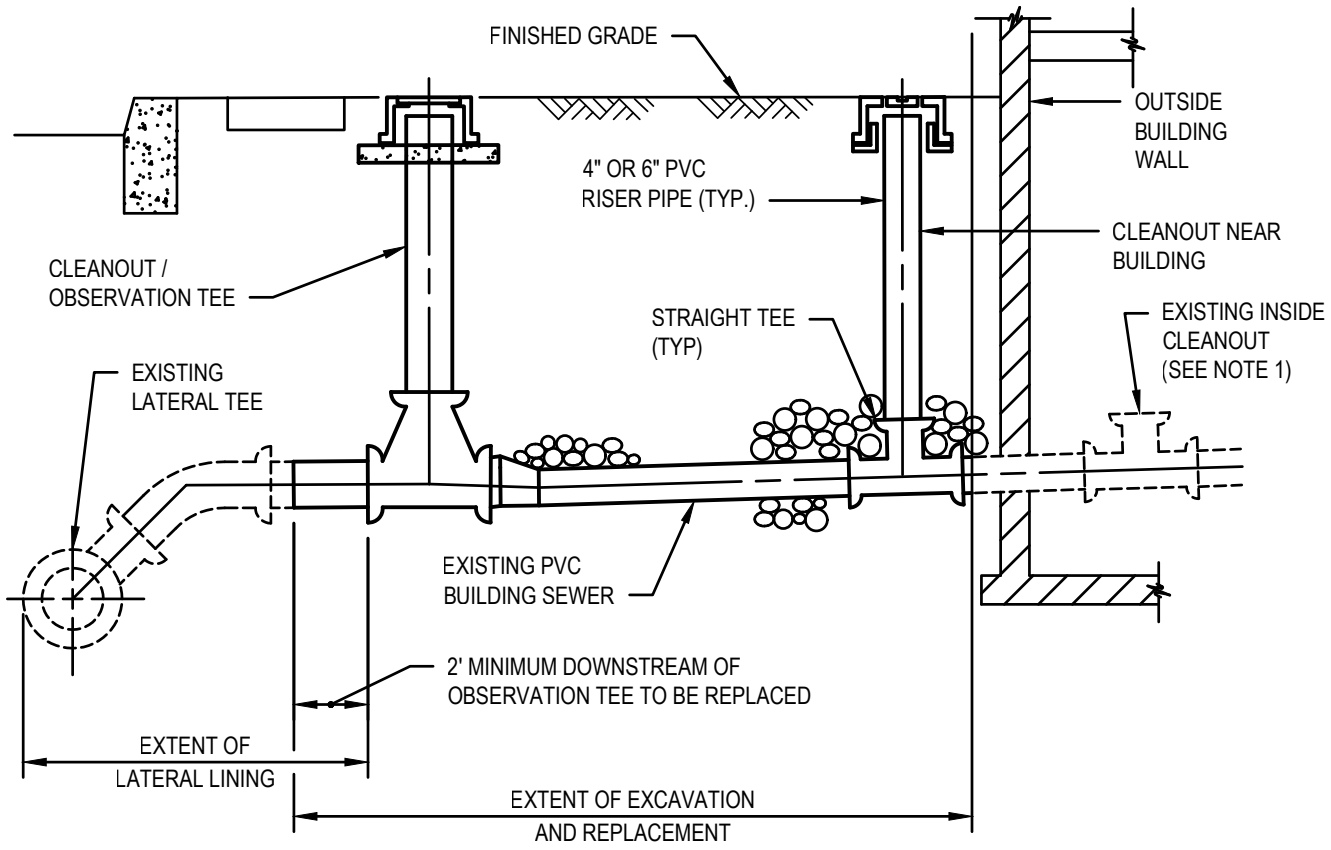
STANDARD DETAILS

CLEANOUT LOCATION PLAN

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
11/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT-8



SECTION

NOTES:

1. LATERAL LINING SHALL BE BETWEEN THE MAIN AND THE NEWLY INSTALLED DOUBLE SWEEPING TEE. SEE SPECIFICATIONS FOR LATERAL LINING EXECUTION.

2. PRIME CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY CCTV INSPECTIONS OF EXISTING LATERAL BEFORE BUILDING SEWER IS REPLACED AND MAINLINE CIPP IS INSTALLED.

3. BUILDING SEWER MUST BE AIR TESTED INDEPENDENTLY OF THE LATERAL LINING. OBSERVATION TEE RISER STACK AND BUILDING SEWER RISER STACK SHALL BE INCLUDED IN THE BUILDING SEWER AIR TEST.

FILE NAME: LAT-9-REP-LAT-LINING.dwg

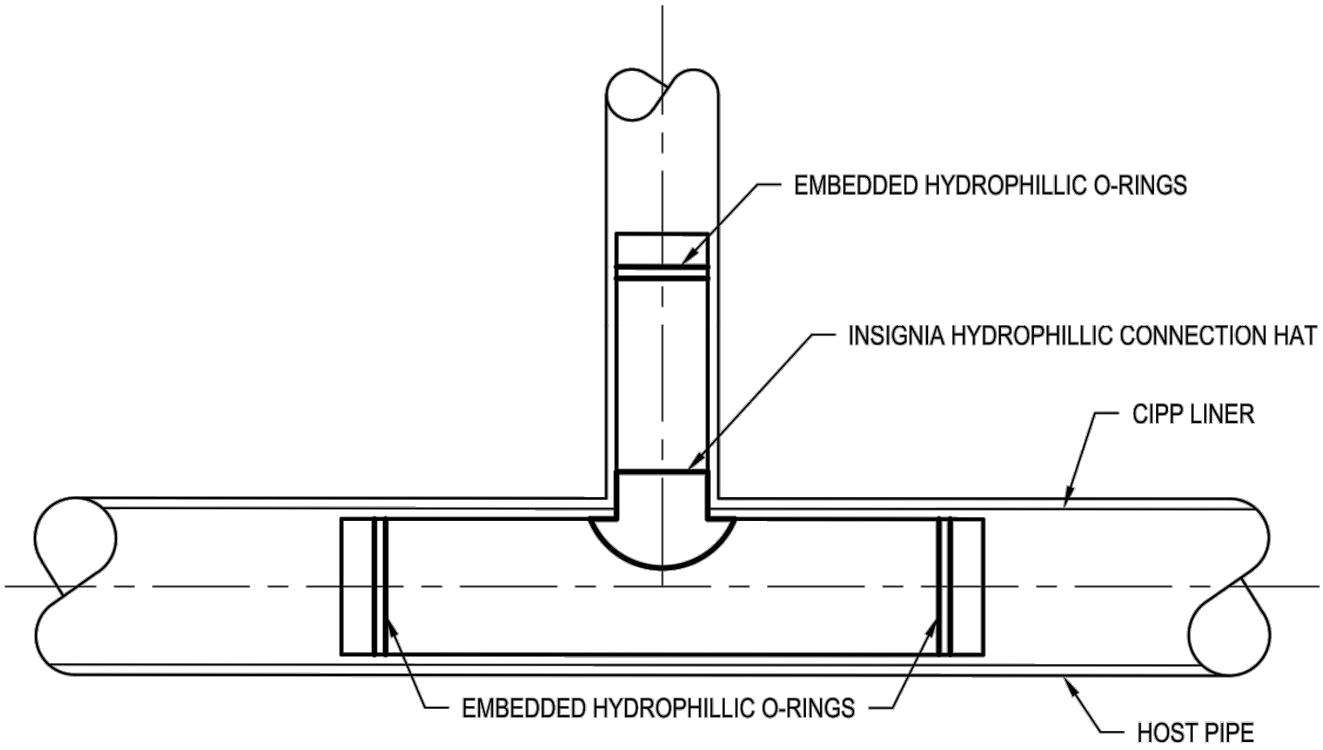
STANDARD DETAILS

LATERAL / BUILDING SEWER REPLACEMENT ASSOCIATED WITH LATERAL LINING

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
12-21	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT-9



FILE NAME: 10-11-BLD-SEAL.dwg

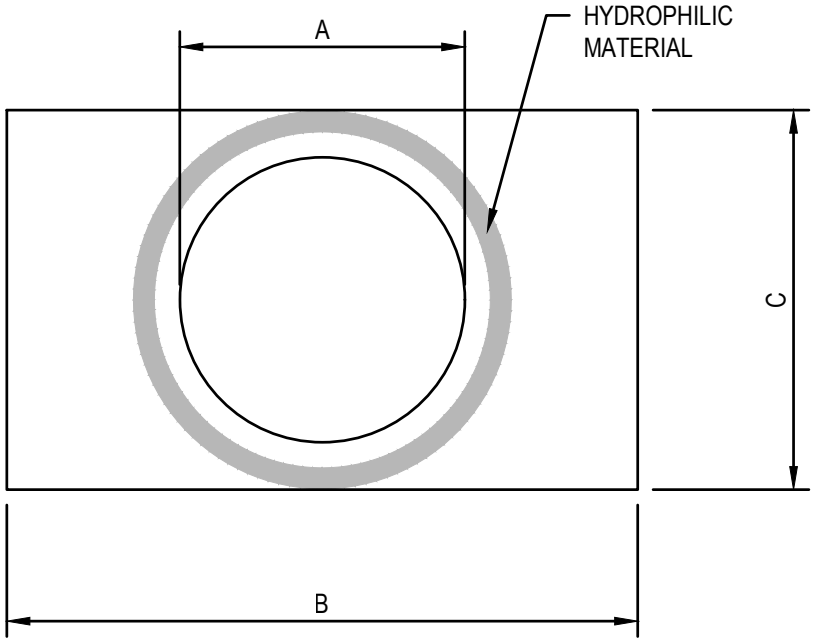
STANDARD DETAILS

LMK LATERAL LINER SYSTEM

QUARRYVILLE BOROUGH AUTHORITY

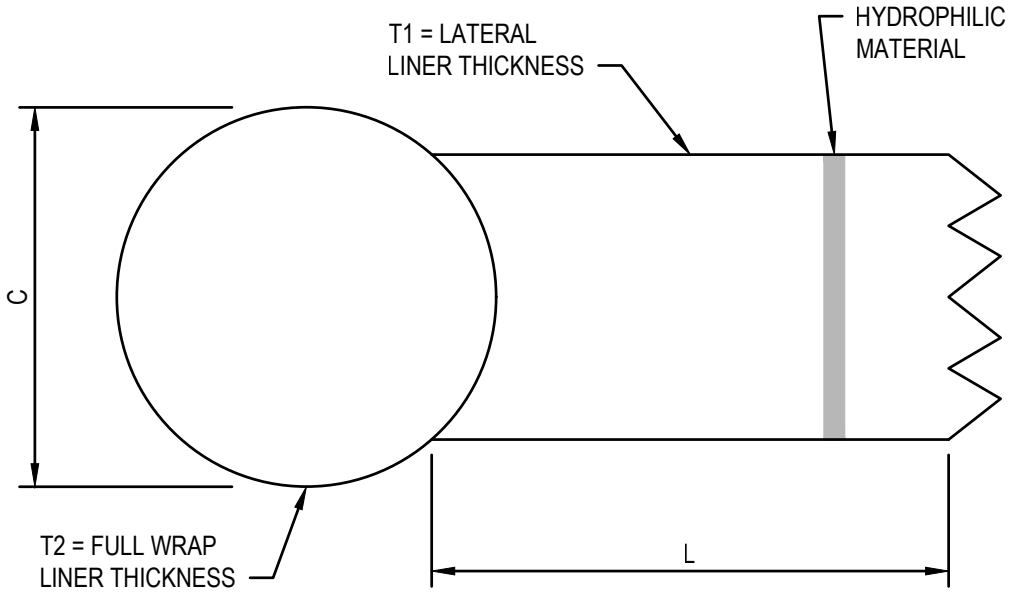
DATE	REVISIONS
12-21	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT-10



A = LATERAL DIAMETER (4"-6")
B = FULL WRAP LINER LENGTH (NTX 18")
C = MAIN LINE PIPE DIAMETER (TYPICALLY 8"-24")
T1 = LATERAL LINER THICKNESS (REFER TO DESIGN CALCULATIONS)
T2 = FULL WRAP LINER THICKNESS (TYPICALLY 3.0 MM)
L = LENGTH OF LATERAL LINER

NOTE: ALL LENGTHS AND THICKNESS VALUES WILL BE DETERMINED BY THE TECHNICAL SPECIFICATIONS AND/OR DESIGN CALCULATIONS



FILE NAME: 10-11-BLD-SEAL.dwg

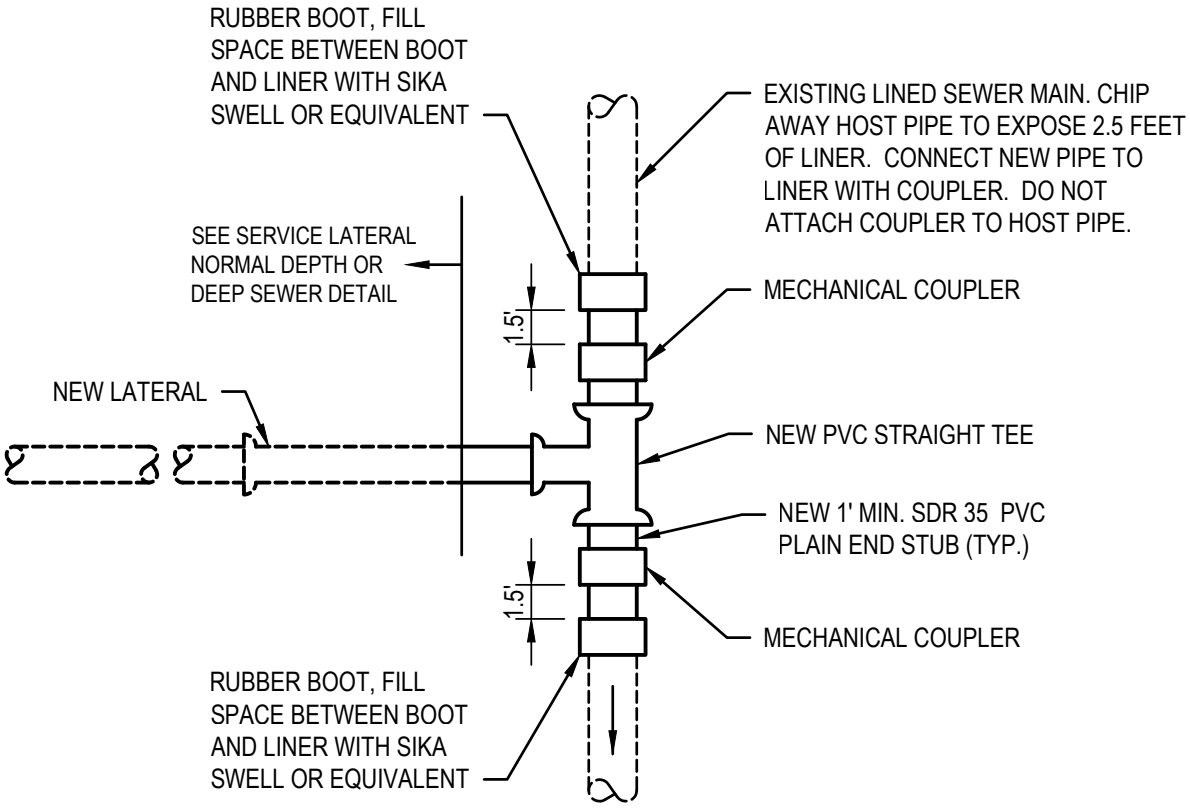
STANDARD DETAILS

BLD SERVICES LLC SERVICE CONNECTION SEAL PLUS LATERAL (SCS+L) - FULL WRAP

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
12-21	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT-11



NOTE:

1. TO ADDRESS THE INTERNAL CONNECTION, EITHER INSTALL A LATERAL LINER WITH 360-DEGREE CIRCULAR LINER WITHIN THE INSIDE DIAMETER OF THE MAIN LONG ENOUGH TO COVER THE LINER AND NEW PIPE TRANSITION OR INSTALL TWO (2) POINT REPAIRS TO COVER THE TRANSITION BETWEEN THE LINER AND NEW PIPE TRANSITION ON EITHER SIDE OF THE TEE.

FILE NAME: LAT–12–SERLATERALLINED.dwg

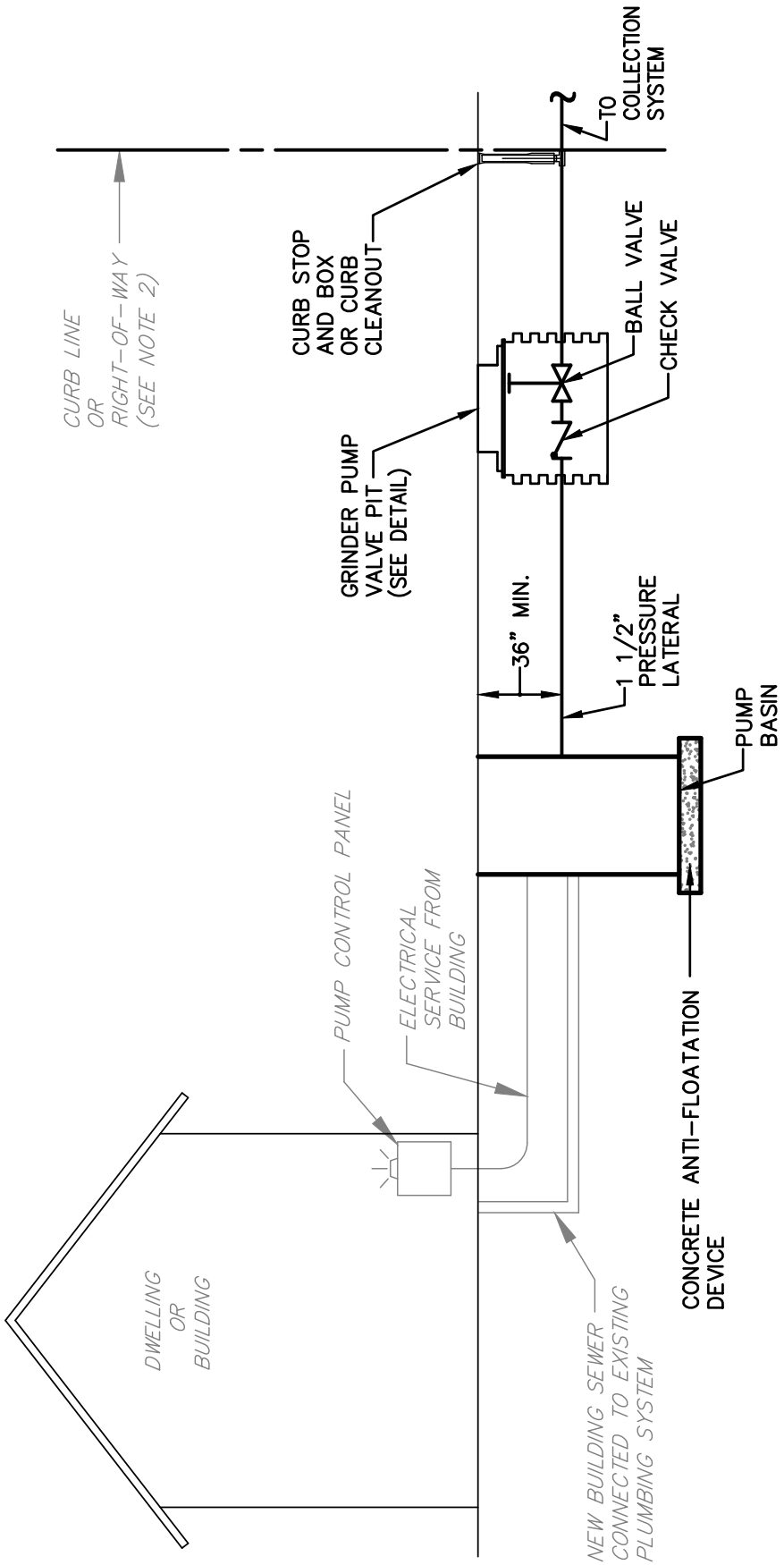
STANDARD DETAILS

SERVICE LATERAL CONNECTION TO EXISTING LINED SEWER MAIN

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
12–21	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LAT–12



NOTES:

1. PROVIDE CHECK VALVE AND BALL VALVE IN VALVE PIT ONLY REQUIRED WHEN CONNECTING TO L.P.S. MAIN.
2. REFER TO LAT-1 DETAIL FOR LOCATION.

FILE NAME: LP-1-2-GRINDPMPINST.dwg

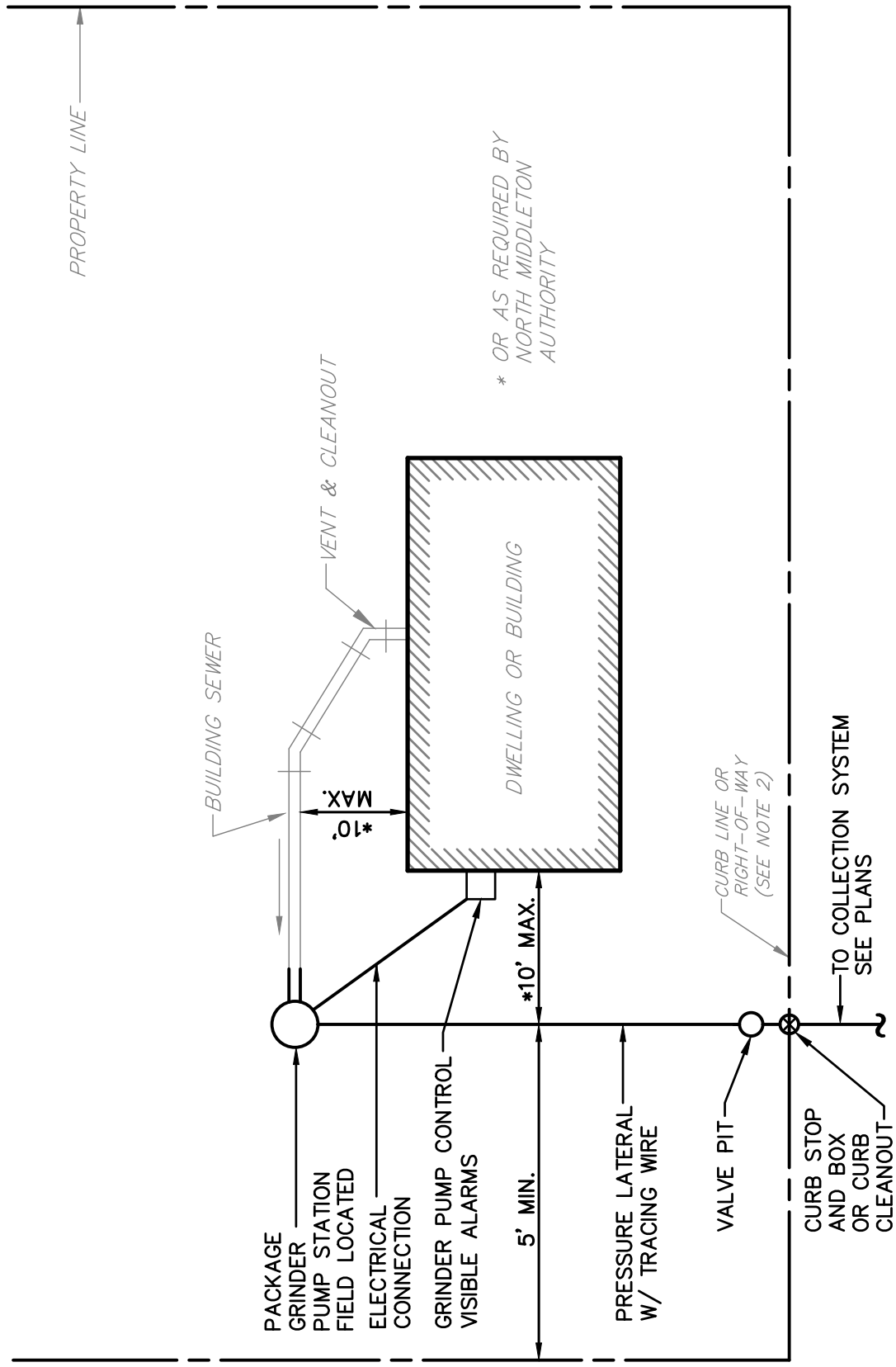
STANDARD DETAILS

TYPICAL GRINDER PUMP INSTALLATION DETAIL

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP-1



NOTES:

1. ACTUAL PUMP STATION AND LATERAL LOCATION MAY DIFFER. CONTRACTOR TO COORDINATE LATERAL OUTLET WITH OWNER.
2. REFER TO LP-1 FOR LOCATION.

FILE NAME: LP-1-2-GRINDPMPINST.dwg

STANDARD DETAILS

TYPICAL GRINDER PUMP INSTALLATION DETAIL

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP-2

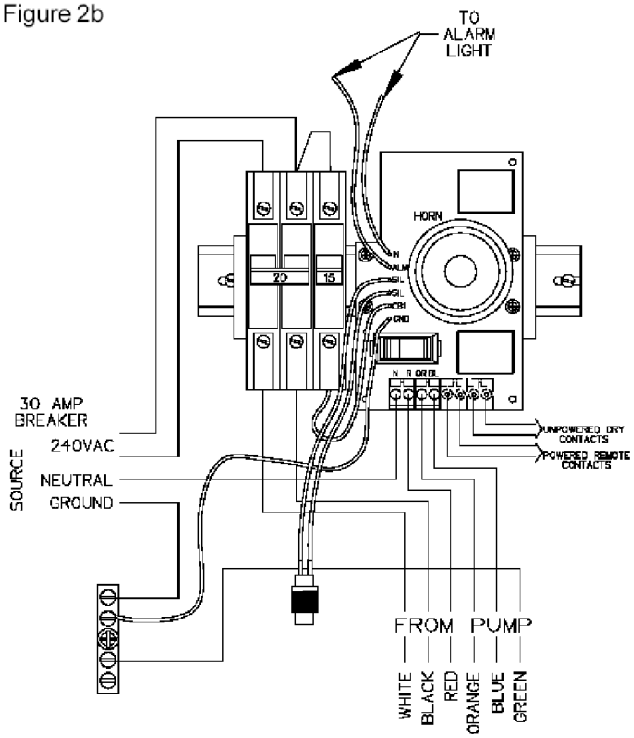
Environment One Grinder Pump Feature Identification:

1. GRINDER PUMP BASIN – High density polyethylene (HDPE).
2. ACCESSWAY COVER – FRP
3. ELECTRICAL QUICK DISCONNECT (EQD) – Cable from pump core terminates here.
4. POWER AND ALARM CABLE – Circuits to be installed in accordance with local codes.
5. ALARM PANEL – NEMA 4X enclosure. Equipped with circuit breakers. Locate according to local codes.
6. ALARM DEVICE – Every installation is to have an alarm device to alert the homeowner of a potential malfunction. Visual devices should be placed in very conspicuous locations.
7. INLET – EPDM grommet (4.5" ID). For 4.5" OD DWV pipe.
8. WET WELL VENT – 2.0" tank vent, supplied by factory in units with accessways.
9. GRAVITY SERVICE LINE – 4" DWV, (4.5" OD). Supplied by others.

9a. STUB–OUT – 4" X 5' Long watertight stub–out, to be installed at time of burial unless the gravity service line is connected during installation. Supplied by others.

10. DISCHARGE VALVE – 1–1/4" Female pipe thread.
11. DISCHARGE LINE – 1–1/2" Nominal pipe size. Supplied by others.
12. CONCRETE ANCHOR – See Ballast Calculations for specific weight for station height. Supplied by others.
13. BEDDING MATERIAL – 6" minimum depth, round aggregate, (gravel). Supplied by others.
14. FINISHED GRADE – Grade line to be 1" to 4" below removable lid and slope away from the station.
15. VENT – Indoor installation. See section 6, Venting, on page 6.
16. VALVE – Full ported ball valve. Recommended option; for use during service operations. Supplied by others.
17. CONDUIT – 1" or 1–1/4", material and burial depth as required per national and local codes. Conduit must enter panel from bottom and be sealed per NEC section 300.5 & 300.7. Supplied by others.

Figure 2b



240 VOLT WIRING

FILE NAME: LP–3–4–EONEGRINDERPUMP.dwg

STANDARD DETAILS

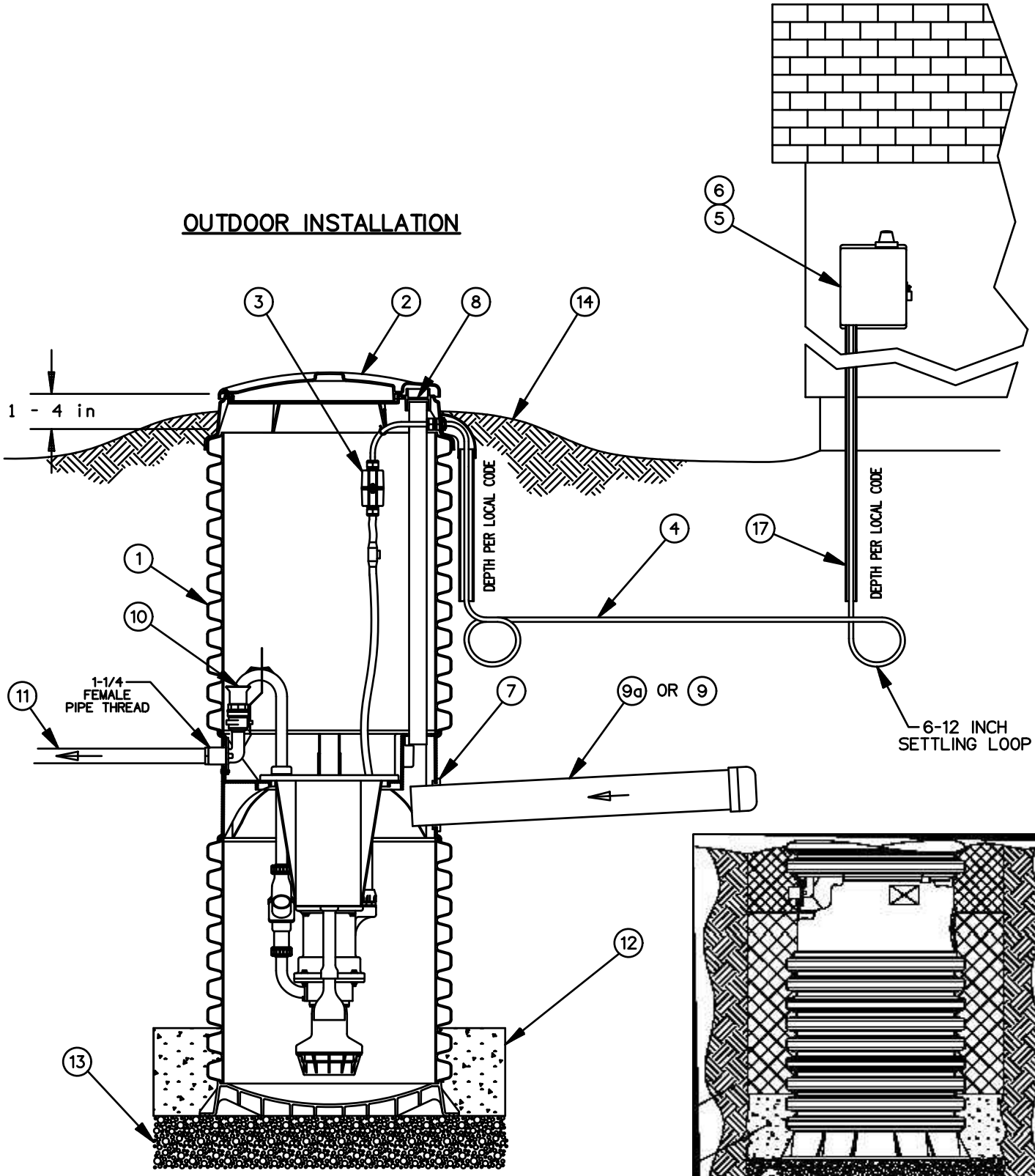
ENVIRONMENT ONE GRINDER PUMP FEATURE IDENTIFICATION – 240 VOLT WIRING

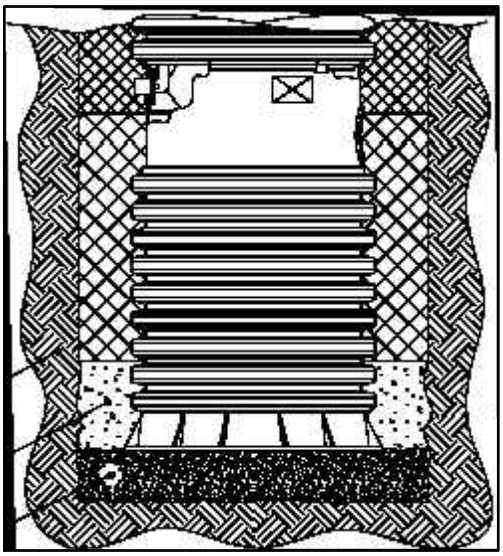
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP–3

OUTDOOR INSTALLATION





POURED IN-PLACE

FILE NAME: LP-3-4-EONEGRINDERPUMP.dwg

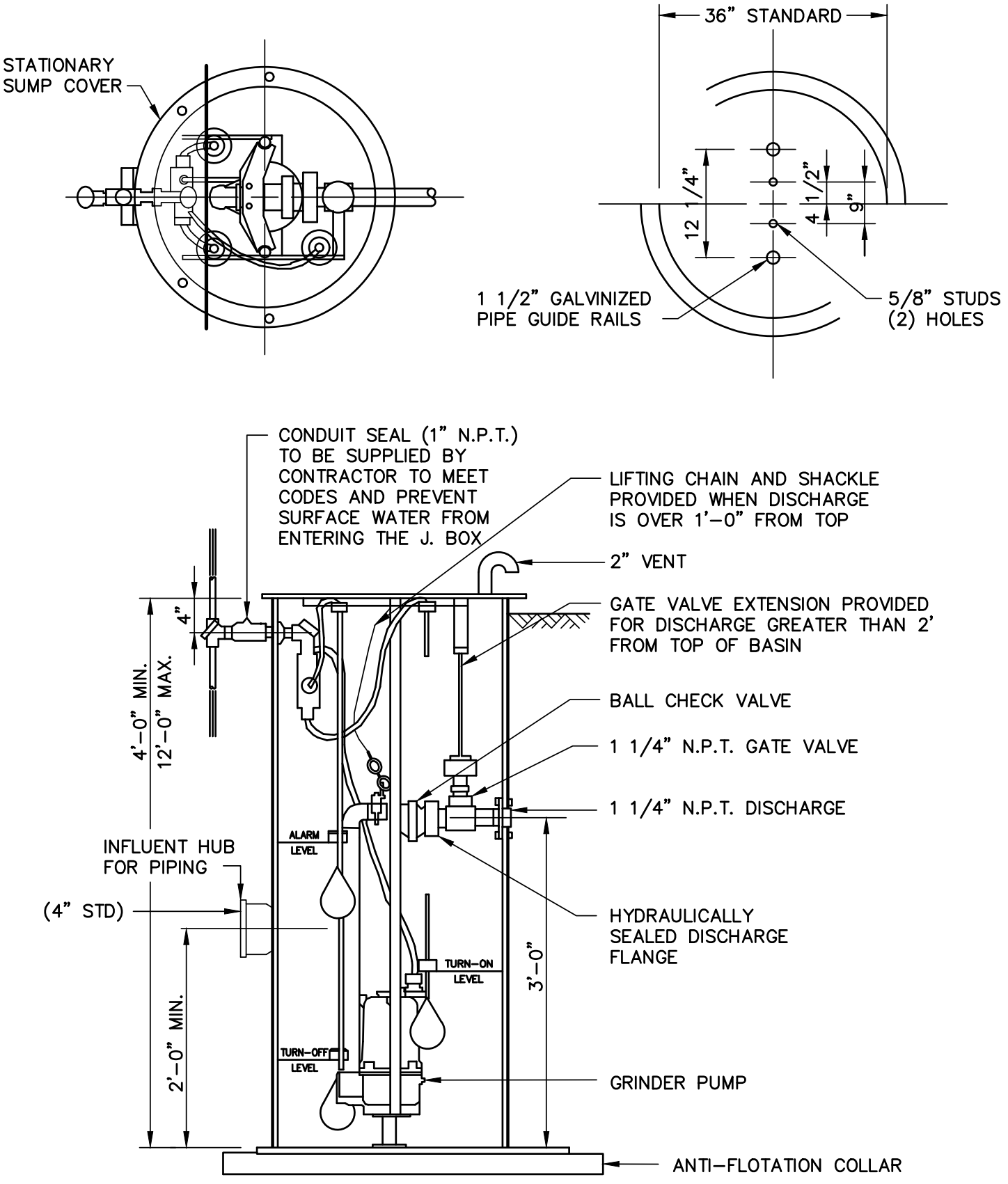
STANDARD DETAILS

ENVIRONMENT ONE GRINDER PUMP OUTDOOR INSTALLATION - POURED IN-PLACE

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP-4



FILE NAME: LP-5-GRINDERPUMP.dwg

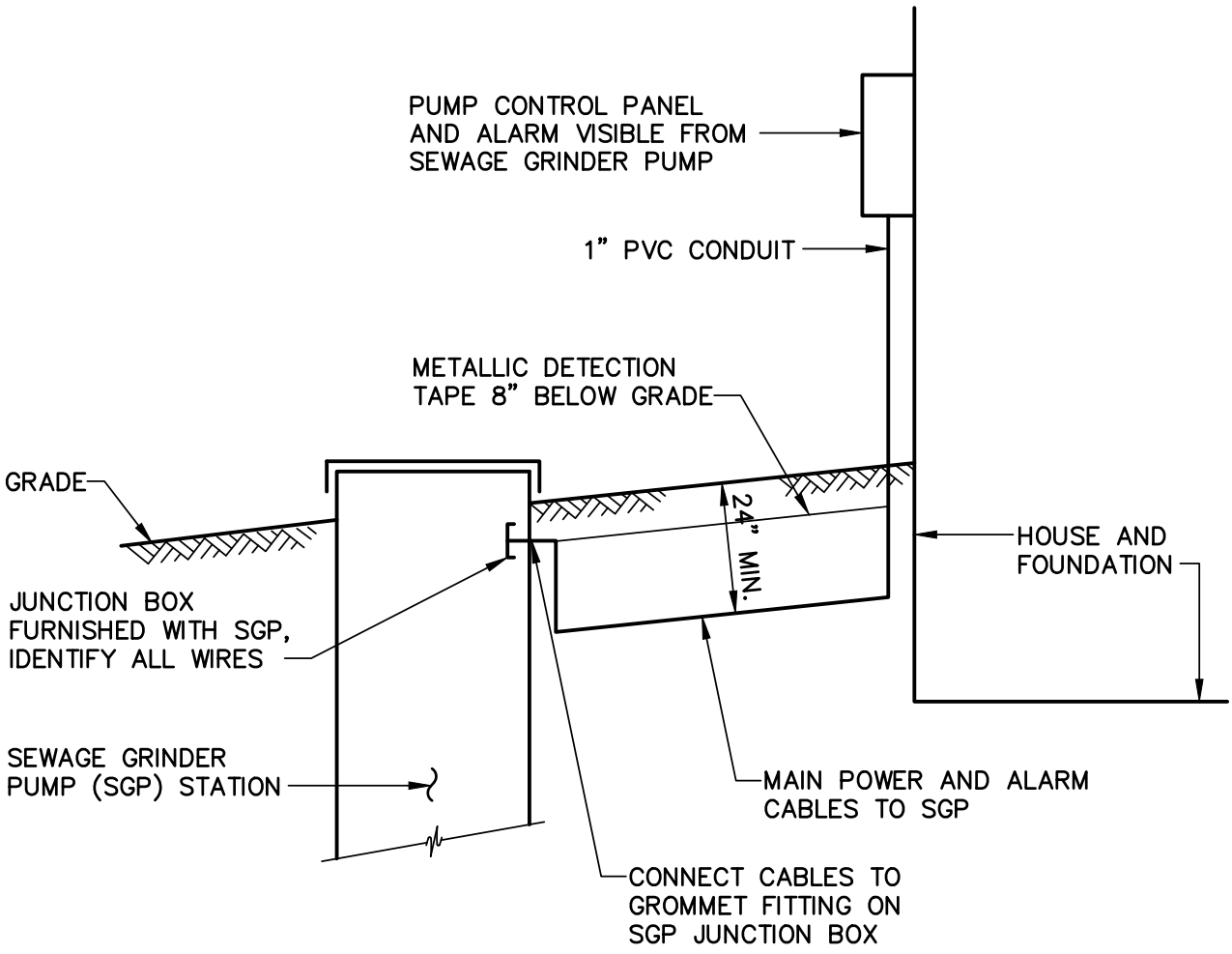
STANDARD DETAILS

SIMPLEX SEWAGE GRINDER PUMP STATION

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP-5



FILE NAME: LP-TYPELEC.dwg

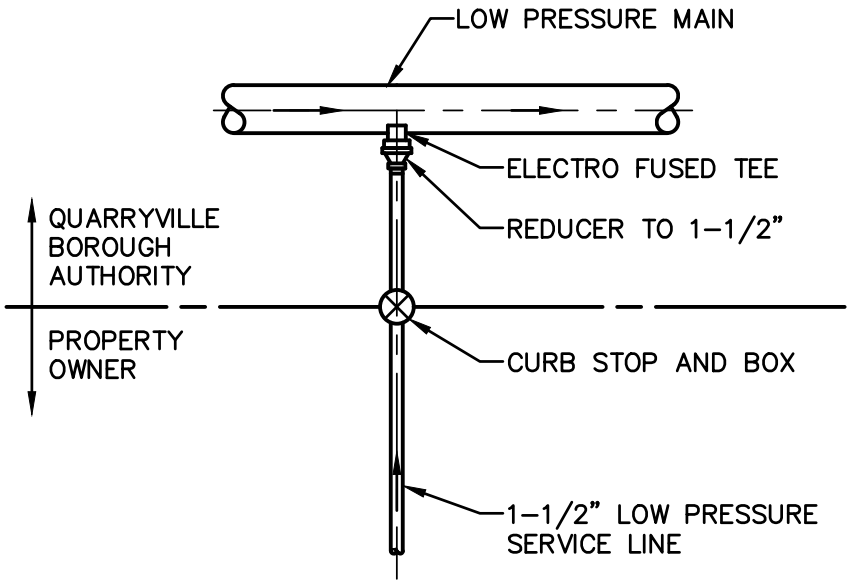
STANDARD DETAILS

TYPICAL ELECTRICAL LAYOUT

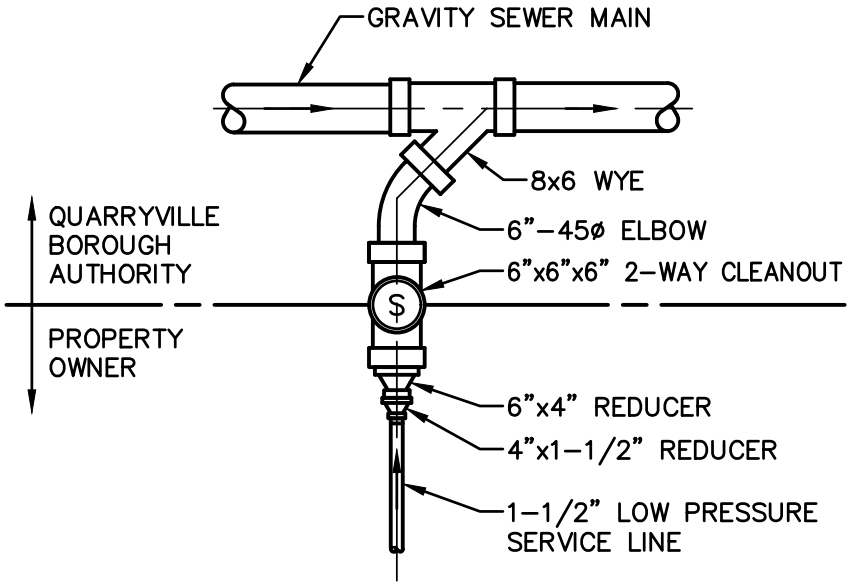
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP-6



PLAN



PLAN

FILE NAME: LP-7-LOWPRSCONN.dwg

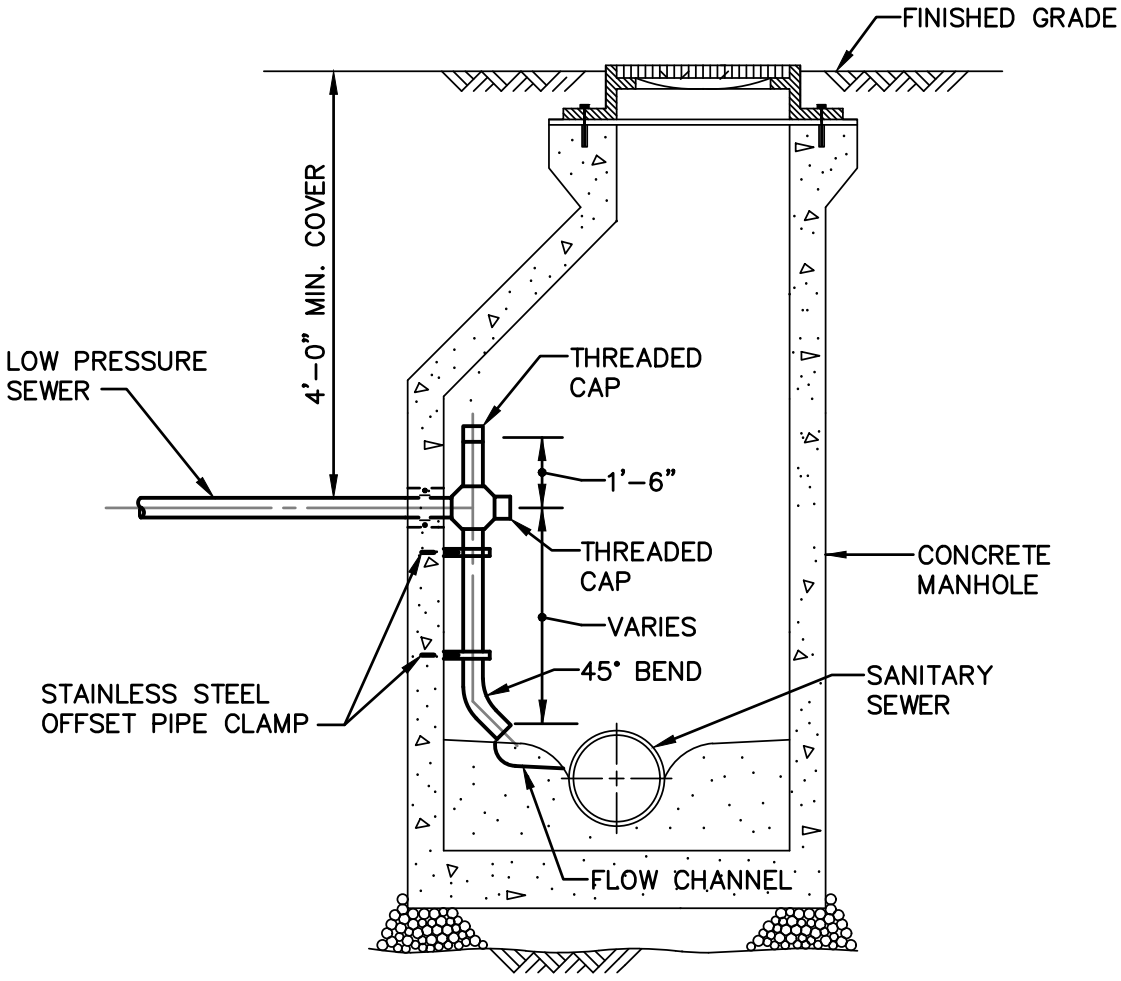
STANDARD DETAILS

LOW PRESSURE SERVICE LINE CONNECTION AT GRAVITY/PRESSURE MAIN

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP-7



NOTE:

1. MANHOLE TO BE LINED WITH SPRAYROQ LINING SYSTEM MINIMUM OF 250 MILS DRY FILM THICKNESS.

FILE NAME: LP-13-LOWPRESDIS.dwg

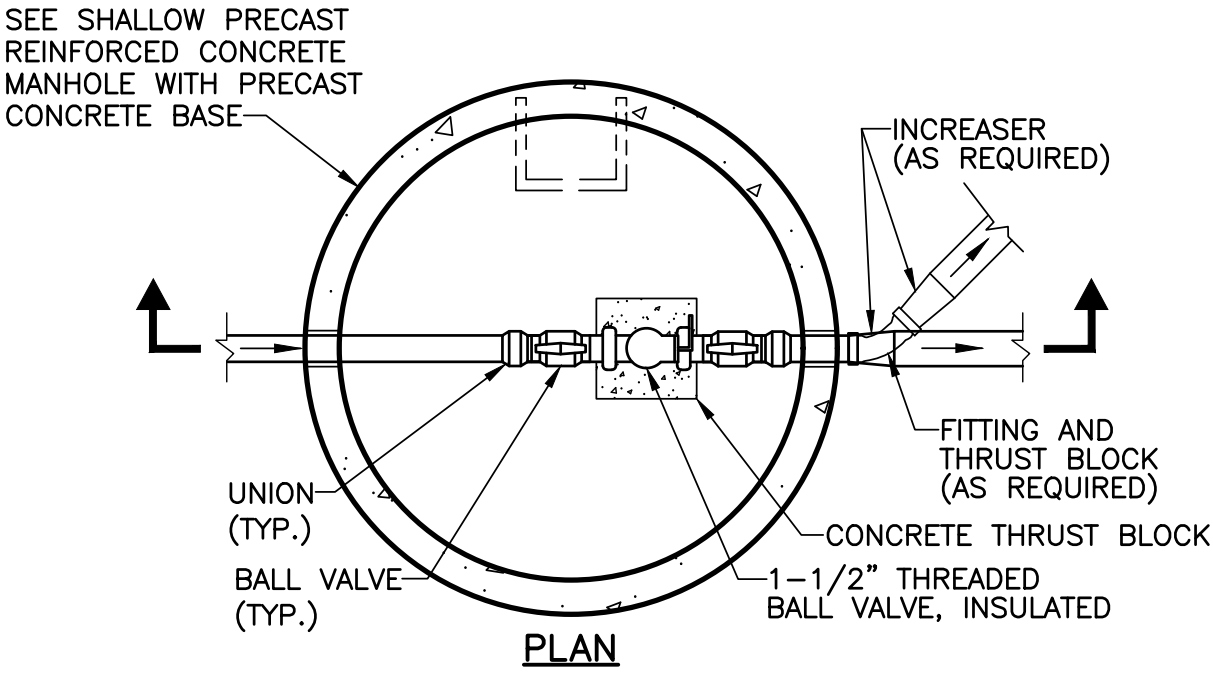
STANDARD DETAILS

LOW PRESSURE SEWER DISCHARGE MANHOLE

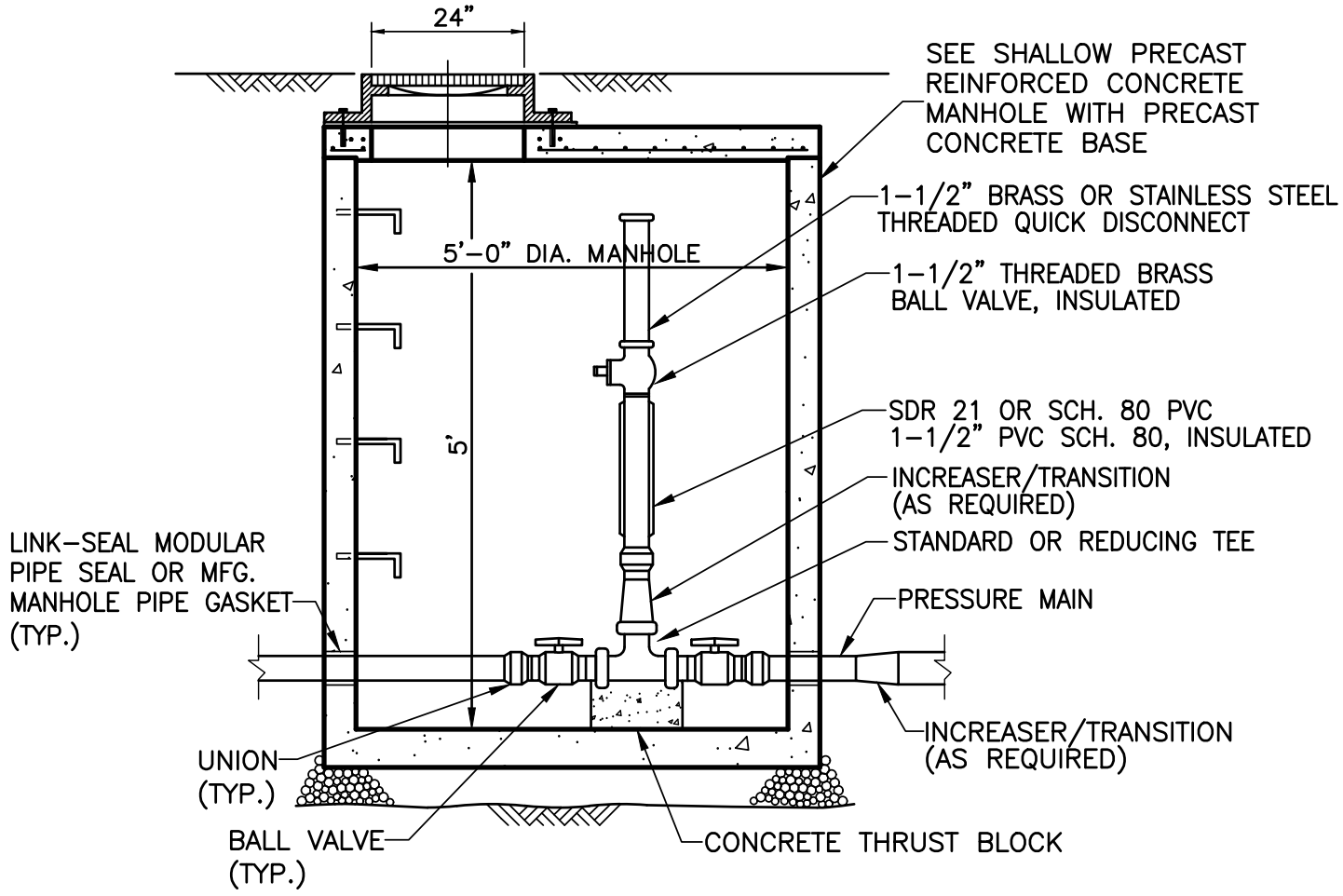
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP-8



PLAN



SECTIONAL ELEVATION

FILE NAME: LP-7-IN-LINE-CO-VALVE.DWG

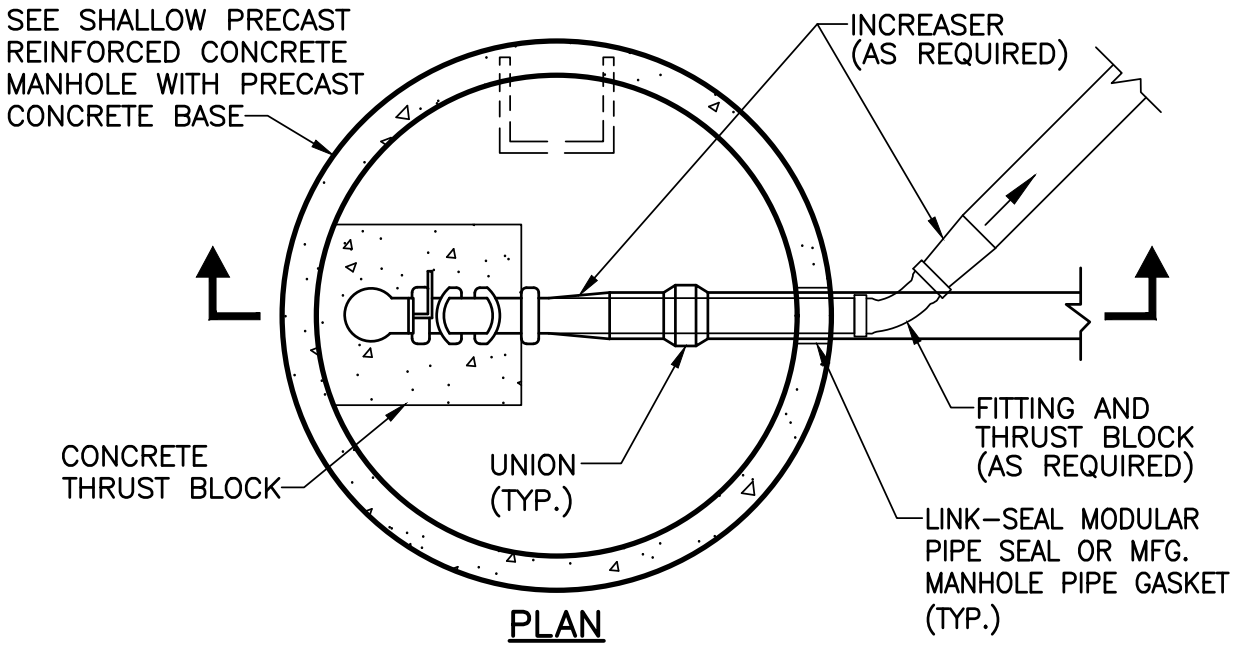
STANDARD DETAILS

IN-LINE CLEANOUT/VALVE PIT FOR LOW PRESSURE SEWER MAIN

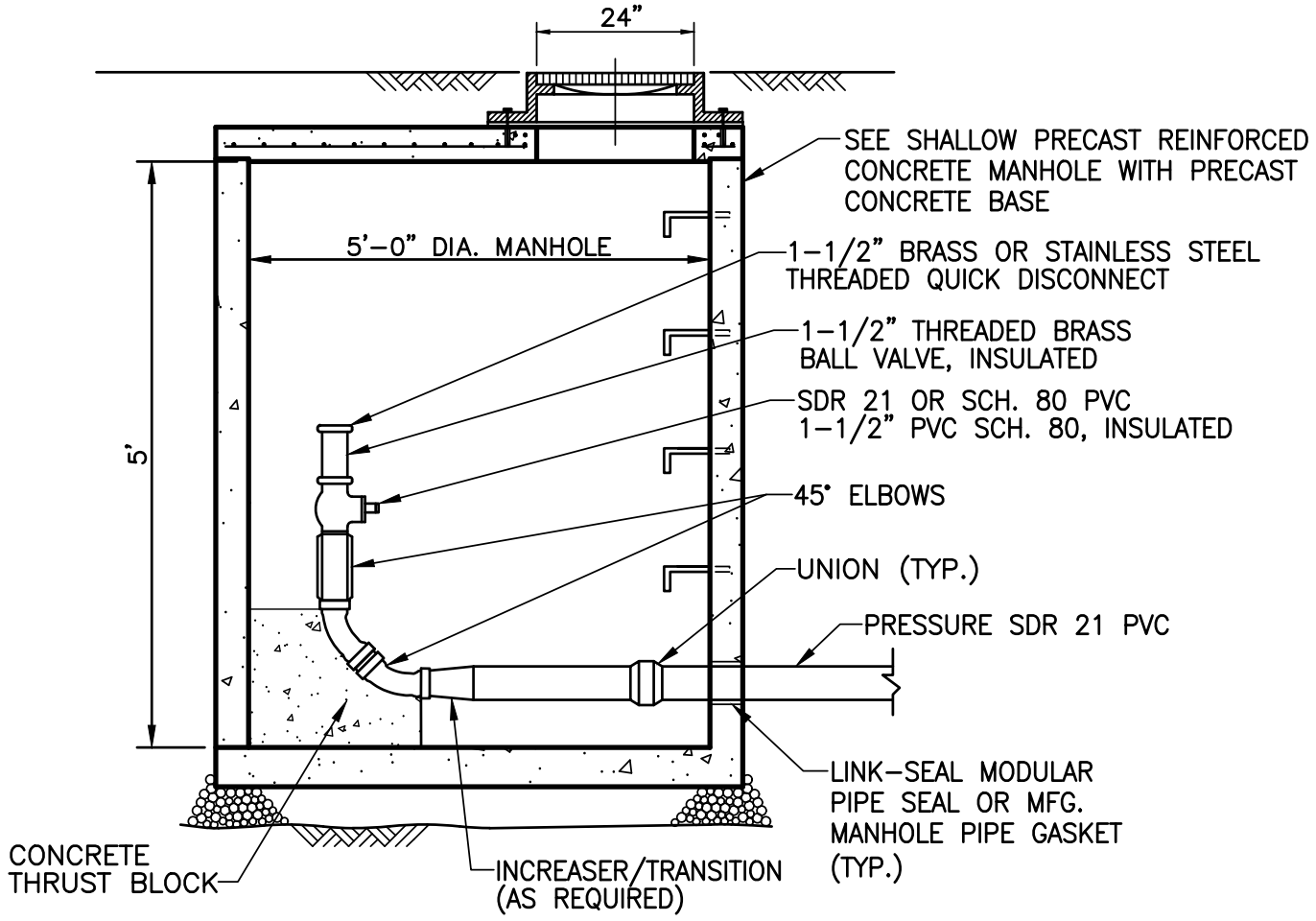
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP-9



PLAN



SECTIONAL ELEVATION

FILE NAME: LP-8-IN-LINE-TERM-CO.dwg

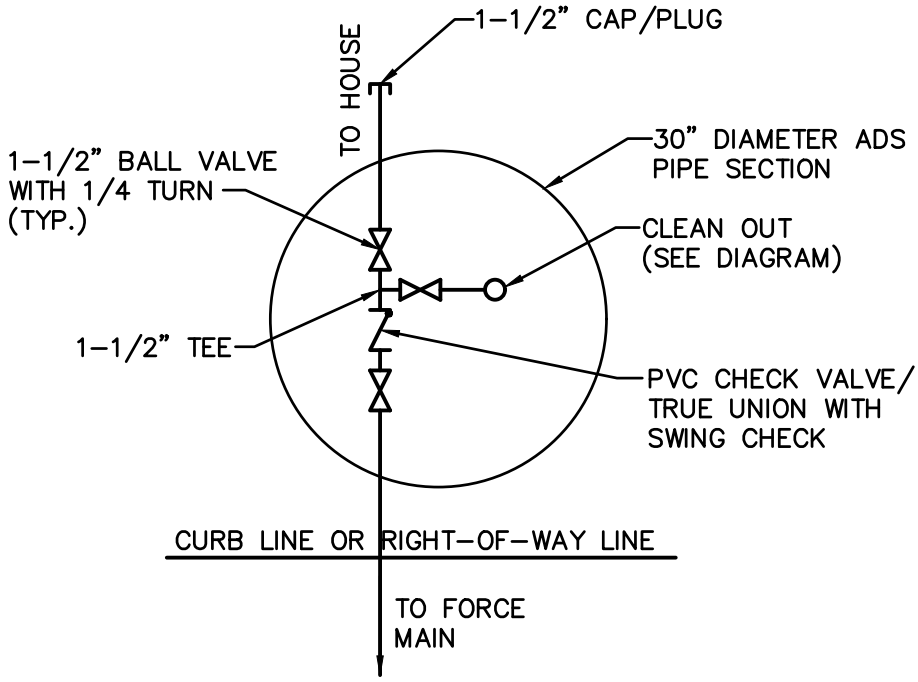
STANDARD DETAILS

IN-LINE TERMINAL CLEANOUT FOR LOW PRESSURE MAIN

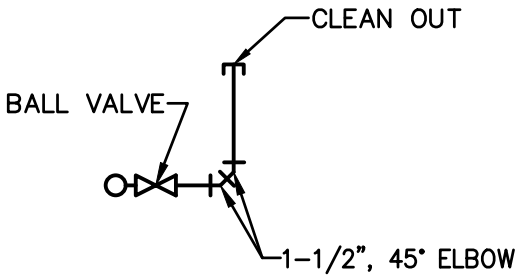
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/08	DWG. CREATED
4/22	DWG. REVISION

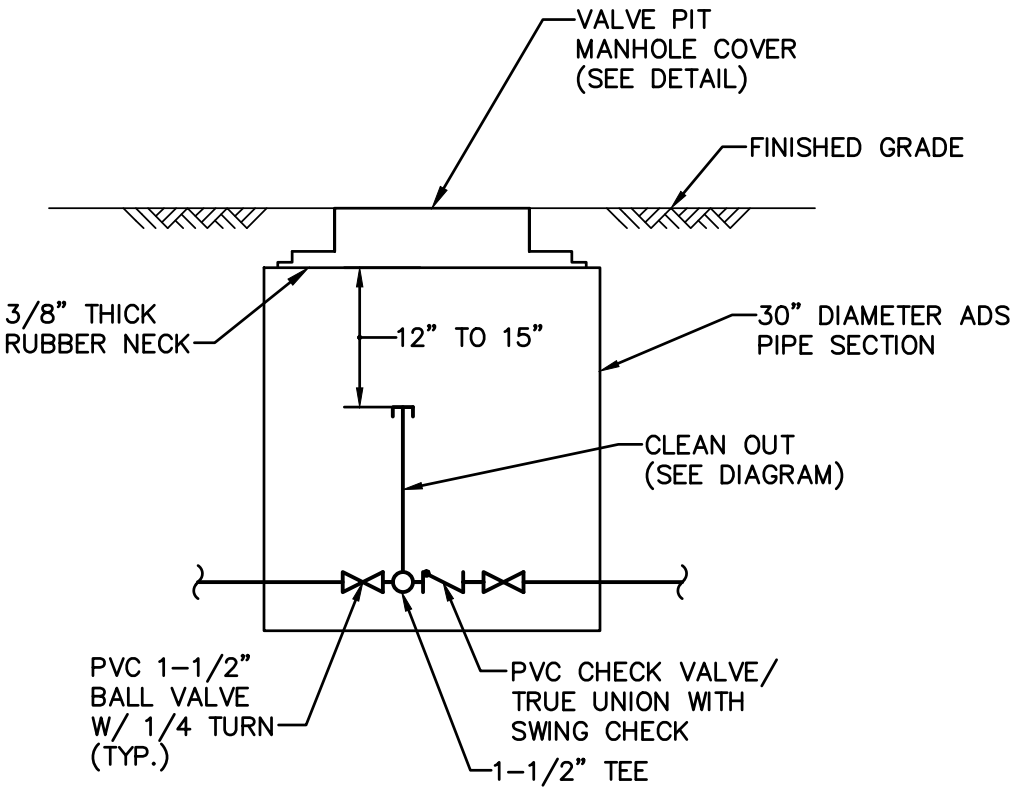
SCALE	DWG. NO.
NO SCALE	LP-10



PLAN VIEW



TEE DIAGRAM



SECTION VIEW

FILE NAME: LP-VALVEPITDET.dwg

STANDARD DETAILS

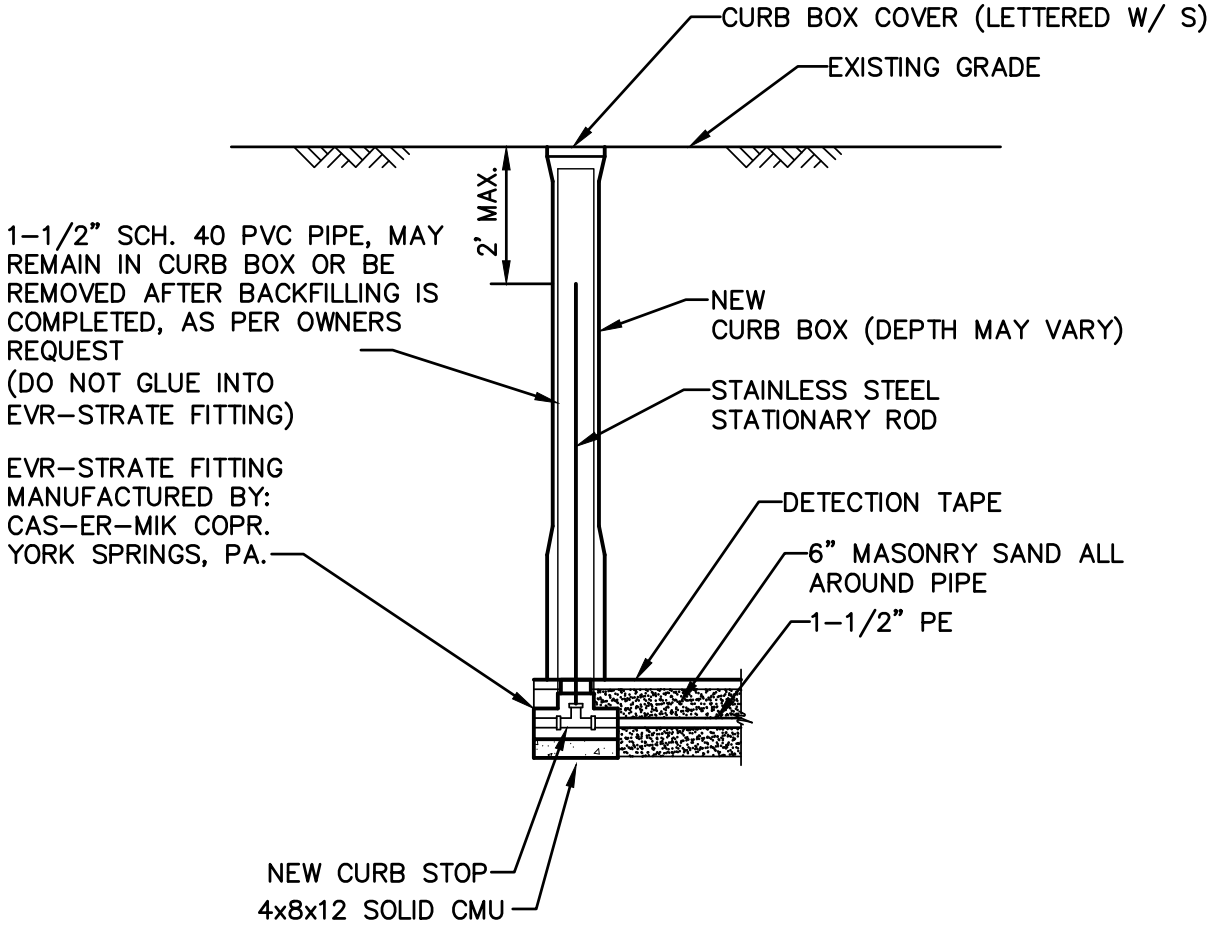
IN LINE VALVE PIT DETAIL BUILDING SEWER

NOTE: FOR NON-TRAFFIC AREAS ONLY

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP-11



FILE NAME: LP–17–CURBSTOP.dwg

STANDARD DETAILS

CURB STOP AND BOX DETAIL

QUARRYVILLE BOROUGH AUTHORITY

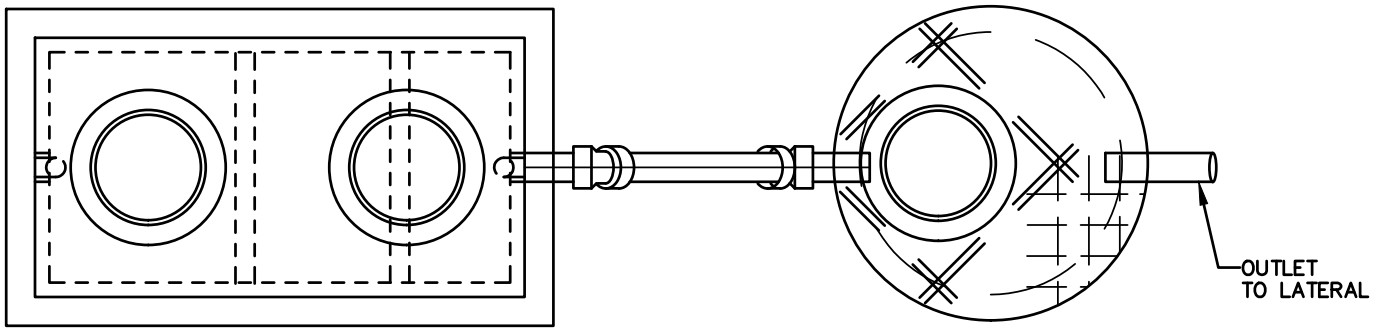
DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	LP–12

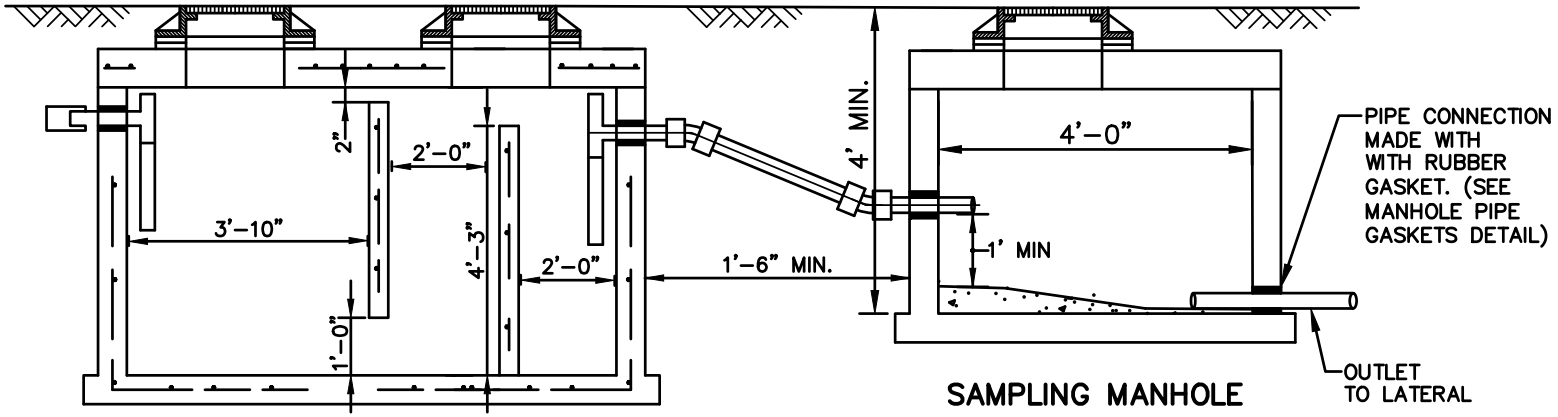
STANDARD DETAILS

TYPICAL GREASE INTERCEPTOR TO SAMPLING MANHOLE CONNECTION

QUARRYVILLE BOROUGH AUTHORITY



PLAN



SECTION

NOTES:

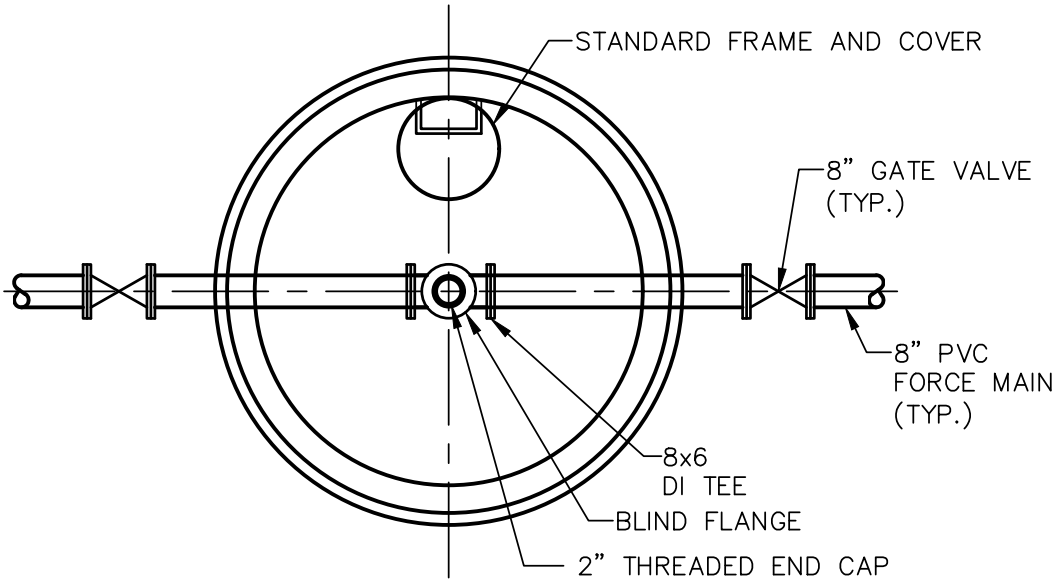
1. MINIMUM SIZE OF OF GREASE TRAP PERMITTED IS 1,000 GALLONS.
2. GREASE INTERCEPTOR SIZE AND DESIGN SHALL BE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. ACCEPTABLE MANUFACTURERS: MONARCH PRODUCTS OR APPROVED EQUAL.
4. CONCRETE FOR SLOPE TO BE 3500 psi MIX DESIGN MEETING SECTION 2605 PART 2.01 OF THE STANDARD SPECIFICATIONS
5. FLOW CHANNEL NECESSARY.

REVISIONS	DATE
DWG. CREATED	3/14
DWG. REVISION	4/22

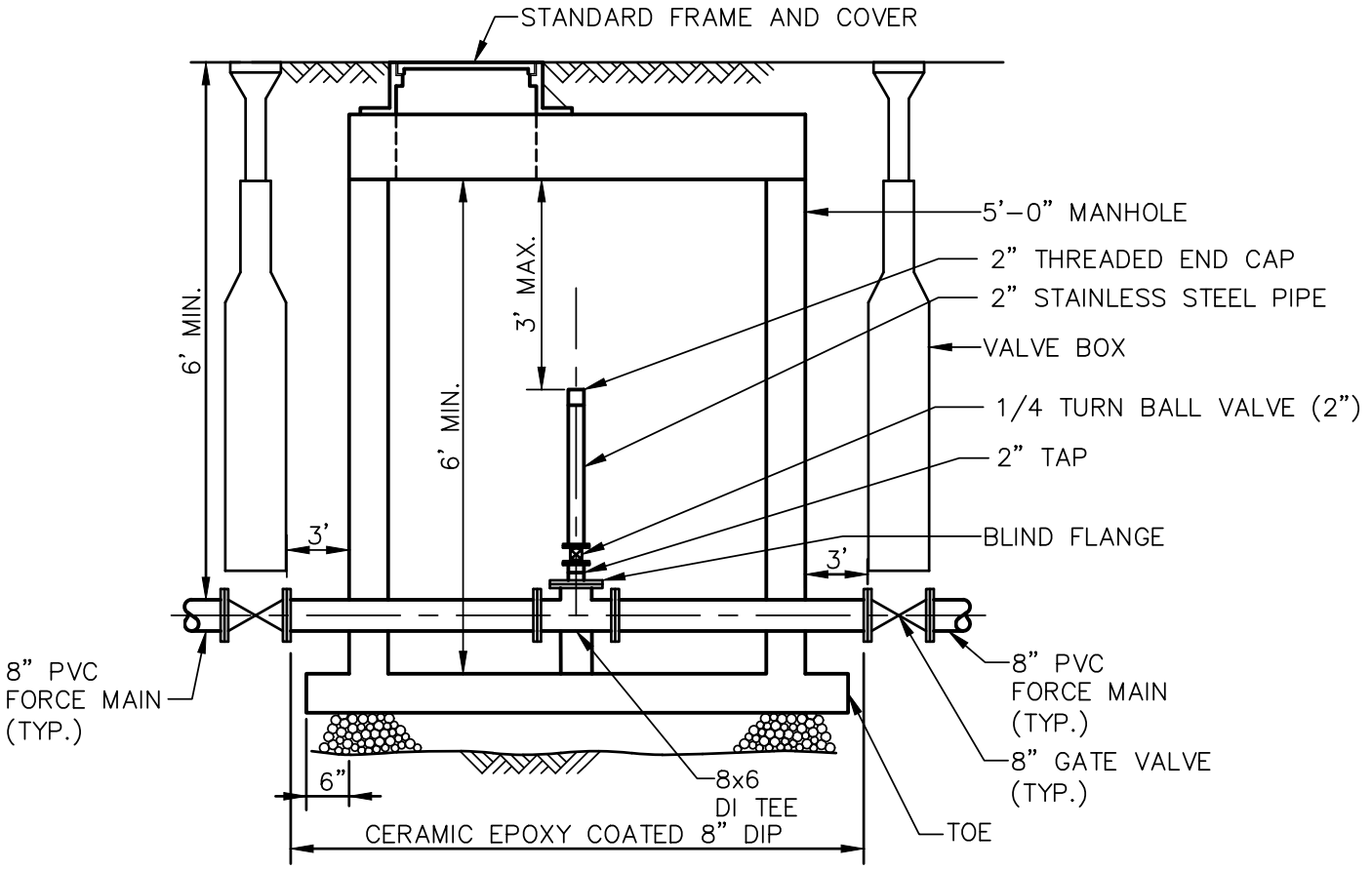
SCALE: NO SCALE

DWG. NO. GR-1

FILE NAME: GR-1-GreaseTrap-Vault.dwg



PLAN



SECTION

FILE NAME: FM-1-FLUSH-CHAMBER.dwg

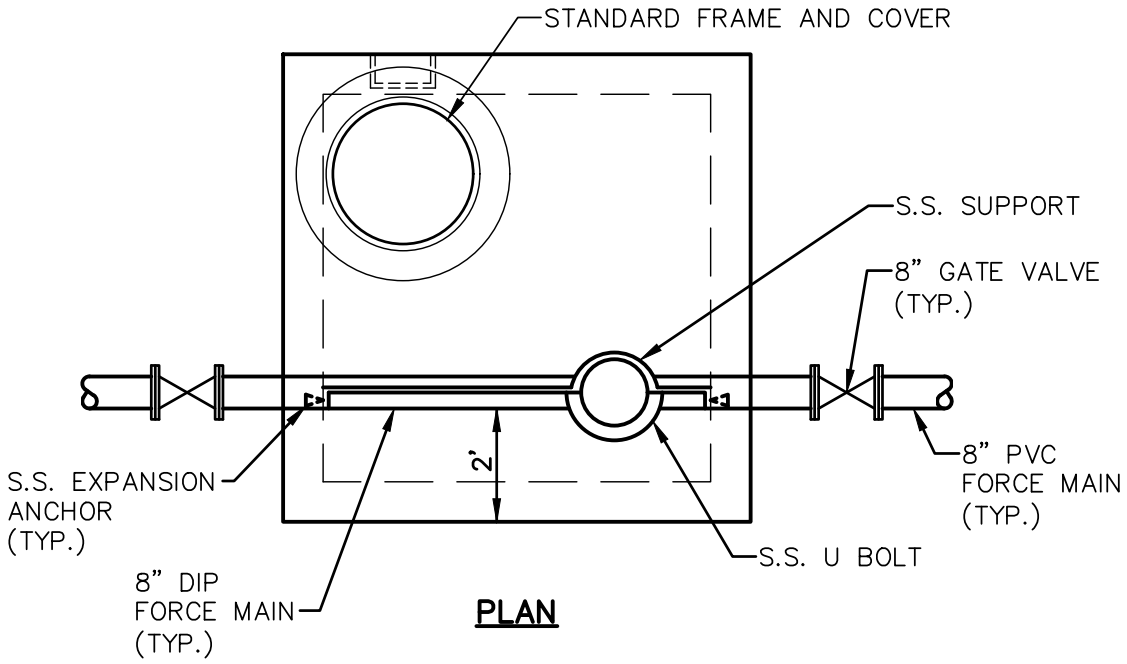
STANDARD DETAILS

FLUSH CHAMBER

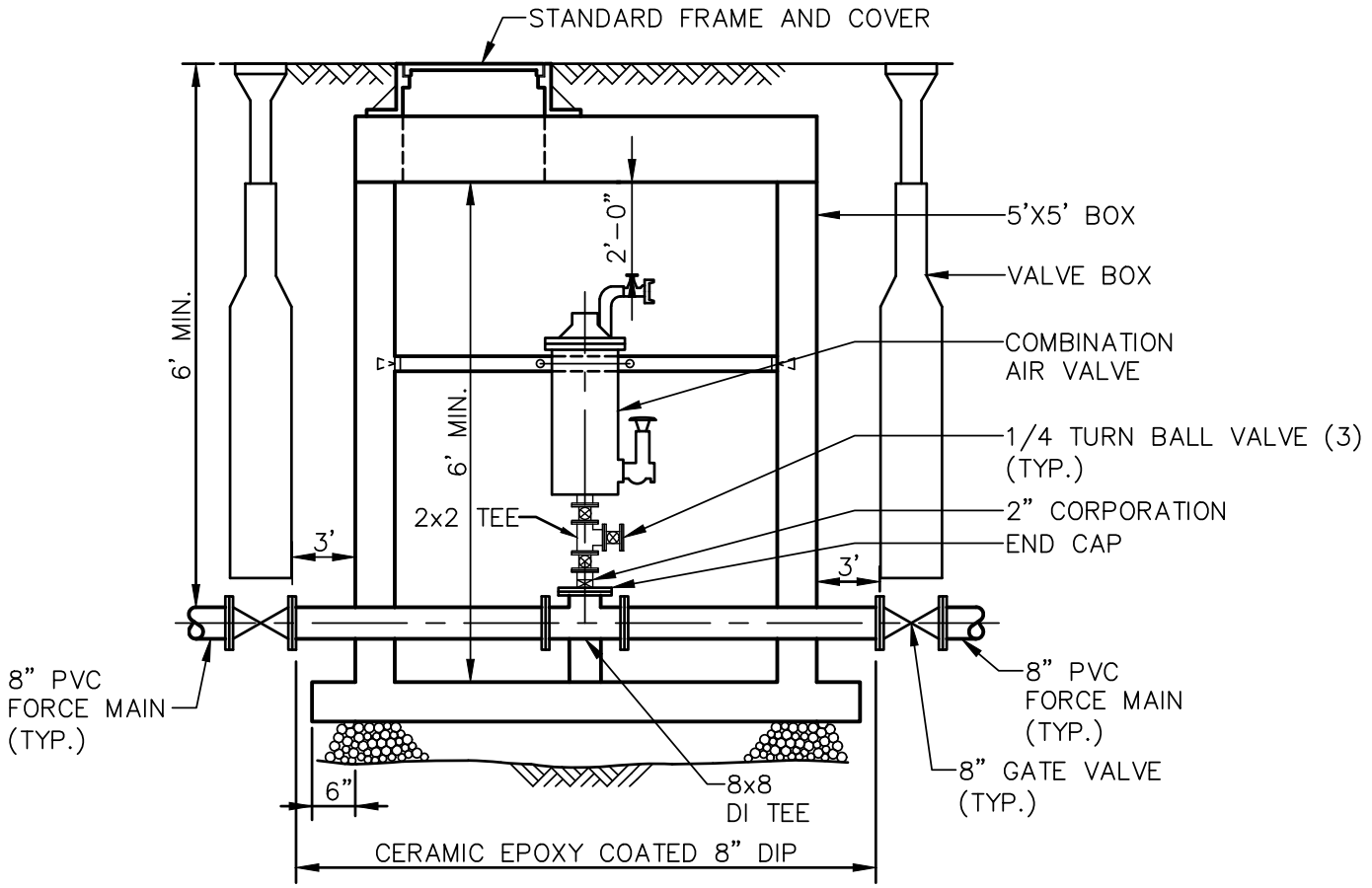
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	FM-1



PLAN



SECTION

FILE NAME: FM-2-AIR-RELEASE.dwg

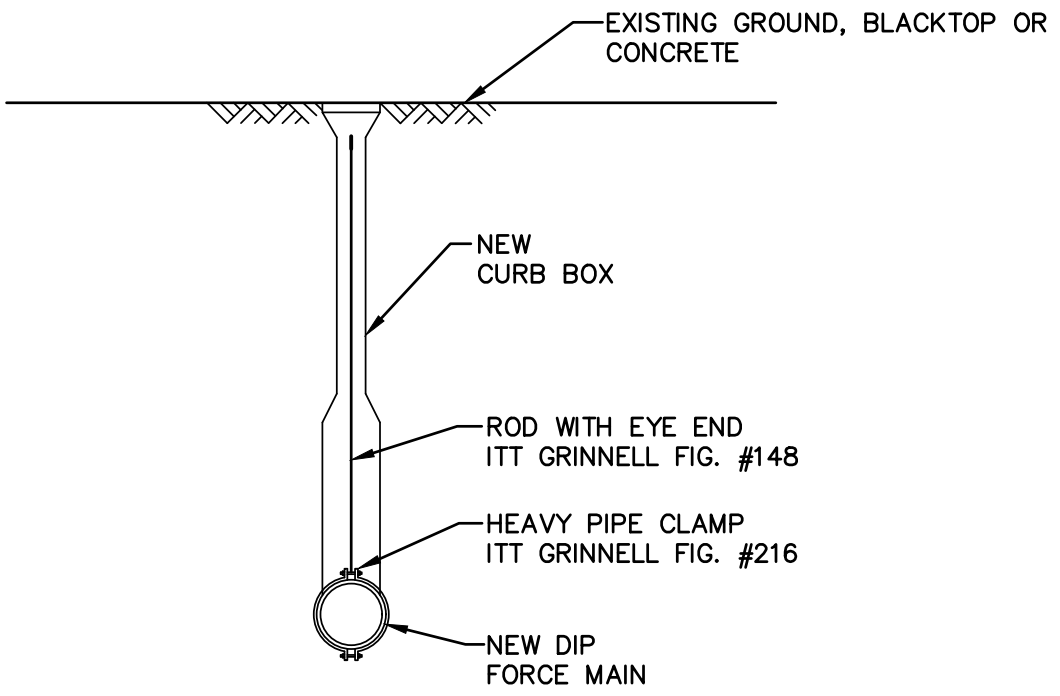
STANDARD DETAILS

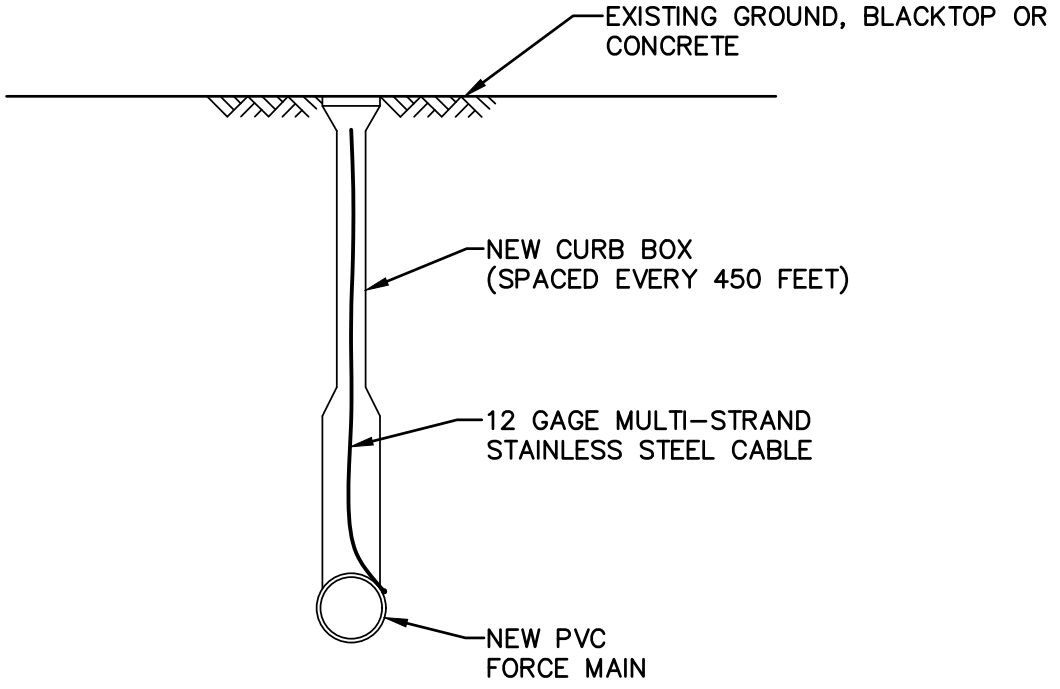
AIR RELEASE VALVE CHAMBER

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	FM-2





FILE NAME: FM-3-FMLOCATOR.dwg

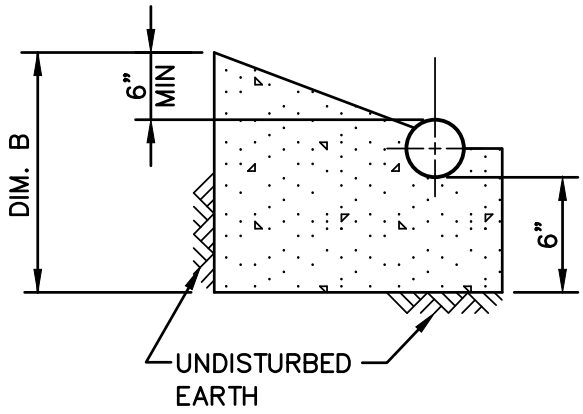
STANDARD DETAILS

FORCEMAIN LOCATOR ASSEMBLY

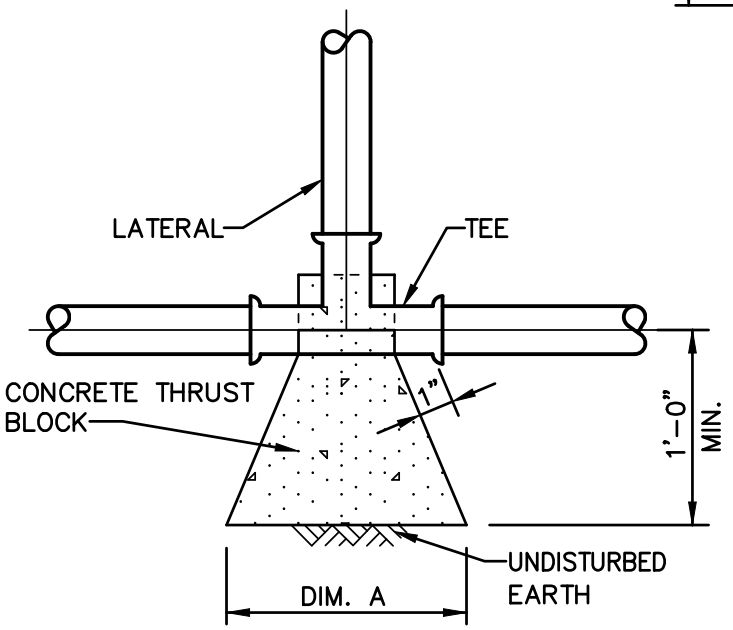
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	FM-3



SECTION



PLAN

TEE DIMENSION SCHEDULE LATERAL SIZE				
DIM.	1-1/2"	2"	2-1/2"	3"
A	14"	16"	18"	20"
B	14"	14"	15"	15"

FILE NAME: FM-4-HTHRUSTLOWPRS.dwg

STANDARD DETAILS

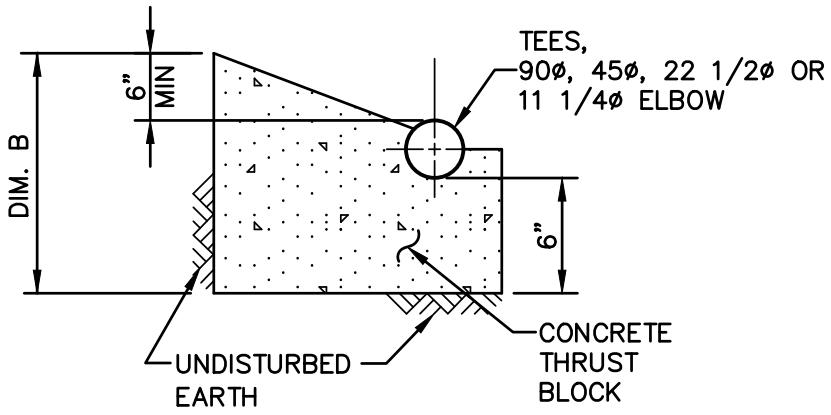
HORIZONTAL THRUST BLOCK DETAILS FORCE MAIN

QUARRYVILLE BOROUGH AUTHORITY

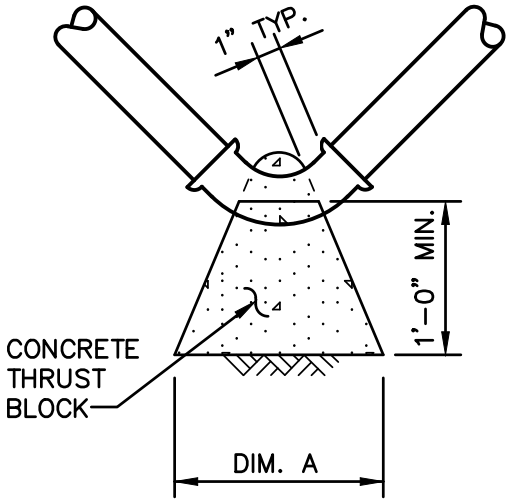
DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	FM-4

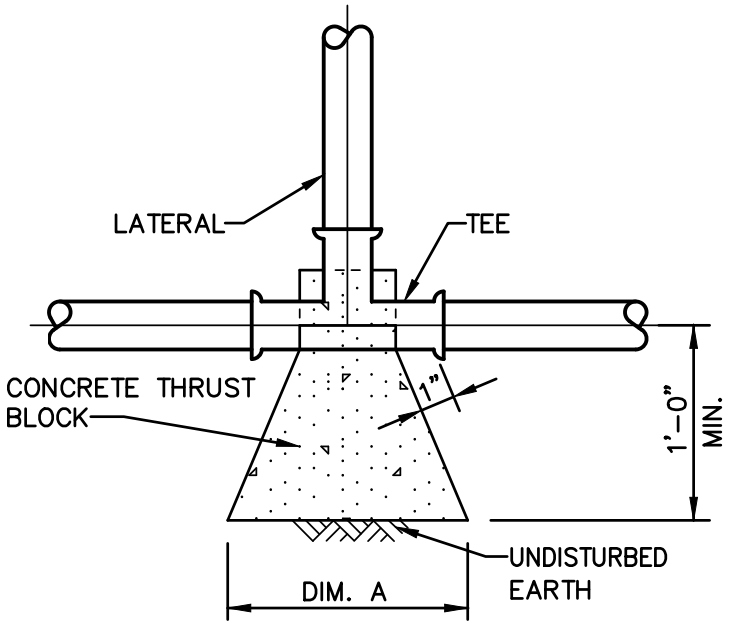
ELBOW DIMENSION SCHEDULE											
DIM.	3"–90°	3"–45°	3"–22 1/2°	3"–11 1/4°	2 1/2"–90°	2 1/2"–45°	2 1/2"–22 1/2°	2"–90°	2"–45°	1 1/2"–90°	1 1/2"–45°
A	20"	18"	16"	12"	18"	16"	14"	16"	14"	14"	12"
B	15"	15"	15"	14"	15"	15"	15"	14"	14"	14"	14"



SECTION



BENDS



TEES

TEE DIMENSION SCHEDULE LATERAL SIZE				
DIM.	1–1/2"	2"	2–1/2"	3"
A	14"	16"	18"	20"
B	14"	14"	15"	15"

FILE NAME: FM–5–THRUST–BLOCKS.dwg

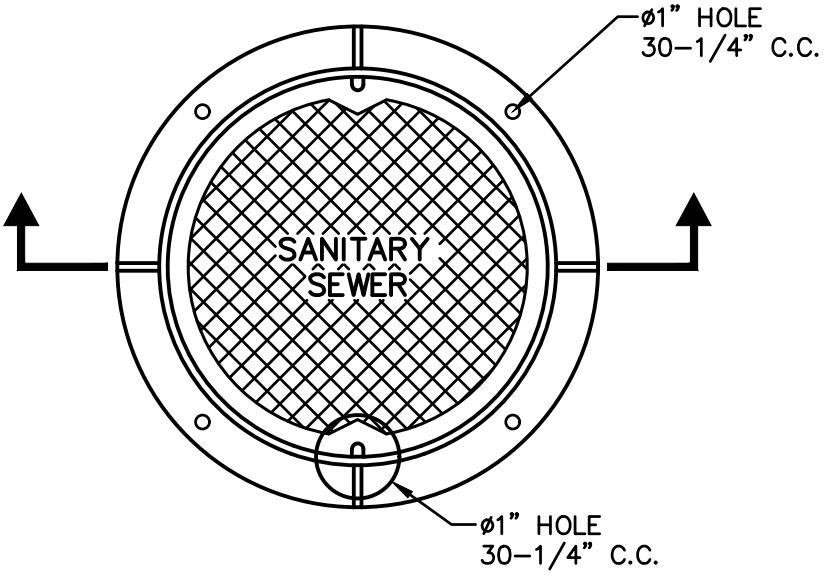
STANDARD DETAILS

CONCRETE THRUST BLOCK DETAILS FORCE MAIN

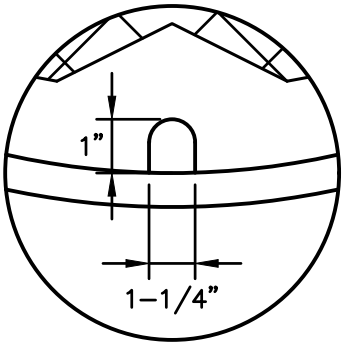
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

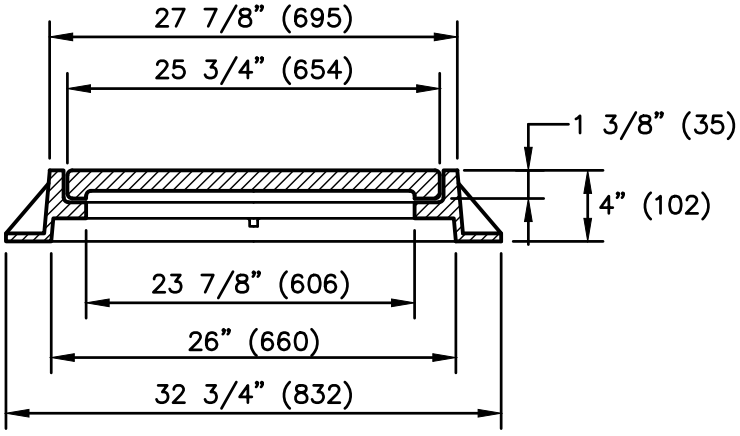
SCALE	DWG. NO.
NO SCALE	FM–5



PLAN



NON–PENETRATING
PICKHOLE DETAIL



SECTION

NOTES:

1. MATERIAL SHALL BE GRAY CAST IRON CONFORMING TO ASTM A48 (LATEST REVISION) CLASS 30.B SECTION THINCKNESS AT ANY POINT SHALL BE A MINIMUM OF 1/2".
2. UNITS DESIGNED HEAVY DUTY FOR A.A.S.H.T.O. HS20–44 WHEEL LOADS.
3. EACH FRAME AND COVER SHALL HAVE MACHINED HORIZONTAL BEARING SURFACES.
4. DIMENSIONS ARE APPLIED USING SOFT CONVERSION. ALL DIMENSIONS IN BRACKETS ARE MILLIMETERS.
5. ALL UNITS MANUFACTURED IN U.S.A. WITH DOMESTIC STEEL.

FILE NAME: FM–6–VALVEPITCOV.dwg

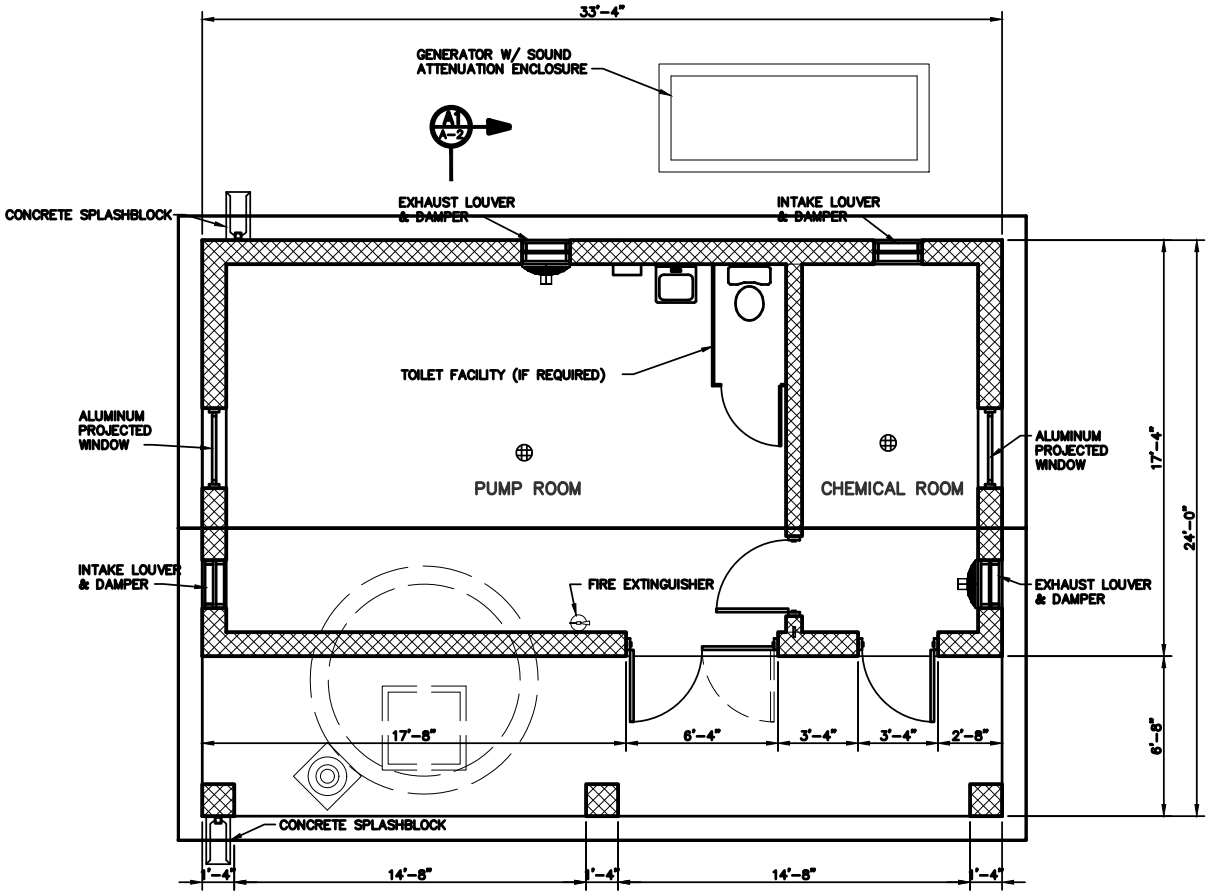
STANDARD DETAILS

VALVE PIT COVER DETAIL

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	FM–6



FILE NAME: PS-1-PUMP STATION.dwg

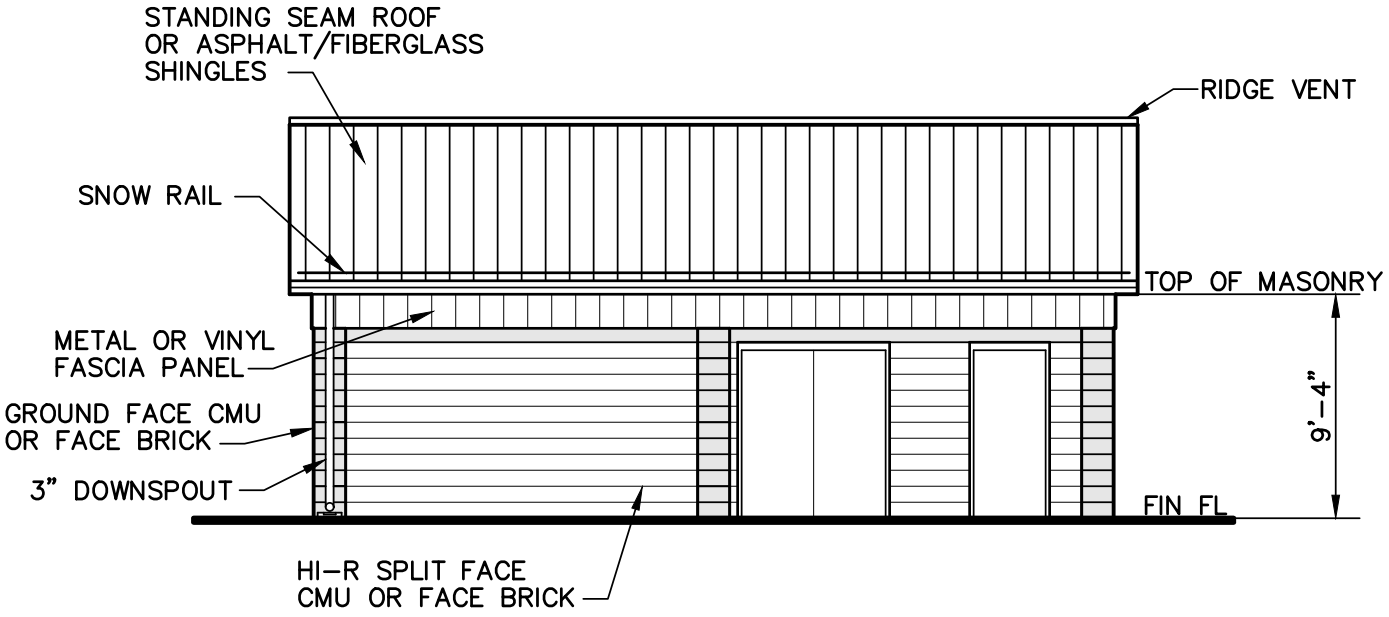
STANDARD DETAILS

TYPICAL PUMP STATION LAYOUT W/ TOILET FACILITIES & CHEMICAL ROOM

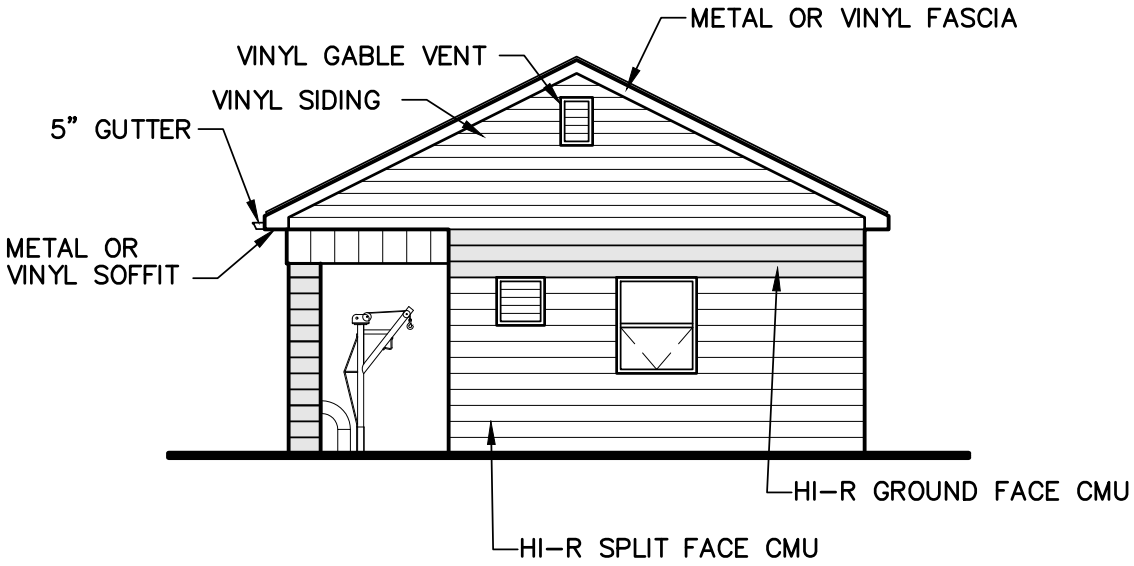
QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	PS-1



FRONT



SIDE

FILE NAME: PS-1-PUMP STATION.dwg

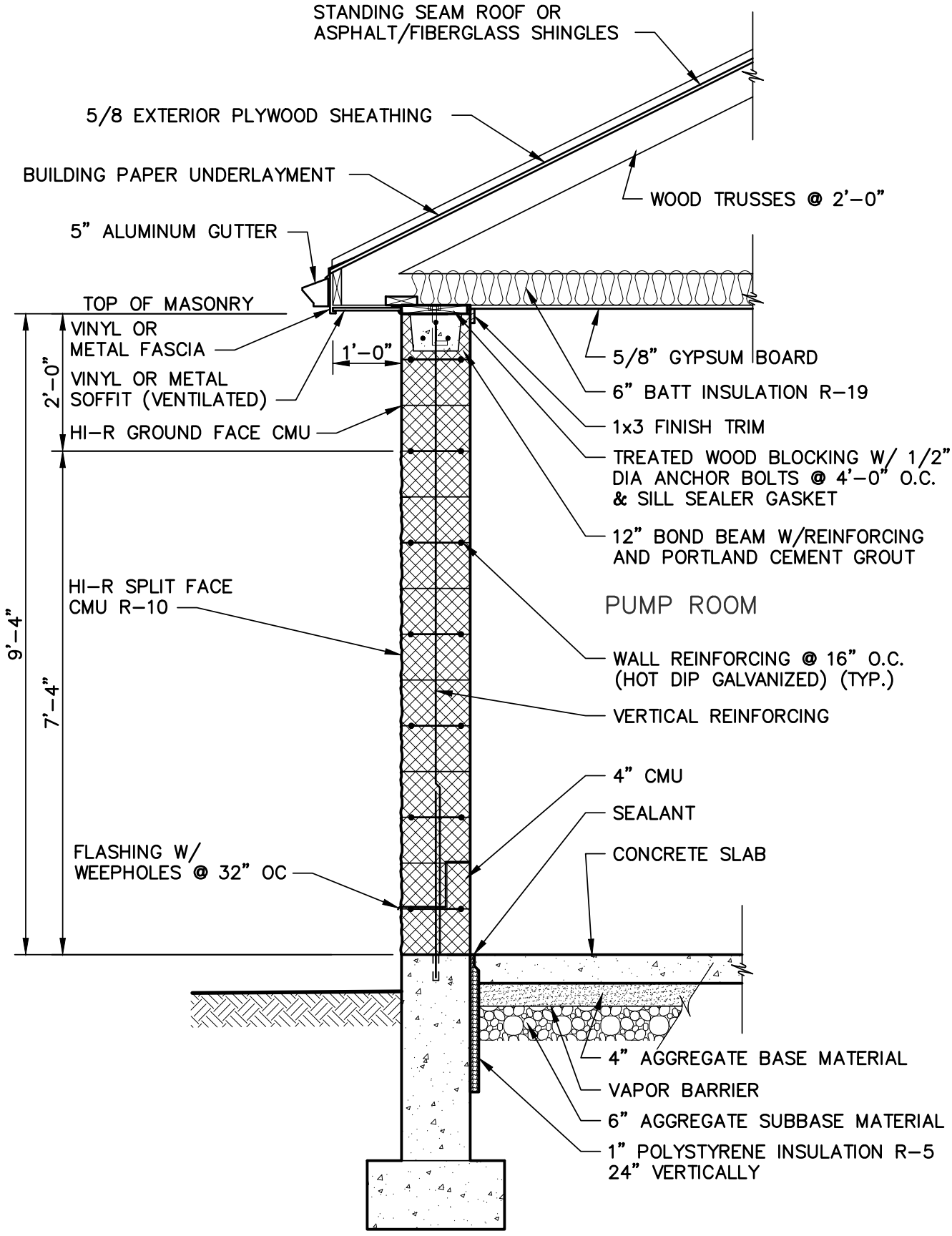
STANDARD DETAILS

TYPICAL PUMP STATION ELEVATIONS

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	PS-2



FILE NAME: PS-1-PUMP STATION.dwg

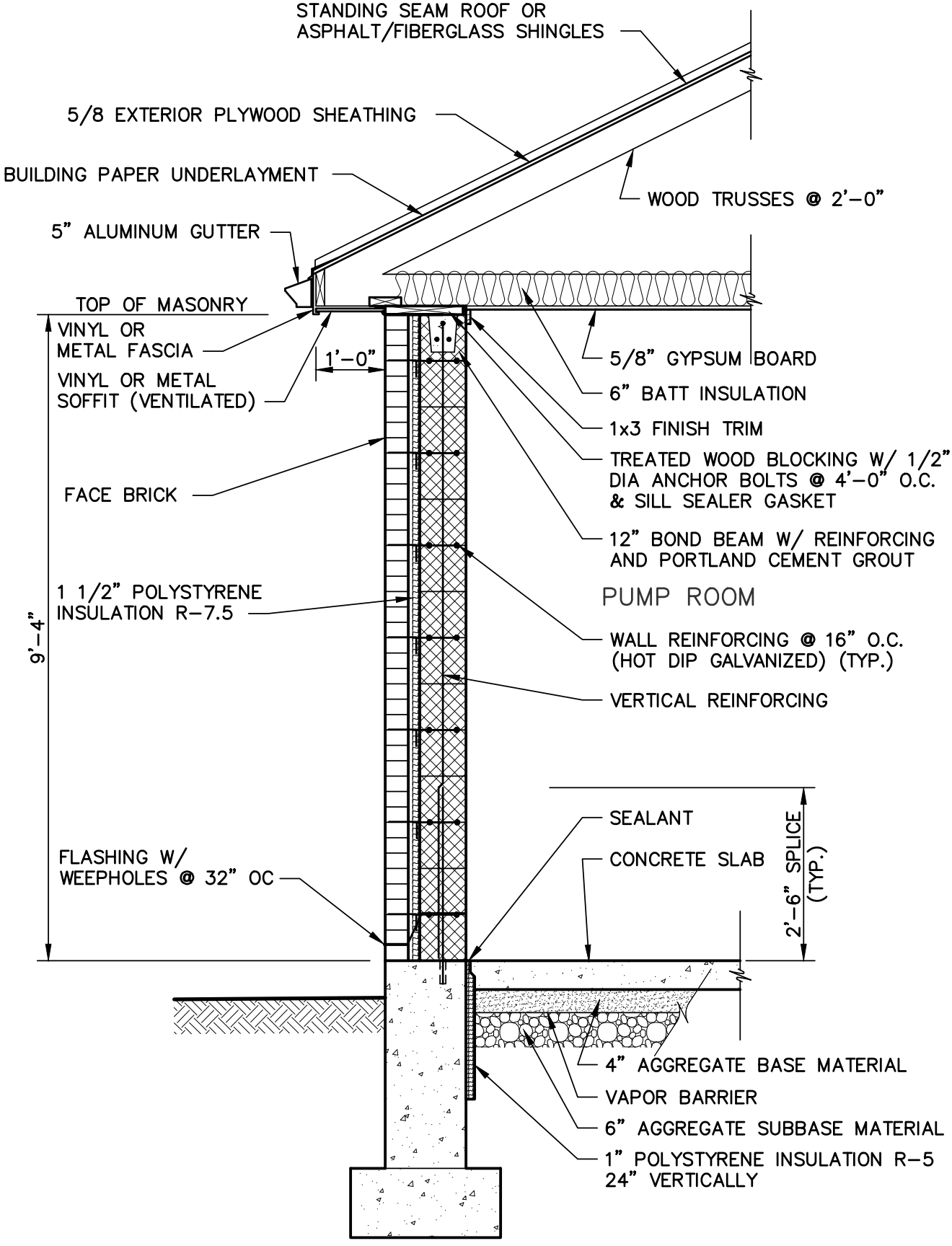
STANDARD DETAILS

PUMP STATION SPLIT FACE CMU SECTION

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	PS-3



FILE NAME: PS-1-PUMP STATION.dwg

STANDARD DETAILS

PUMP STATION BRICK SECTION

QUARRYVILLE BOROUGH AUTHORITY

DATE	REVISIONS
3/14	DWG. CREATED
4/22	DWG. REVISION

SCALE	DWG. NO.
NO SCALE	PS-4

FORMS

QUARRYVILLE BOROUGH AUTHORITY
AS-BUILT SANITARY SEWER LATERAL LOCATIONS

Project				Length	L.F.
Street		Pipe Size		Type	
Contractor		Grade	%	Max Depth	Ft.
Engineer		Air Test		Lbs	Secs.
Submitted		Internal		Final	

House/Lot No.	Depth at End	Lateral Length	Station of "T"	MH	Invert	Station of "T"	Lateral Length	Depth at End	House/Lot No.
				STA 0+00					
				MH	Invert				