BOOK NO._____

MANUAL FOR

SEWER EXTENSION CONSTRUCTION AND MATERIAL SPECIFICATION FOR WASTEWATER COLLECTION SYSTEM

NORTH LONDONDERRY TOWNSHIP AUTHORITY

of

LEBANON COUNTY, PENNSYLVANIA

FEBRUARY 2018

GHD
1240 NORTH MOUNTAIN ROAD
HARRISBURG, PENNSYLVANIA 17112

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PREFACE

This technical manual is provided by North Londonderry Township Authority for use by Developers and Contractors for design and construction of sanitary sewers and appurtenances within the Authority's service area. These standards must be followed in design development and construction. Use of this document for any other purpose other than preparation of plans for submittal to North Londonderry Township Authority or for construction of sanitary sewers in the Authority's service area is forbidden.

PROJECT MANUAL

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SECTION 1

GENERAL INSTRUCTIONS

1.01 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 and/or Township: NORTH LONDONDERRY TOWNSHIP AUTHORITY or NORTH LONDONDERRY TOWNSHIP 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. Completion Certificate: The certificate of the Engineer or Authority Inspector indicating the completion and acceptance of all work specified and performed under the Contract.

C. 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 NORTH LONDONDERRY TOWNSHIP AUTHORITY Wastewater Collection System.

D. Contractor: The corporation, partnership, or individual utilized to construct sanitary sewer system or party hired by the NORTH LONDONDERRY TOWNSHIP 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.

E. 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.

F. 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.

G. 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.

H. 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.

I. 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.

J. 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.

K. 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.

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

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

N. ACI: American Concrete Institute.

O. AISC: American Institute of Steel Construction.

P. ANSI: American National Standards Institute.

Q. ASTM: American Society of Testing Materials.

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

S. "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.

1.02 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 or Contractor 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. 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.

1.03 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.

1.04 WORKING CONDITIONS

A. No work shall be done without the Engineer's presence, unless previous written arrangements have been made with the Authority.

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 7am and 4 pm.

1.05 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 insure preservation of their specified quality and fitness for the work. When considered necessary they shall be placed on wooden platforms or other hard and clean surfaces, and not on the ground, and shall be placed under cover when 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 Owner and a copy provided Township.

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.

1.06 ADVERTISING

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

1.07 PERMITS AND LICENSES

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 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 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.

1.08 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.

1.09 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 in strict conformity to all State and local laws and regulations.

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.

1.010 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.

1.011 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.

1.012 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 3 working days 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 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.

1.013 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.

1.014 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.

1.015 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.

1.016 ITEMS REQUIRED PRIOR TO BEGINNING CONSTRUCTION

A. Sewer Extension Agreement

B. County Conservation District approved Erosion Control Plan.

C. Security Capacity Agreement.

D. PennDOT Highway Occupancy Permit if needed.

E. 10 day notice letter indicating Contractor intends to start work.

F. Pre-Construction meeting

G. Sewer Connection Permit(s) issued prior to building permit, applicable to the Project.

H. Evidence of approved Preliminary Plans or recorded Final Plans if applicable.

I. Financial security as specified by the Township to assure completion of the sewer extension.

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

K. 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.

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

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

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

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

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01. SITE LOCATION

A. Project locations are in the service area of the North Londonderry Township Authority, Lebanon County, Pennsylvania.

1.02. 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.

1.03. 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 North Londonderry Township Authority, 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 shall be paid by the Developer and/or the Contractor. 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 cleanout/test tee to the building using materials required by the latest version of the Building Sewer Specifications.

D. Where feasible, and to the maximum extent possible, locate new sewers in streets and paved areas to facilitate access for maintenance purposes or in easements outside streets and paved areas, if determined by the Authority.

E. Do not connect stormwater or groundwater drainage to any sewer extension of the Authority's system. No rain water leaders, roof drainage, area or yard drainage, basement, surface 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 be admitted to the sanitary sewer system by the use of pumps of any type. The sanitary sewer system, and all extensions, are intended to convey sanitary sewage 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 have been removed from the new sewer facilities and the new sewer facilities have passed all specified acceptance tests.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 GENERAL

1.01. REQUIREMENTS INCLUDED

A. DEVELOPER and/or CONTRACTOR is responsible to provide and pay for all field-engineering services required for Project.

1. Survey work required in execution of Project.

2. Civil, structural or other professional engineering services specified, or required to execute DEVELOPER's construction methods.

1.02. RELATED REQUIREMENTS

A. Conditions of the Project.

B. Section 01010 - Summary of Work.

C. Section 01720 - Project Record Documents.

1.03. QUALIFICATIONS OF SURVEYOR OR ENGINEER

A. Qualified engineer or registered land surveyor, acceptable to DEVELOPER and TOWNSHIP/AUTHORITY.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01060

FIELD ACCESS IN RIGHTS-OF-WAY

PART 1 GENERAL

1.01. REQUIREMENTS INCLUDED

A. DEVELOPER shall be responsible for obtaining access to existing sanitary sewers and manholes located in rights-of-way. This includes, but is not limited to coordinating access with adjacent property owners and the Authority.

1.02. RELATED REQUIREMENTS

A. Section 01720 - Project Record Documents.

B. Section 01040 - Project Coordination.

1.03. SEWER AND MANHOLE LOCATIONS

A. Existing sanitary sewers and manhole locations are as designated on Drawings by DEVELOPER.

B. Locate and identify all rights-of-way, access roads and manholes prior to starting work.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 GENERAL

1.01. REQUIREMENTS INCLUDED

A. Applicability of Reference Standards.

B. Provision of Reference Standard at site.

C. Acronyms used in Manual for Reference Standards. Source of Reference Standards.

1.02. RELATED REQUIREMENTS

A. General Conditions of the Project: Reference Standards.

1.03. QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The date of the standard that is in effect as of the Agreement date.

C. When required by individual Specification section, obtain copy of standard. Maintain copy at jobsite during submittals, planning, and progress of the specific work, until Substantial Completion.

1.04. SCHEDULE OF REFERENCES

AA	Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001
ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
AISC	American Institute of Steel Construction 1221 Avenue of the Americas New York, NY 10020
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036

AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASTM	American Society for Testing Materials 1916 Race Street Philadelphia, PA 19103
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
AWS	American Welding Society 2501 NW 7th Street Miami, FL 33125
CRSI	Concrete Reinforcing Steel Institute 180 North LaSalle Street Suite 2110 Chicago, IL 60601
EJMA	Expansion Joint Manufacturers Association 708 Westchester Avenue White Plains, NY 10604
FM	Factory Mutual System 1151 Boston-Providence Turnpike Norwood, MA 02062
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
IEEE	Institute of Electrical and Electronics Engineers 345 East 47th Street New York, NY 10017
IMIAC	International Masonry Industry All-Weather Council International Masonry Institute 823 15th Street, N.W. Washington, DC 20005
MIL	Military Specification Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120

NEMA	National Electrical Manufacturers' Association 2101 L Street, N.W. Washington, DC 20037
NFPA	National Fire Protection Association Battery March Park Quincy, MA 02269
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076
PCI	Prestressed Concrete Institute 20 North Wacker Drive Chicago, IL 60606
PennDOT	Pennsylvania Department of Transportation Harrisburg, PA 17120
PS	Product Standard U.S. Department of Commerce Washington, DC 20203
SDI	Steel Door Institute 712 Lakewood Center North Cleveland, OH 44107
SSPC	Steel Structures Painting Council 4400 Fifth Avenue Pittsburgh, PA 15213
UL	Underwriters Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01153

PROCEDURES FOR PROJECT CHANGES

PART 1 GENERAL

1.01. REQUIREMENTS INCLUDED

A. Promptly implement procedures for project changes.

1. Provide full written data required to evaluate changes.

2. Provide full documentation to ENGINEER on request.

B. Designate in writing the member of DEVELOPER's organization:

1. Who is authorized to accept changes in the Work.

2. Who is responsible for informing others in DEVELOPER's employ of the authorization of changes in the Work.

1.02. PROCEDURES

A. TOWNSHIP/AUTHORITY or ENGINEER may require changes by timely submitting a letter of project change to the DEVELOPER. Under no circumstances shall the TOWNSHIP/AUTHORITY or ENGINEER be financially or otherwise liable for any increased costs by virtue of such changes to meet TOWNSHIP/AUTHORITY'S requirements.

1. Description of the change, products, and location of the change in the Project.

2. Supplementary or revised Drawings and/or Specifications.

B. DEVELOPER may initiate changes by submitting a written notice to ENGINEER, containing:

1. Description of the proposed changes.

2. Statement of the reason for making the changes.

3. Statement of compliance with Project Manual requirements.

4. Documentation supporting need for change.

5. No changes from the approved design shall be made without written authorization from the ENGINEER.

1.03. CONSTRUCTION CHANGE AUTHORIZATION

A. In lieu of letter of project change, ENGINEER may issue a field Construction Change Authorization for CONTRACTOR to proceed with a change for subsequent inclusion in letter for project change.

B. Authorization will describe changes in the Work, including both additions and deletions.

C. ENGINEER will sign and date the Construction Change Authorization in the field as authorization for the DEVELOPER to proceed with the changes.

D. CONTRACTOR may sign and date the Construction Change Authorization to indicate agreement.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SUBMISSIONS REQUIRED FOR NEW SUBDIVISIONS

A. General: The descriptions under the SUBMITTALS Article in each Specifications Section indicates 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.

1.02 GENERAL OUTLINE OF STEPS FOR DEVELOPER SEWER EXTENSIONS

A. All land development plans regardless of size shall be required to submit 4 sets of drawings to the Authority for review and comment.

B. Planning Phase:

1. Submit written request to Authority inquiring as to the availability of capacity in the sanitary sewer system. NORTH LONDONDERRY TOWNSHIP AUTHORITY will respond to request in writing. If a planning module is required, this will be indicated in NORTH LONDONDERRY TOWNSHIP AUTHORITY'S written response.

2. If capacity exists, submit a PADEP Planning Module or Post Card application requesting capacity.

a. The Authority's engineer will determine availability of capacity.

b. NORTH LONDONDERRY TOWNSHIP AUTHORITY will either approve or disapprove the Developer's request.

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

4. In some cases, it may be in the best interest of the Developer to meet with the Authority and its Engineer prior to design submission of drawings. Such a meeting, can prevent multiple requests of redesign of a sewer extension.

C. Design Phase:

1. The Developer should submit 4 sets of drawings for each submission to the Authority for review and comment.

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

3. Developer shall submit all legal descriptions for any easements to be dedicated to the Authority, prior to approval of design drawings. At completion of work, these shall be used in the dedication process.

4. If a Highway Occupancy Permit is needed for installation of the sewer, the Developer should prepare the permit in the name of the Authority. The Developer should then deliver the application to the Authority for review, signature. The Developer will be responsible for submitting the Permit Application to PennDOT. Any and all changes to the Permit Application are the responsibility of the Developer.

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

6. The Developer shall submit five (5) sets of drawings to the Authority's Engineer. These drawings will be stamped approved for construction. During the Pre-construction 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 (SEA) shall be entered into between the Developer and the Authority.

   a. Construction Cost Estimate for Financial Security when constructing a public sewer extension.

      1) The Developer shall submit to the Authority a construction cost estimate for review by the Authority's Engineer. The construction cost estimate will be used for financial security. The construction cost estimate will be multiplied by 1.10 for a ten percent contingency and this is the amount of required financial security.

      2) The Developer shall then post the required financial security in the form of a Restricted Escrow Account or an acceptable Bank Letter of Credit. No other form of financial guarantee shall be accepted. The Authority has standard forms for each of these. 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 SEA and attach the Developer's financial security.

      If additional escrow is required, the SEA will also indicate that additional money shall be deposited with the Authority for costs to be incurred by the Authority.

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

The Authority will then forward the SEAs 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 to submit a minimum five (5) copies of Shop Drawings to the Authority's Engineer for review and comment.

   b. Developer to have executed SEA.

   c. Developer to have established the escrow account to the dollar amount specified in the SEA.

      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 once all 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 Pre-construction Meeting will be held. Attendees at the Pre-construction meeting include at a minimum the Developer, Developer's Contractor, Authority, Construction Inspector, and Authority's Engineer.

3. Developer and/or 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 the installation and 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. Developer shall submit Record Drawings as outlined later in Section 01300. If the Developer does not want to develop these using its engineer, the Authority's Engineer can develop the drawings and the Developer will be billed accordingly.

2. Developer shall submit revised legal descriptions, if needed, for dedication of sewer easements. Both on or off the Developer's property, as necessary. The requirements of the plats and legal descriptions are as outlined later in Section 01300.

3. Developer shall submit to the Authority a Guarantee Phase Financial Security.

a. The security shall be in the amount of 15% of the approved construction cost estimate.

b. The security shall be in effect for 18-months from the date of executed deed of dedication.

4. Thirty (30) days prior to expiration of the Financial Security, the Authority or the Authority's Engineer may perform an inspection of the sewer extension. Any deficiencies shall be corrected at the Contractor's expense. If Contractor refuses to correct deficiencies, the Financial Security will be used by the Authority to correct them.

5. Upon approval of the above information, the Authority will then permit issuance of individual connection permits in accordance with the SEA.

1.03 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 or Part II permit is required from DEP, submit six (6) sets.

3. Sheet Size: 24 x 36 inches

4. Base all elevations on USGS datum 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 NORTH LONDONDERRY TOWNSHIP AUTHORITY STANDARD CONSTRUCTION AND MATERIALS SPECIFICATIONS."

6. Include the following note on each drawing, "for sewer detail drawings, reference standard construction and material specifications."

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. All construction details will be put on the drawings.

9. Bind drawings in sets and number them consecutively.

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. 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 1, which is attached, is a checklist of minimum design criteria for sewer extensions.

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).

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.

i. Sewers installed at a depth greater than 22 feet shall be made of Class 52 cement lined ductile iron pipe.

j. 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% 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. Ductile Iron pipe shall be used in all areas of fill.

k. Size of proposed sewer (Profile View); 8-inch main with 6-inch Service laterals.

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

m. 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. All connections to manholes will be either cast into the new manhole or field cored and the appropriate connection band used.

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

n. Invert elevations of manholes having greater than 24 inches difference between influent and effluent shall require construction of an inside drop connection. Splashes and/or slides are not acceptable.

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

Table 1
Technical Review for Sanitary Sewer Extensions

Job Number _____
Developer _____
Development _____
Date _____
Submittal No. _____

Item Number	Item	Acceptable	Unacceptable
1	Base Datum on existing sewers		
2	Note on each Drawing "All materials used and construction methods employed are to be in accordance with the latest standards of the North Londonderry TownshipAuthority."		
3	Note on Drawings "For sewer detail drawings reference Standard Construction and Material Specifications, North Londonderry Township Authority."		
4	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."		
5	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."		
6	Name of Engineer/Surveyor		
7	Seal of Engineer/Surveyor		
8	Signature of Engineer/Surveyor		
9	Name of Development and Owner		
10	Act 287 Utility List and Serial Number		
11	Location of building(s)		
12	Note indicating those lots not having basement service		
13	Elevation of Basements shown on Plan or if no basement service then show first floor elevation		

Table 1
Technical Review for Sanitary Sewer Extensions

Item Number	Item	Acceptable	Unacceptable
14	Plan view 1"=50 ' Profile 1"=10'		
15	Min. Cover of 5’		
16	Minimum manhole height with standard 4' diam. manhole and 8" pipe is 5.1 feet. If flattop manhole is necessary, verify necessary minimum height.		
17	Minimum slope across manhole 0.1 feet		
18	Check Prefix and number system		
19	Check for clearance with water (10’)		
20	Check for clearance with storm sewer (5’)		
21	Do the plans indicate Electric to be installed in the sewer easement? Min distance = 5'		
22	Right-of-way - 30’ (min.)		
23	Constructability		
24	Maintenance		
25	Max. Run length of **400’**		
26	Placement of manholes on street. Are they in the wheel path?		
27	Placement of manholes in parking lots. Are they in the parking space?		
28	Min. Slope of 0.5% for 8-inch pipe		
29	Terminal Run Min. Slope of 1.0%		
30	Invert Ins, Invert Outs, Rim Inverts shown on Dwgs		
31	Lateral Stationing from downstream manhole		
32	Size of Laterals Shown, should be 6-inch		

40	If sewer is deep, greater than 22 feet, DIP should be used?		
41	Sheet Size 24 by 36		
42	Revision Date Shown		
43	Correct slopes and lengths		
44	Curb cuts when sewer extends off of streets so that there is right-of-way access for vehicles		
45	Is a right-of-way gate needed?		
46	If on-lot grinder pumps are needed, does the design comply with the Specifications?		
47	Indicate those manholes that require watertight covers		
48	Have all Permits been obtained?		
49	Indicate all utilities on the plans and profiles		
50	Stream crossings meet County standards for use of ductile iron pipe (DIP) or concrete encase?		
51	If the sewer is shallow, use DIP?		

D. Final Acceptance Submissions:

1. Record Drawings:

a. Before the work will be accepted by the Authority, submit reproducible mylars (after final approval), a digital copy, and two (2) copies of all working Drawings, modified as necessary to show the facilities as constructed. Submit a certificate with the record reproducibles attesting to the correctness of all information shown on the Drawings.

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” x 36”

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

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

Name of Design Engineer/Surveyor including seal and signature.

Name of Developer including address.

Name of Owner if different than Developer.

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. Sewers including manhole numbers shall be indicated.

3. Provide the Authority with a digital copy of the Record Drawings in the latest version of AutoCADD and ArcGIS data for every sewer main, lateral and manhole as well as elevations.

Table 2
Record Drawings
Technical Review Checklist

Job Number _____
Developer _____
Development _____
Date _____
Submittal No. _____

Item Number	Item	Acceptable	Unacceptable
1	Drawings Titled "Record Drawings" ("As-Built" is not acceptable)		
2	Base Datum on existing sewers (GPS Data)		
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"=50 ' Profile 1"=10'		
9	Check Prefix and number system		
10	Right-of-way - 30’		
11	Invert Ins, Invert Outs, Rim Inverts shown on Dwgs		
12	Lateral Stationing from downstream manhole		
13	Size of Laterals Shown		
14	Lateral Length - from Main to R/W Line		
15	Lateral Depth at end of service lateral		
16	Sheet Size 24-inch by 36-inch		
17	Correct Slopes		
18	Type of sewer pipe		

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

a. 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 Re-inspection which will take place at the end of the 18 month Guarantee time period.

b. 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 Township regulations.

1.04 RIGHT-OF-WAY DRAWINGS

A. Provide 5 copies of all required descriptions for rights-of-way. Proposed generic form for Deed of Easement is available from the Authority. The Authority shall record rights-of-way in the courthouse.

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

1.05 CONSTRUCTION PROGRESS SCHEDULE – CONTRACTOR SUBMISSION

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

B. At least seven days before work is commenced, submit three 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 copies of the updated Construction Progress Schedule immediately after its completion.

1.06 SHOP DRAWINGS – CONTRACTOR SUBMISSION

A. Submit a minimum five 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.

a. 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.

D. 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.

E. 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.

F. 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 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 copies to the Engineer for review.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01405

PROJECT QUALITY CONTROL

PART 1 GENERAL

1.01. REQUIREMENTS INCLUDED

A. Quality control of products and workmanship.

B. Manufacturer's instructions.

1.02. RELATED REQUIREMENTS

A. Section 01090 - Reference Standards.

B. Section 01340 - Shop Drawings, Product Data, and Samples: Field samples.

1.03. DESCRIPTION

A. Maintain quality control over supervision, subcontractors, suppliers, manufacturers, products, services, workmanship, and site conditions, to produce Work in accordance with Manual.

1.04. WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Provide suitably qualified personnel to produce Work of specified quality.

1.05. MANUFACTURER'S INSTRUCTIONS

A. When required in individual Specification sections, submit manufacturer's printed instructions in the quantity required for product data, for delivery, handling, storage, assembly, installation, startup, adjusting, balancing, and finishing, as appropriate.

B. Require compliance with instructions in full detail, including each step in sequence.

C. Should instruction conflict with Manual, request clarification from ENGINEER before proceeding.

1.06. MANUFACTURER'S CERTIFICATES

A. When required in Manual, submit manufacturer's certificate, in duplicate, certifying that products meet or exceed specified requirements, executed by responsible officer.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01560

TEMPORARY CONTROLS

PART 1 GENERAL

1.01. REQUIREMENTS INCLUDED

A. Provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and related areas under DEVELOPER's control. Remove controls and temporary facilities at the completion of work.

1.02. RELATED REQUIREMENTS

A. Section 01040: Project Coordination.

1.03. DUST CONTROL

A. Provide positive methods and apply dust control materials to minimize raising dust from construction operations, and provide positive means to prevent air-borne dust from dispersing into the atmosphere.

1.04. DIVERSION AND CARE OF WATER DURING STREAM CROSSINGS

A. Where required, DEVELOPER or CONTRACTOR will obtain the necessary permits for wetlands and stream crossings from the Pennsylvania Department of Environmental Protection and the Pennsylvania Fish Commission. DEVELOPER or CONTRACTOR shall not perform any work in a stream channel, unless he has been notified that the required permit has been issued, and whether or not the permit is subject to stipulations or special conditions. DEVELOPER or CONTRACTOR shall take sufficient precautions to prevent pollution of wetlands or streams with fuels, oils, bitumens, or other harmful materials. He shall conduct his operations in such a way that will minimize damage to the stream channel and stream banks, prevent erosion of stream banks and deposits of excess sediment in streams, or otherwise harm streams or the properties along streams.

B. Diversion and care of water during swamp area or stream crossing and canal embankment excavation work shall consist of diverting and maintaining the flow during the construction period, and dewatering work areas. All permanent construction work shall be performed in areas free from water unless otherwise specifically authorized by ENGINEER. The finished structures and portions thereof shall be protected from damage by flowing water until completion of work.

C. The DEVELOPER or CONTRACTOR shall lay the pipe in the dry by diverting streams and/or dewatering the swamp areas. In diverting streams, extreme care must be used to prevent property damage.

D. The pipe shall be installed on wood blocks in order to maintain the proper grade. The pipe shall be encased in concrete in accordance with the dimensions shown on the Drawings. If the material in swamp areas or stream bottoms is soft, forms shall be used to construct the concrete encasement. Unsuitable material shall be removed to a depth at which stable, undisturbed earth or rock is encountered, not to exceed a depth below pipe invert of three (3) feet, or to the limits designated by the ENGINEER. Trench subbedding shall be backfilled

with No. 3 coarse aggregate in accordance with the Detail Drawings. If wetlands or stream bottom is rock, forms shall not be used and, instead, the concrete shall be placed on firm rock below the pipe, and against firm rock on both sides of the pipe.

E. After the concrete is placed, the balance of the trench under streams and their banks shall be backfilled with PA Select Granular Material. The trench over the encasement in wetlands shall also be backfilled with PA Select Granular Material in accordance with Section 02221 and the Detail Drawings, or as directed by the ENGINEER.

F. Removal of Temporary Work: Unless otherwise authorized, all temporary protective structures and other works shall be removed upon completion of work. All banking and filling which is not part of the permanent work shall be removed to the original ground surfaces existing prior to beginning of work and all diversion channels, ditches, and other cavities shall be backfilled with embankment material, placed and compacted in accordance with Section 02221. Materials used in temporary construction shall be disposed of to the satisfaction of the ENGINEER. Whenever the ENGINEER determines that the removal of sheeting and bracing will endanger completed work, he will direct that it be cut off not less than 2 feet below the ground surface, left in place, and backfilled. All temporary protective works shall be removed from the site after having served their purpose.

1.05. WATER CONTROL

A. Provide methods to control surface water to prevent damage to the Project, the site, or adjoining properties.

1. Control fill, grading and ditching to direct surface drainage away from excavations, pits, tunnels and other construction areas, and to direct drainage to proper runoff.

B. Maintain excavations and trenches free of water, provide and operate pumping equipment of a capacity to control water flow.

C. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas, comply with applicable codes and regulations, and Article 1.07.

1.06. DEBRIS CONTROL

A. Maintain all areas under DEVELOPER's control free of extraneous debris.

B. Initiate and maintain a specific program to prevent accumulation of debris.

1. Provide containers for deposit of debris.

2. Prohibit overloading of trucks to prevent spillages.

a. Provide periodic inspection to enforce requirements.

C. Schedule periodic collection and disposal of debris.

1. Provide additional collections and disposal of debris whenever the periodic schedule is inadequate.

1.07. SOIL EROSION AND SEDIMENTATION CONTROLS

A. Plan and execute construction to control surface drainage to prevent erosion and sedimentation.

B. Comply with *Erosion and Sediment Pollution Control Program Manual*, PA Department of Environmental Protection, and in accordance with DEVELOPER's approved plan.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 GENERAL

1.01. 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.

1.02. 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 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 and Local Roads:

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 (PDT), including but not necessarily limited to the following:

1) PA Code Title 67, Transportation: Chapter 203 – Work Zone Traffic Control.

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

2.01. 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 203 – Work Zone Traffic Control which complements Section 901.

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

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01610

TRANSPORTATION AND HANDLING

PART 1 GENERAL

1.01. REQUIREMENTS INCLUDED

A. Provide for expeditious transportation and delivery of products to Project site undamaged, on a schedule to avoid delay of the Work, or work of other contractors.

B. Provide equipment and personnel at the site, unload and handle products in a manner to avoid damage to products.

1.02. RELATED REQUIREMENTS

A. Section 01340: Shop Drawings, Product Data, and Samples.

B. Section 01620: Storage and Protection.

1.03. DELIVERY

A. Arrange deliveries of products in ample time to facilitate inspection prior to installation.

B. Coordinate deliveries to avoid conflict with Work and conditions at site:

1. Limitations of storage space.

2. Availability of equipment and personnel for handling products.

C. Immediately on delivery, inspect shipment to assure:

1. Product complies with requirements of Manual and reviewed submittals.

2. Containers and packages are intact, labels are legible.

3. Products are properly protected and undamaged.

1.04. PRODUCT HANDLING

A. Provide equipment and personnel necessary to handle products, by methods to prevent soiling or damage to products or packaging.

B. Provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.

C. Handle products by methods to prevent bending or overstressing.

D. Lift heavy components only at designated lifting points.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 01620

STORAGE AND PROTECTION

PART 1 GENERAL

1.01. REQUIREMENTS INCLUDED

A. Provide secure storage and protection for products to be incorporated into the Work, and maintenance and protection for products after installation and until completion of the Work.

1.02. RELATED REQUIREMENTS

A. Section 01610 - Transportation and Handling.

B. Individual Specifications Sections: Special requirements for specific products.

1.03. STORAGE

A. Store products immediately on delivery, and protect until installed in the Work.

1. Store and maintain products in accordance with manufacturer's instructions.

2. Label products stored with project number, title, and date and other specified or pertinent information.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 02010

SUBSURFACE EXPLORATION

PART 1 GENERAL

1.01. 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. Dig such test pits only at the locations agreed to by the Engineer.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 02211

ROCK REMOVAL

PART 1 GENERAL

1.01. WORK INCLUDED

A. Rock Removal- Mechanical Method.

B. Rock Removal- Explosive Method.

1.02. RELATED WORK

A. Section 02221 - Trenching for Utilities, comply with paragraph 1.04 Protection as applicable.

1.03. QUALITY ASSURANCE

A. Contractor: Contractor shall have five 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.

1.04. 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.

1.05. REFERENCES

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

PART 2 PRODUCTS

2.01. 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

3.01. INSPECTION

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

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

3.02. 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.

3.03. ROCK REMOVAL - EXPLOSIVES METHODS

A. If rock is uncovered requiring the explosives method for rock disintegration, notify the Engineer and execute as follows:

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 Chapter 211 *"Storage, Handling and Use of Explosives"*, Section 211.46 of the Pennsylvania Department of Environmental Resources regulations.

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

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

3.04. FIELD QUALITY CONTROL

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

END OF SECTION

SECTION 02221

TRENCHING

PART 1 GENERAL

1.01. WORK INCLUDED

A. Excavated trenches for utilities as shown on Drawings.

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

1.02. RELATED WORK

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

1.03. REFERENCES

A. Pennsylvania Department of Transportation Publication 408.

1.04. PERMITS

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

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

C. Blasting permits.

D. Stream crossing permit.

E. Wetland encroachment permit.

1.05. 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.

1.06. 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

2.01. SELECT MATERIALS IN ACCORDANCE PENNDOT’S PUBLICATION 408

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

PART 3 EXECUTION

3.01. 3INSPECTION

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.

3.02. PREPARATION

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

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

3.03. EXCAVATION

A. Excavated and remove all materials as required for piping installation shown on the Drawings. Excavate subsoil required for piping as shown on the Drawings.

B. Removal of Pavement & 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, approval from the Conservation District, E & S approval for the disposal site and a copy of the agreement and approvals have been filed with the TOWNSHIP/AUTHORITY.

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.

3.04. 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.

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.

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, refuse; and free of rock or similar hard objects larger than six inches in any direction.

3.05. UNSUITABLE MATERIAL

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

3.06. TOLERANCES

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

3.07. 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		Mix Percent By Weight	Min Percent Purity Germination	Max Percent Weed Seed
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		Mix Percent By Weight	Min Percent Purity Germination	Max Percent Weed Seed
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 pounds per 1,000 sq. ft. area and not more than five 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 1 ½ 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.

END OF SECTION

SECTION 02270

EROSION AND SEDIMENT POLLUTION CONTROL

PART 1 GENERAL

1.01. DEVELOPER SEWER EXTENSIONS

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

1.02. REQUIREMENTS OF REGULATORY AGENCIES

A. Erosion and Sediment and Pollution Control Plan:

1. Conduct soil erosion and sediment pollution control work in accordance with rules, regulations and requirements adopted by the Pennsylvania Department of Environmental Protection (DEP).

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 Soil and Water Conservation, Division of Soil Resources and Erosion Control, Harrisburg, Pennsylvania.

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

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 02300

TUNNELING, BORING AND JACKING

PART 1 GENERAL

1.01. 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.

1.02. 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, 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 shall be paid for by the Developer or Contractor.

3. Inspection, insurance or other charges demanded by North Londonderry Township in regard to Township street work shall be paid for by the Developer or Contractor.

D. Source Quality Control:

1. Shop Tests: In accordance with Article 1.06 of the General Instructions, factory test pipe materials listed in the following. 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.

1.03. 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 (PDT), Specifications Publication 408, as supplemented.

1. PDT Section 703.2 Coarse Aggregate.

1.04. 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.

1.05. 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.

1.06. SITE CONDITIONS

A. Scheduling:

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

B. 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

2.01. ENCASING CONDUIT

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

1. Minimum Inside Neutral Axis Diameter: As shown on the Drawings or as indicated by the Engineer.

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 1 ½ 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: As shown on the Drawings.

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

2.02. SEWER PIPE AND FITTINGS

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

2.03. 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” 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 PDT 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.

2.04. 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

3.01. 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.

3.02. PREPARATION

A. As specified in Sections 02221 and 02211.

3.03. 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 bold 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 1 ½ 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 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 one-half 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 tope 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.

3.04. 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

SECTION 02605

MANHOLES

PART 1 GENERAL

1.01. 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.

C. Section 02764 – Manhole Rehabilitation – Resin Lining

1.02. WORK INCLUDED

A. Installation of Manholes, etc.

1.03. 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.

1.04. 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. Precast Concrete Manholes.

2. Manhole Grade Rings.

3. Manhole Steps.

4. Manhole Castings

5. Gaskets, Adapters, and Other Appurtenances.

6. Resin Lining System

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

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

1.05. 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

2.01. MATERIALS

A. Manholes.

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

a. A resin spray liner is required in all manholes within the first one thousand (1,000) feet of gravity sanitary sewer main after a force main pipe discharge. Reference section 02764.

b. 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 follows:

2. Concrete: Composition and compressive strength conforming to ASTM C478 except use Type II or Type III cement in manhole components and increase compressive strength to 4500 psi (at 28 days) in precast bases.

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. 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: ASTM C150 Type II, Moderate Sulfate Resistance.

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 3500 psi Mix Design with a 5/8" diameter maximum allowable aggregate size.

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

b. Cement shall be Type II or Type III.

5. Precast Reinforced Concrete Manhole Riser and Top Sections:

   a. As previously specified.

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 shall meet the requirements of Federal Specification SS-S-210A (3.4 Adhesion & 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"-wide joints) shall be such that no sagging is detected (while being tested at 135 degrees F) for a period of 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 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 performed 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 C-443.

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.

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 (3 1/2) 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 A-48 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. All castings shall be cleaned by means of sand blast, neatly finished, and have one coat of black asphaltum paint applied at the factory.

g. Manhole Casting Schedule:

1) Standard frame and cover (Self Sealing):

a) Total weight, 255 pounds minimum.

b) Provide two pick bars.

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 continuous loop polyisoprene or neoprene rubber gasket (40 durometer).

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

g) Catalogue Number: 1835A1GS.

2) Watertight frame and cover.(WTFC):

a) Total weight 255 pounds minimum.

b) The word “SANITARY SEWER” shall be cast appropriately in the center of the cover; lettering shall be a minimum of 2-inch high.

c) Two concealed pick holes shall be provided.

d) The inner lid shall be provided with a machined dovetail groove for a self-sealing1/4-inch diameter continuous loop polyisoprene gasket (40 durometer).

e) Cover shall have bolt holes for ½” stainless steel bolts and lock washers.

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

g) Catalogue Number: 1045ZPT/1040APT.

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

i. Manufacturer:

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

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 1 ½ 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	Based on ASTM D 2240
Tensile Strength	1.6 MPa (232 psi) (not less than 1 MPa)	ASTM D 412 - 87
Compression	under 1 MPa	Based on ASTM D
Deformation - Initial deformation - Final deformation	(145 psi) 6±4% 6±4%	575
Compression Set	0.4% (no more than 4%) under 1 MPa (145 psi)	Based on 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)		ASTM D 573 - 88
- Hardness retained	100%±5%	
- Compressive strength retained	100%±5%	
- Tensile strength retained	100%±5%	
- Elongation retained	100%±5%	

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.

PART 3 EXECUTION

3.01. 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.

B. Manhole Bases (precast concrete and monolithically poured concrete):

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 1/2 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.

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

END OF SECTION

SECTION 02700

PIPED UTILITIES-SANITARY SEWERS

PART 1 GENERAL

1.01. RELATED DOCUMENTS

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

1.02. WORK INCLUDED

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

1.03. 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 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 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.

f. All sewers and plugged laterals shall be televised and inspected to match North Londonderry Township standards for routine cleaning and televising.

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 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.

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. Sanitary sewer pipes 8-inch in diameter and smaller shall be tested at 5 psi and hold the pressure for 5 minutes. Pipes larger than 8-inch in diameter shall be tested at pressures and times dictated by the Authority

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.

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 is 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.

1.04. 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, Fittings and Sweeping Tees.

2. Stone Certifications.

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

4. Detection Tape.

5. Valves and Valve Boxes.

6. Air Release Valves.

7. Multi Strand Detection Cable.

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

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

1.05. 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

2.01. MATERIALS

A. Ductile Iron Pipe (For gravity sewer and force main pipe at ARV Chambers):

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 with retainer glands and shall conform to ANSI specification A21.11. Furnish joints with all required accessories. 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. (To be used on force main only.)

d. 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 manufacturer's specifications. (Protecto lining is for force main piping).

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 mechanical joint in accordance with ANSI A21.11. Furnish joints with required accessories.

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 manufacturer's specifications. (Protecto lining is for force main piping).

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 pipe and fittings.

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

B. Pipe: Force Main (Open Cut):

1. Pipe:

a. 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.

b. Joints shall be restrained with a Uni-Flange as manufactured by Ford or approved equal. Joint restraints are required for two (2) joints on either side of any fitting or bend (not including the fitting or bend).

2. DIP Fittings:

a. Same as specified under Ductile Iron Pipe. Furnish joints with required accessories including Mega-Lugs for PVC. Mega-Lugs shall be as manufactured by EBBA Iron Work.

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.

c. The use of mechanical joint pipe with retainer glands may also be used. Gaskets for restrained joints shall be Field Lok 350 gaskets as manufactured by U. S. Pipe or approved equal. (To be used on force main only.)

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

C. PE Pipe Low Pressure Force Main:

1. Polyethylene pipe shall be manufactured in accordance with AWWA C901 for sizes ½" through 3". Pipe will DR 11. Pipe shall be PE 3608 high density polyethylene meeting cell 345464E for stripes per ASTM D 3350. Pipe shall also be listed by the Plastic Pipe Institute (PPI) TR-4. The strip color shall be "GREEN" for all pipe sizes.

2. Polyethylene fittings shall be made from material meeting the same requirements as the pipe. Polyethylene fittings shall be molded or fabricated by the manufacturer of the pipe.

3. Where applicable, fittings shall meet the requirements of AWWA C906.

4. Molded fittings shall be manufactured in accordance with either ASTM D2683 (socket fused) or ASTM D3261 (butt fused) and shall be so marked. Fittings you service lateral connections will by a WYE 2x2x2 – inch in size.

D. High Density Polyethylene Pipe: Force Main (HDD)

1. 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.

2. Pipe and fittings for force main piping shall be SDR 9 (200psi). Manufacturers shall verify the suitability of pipe for the intended applications.

3. Fitting for connection to Ductile Iron and/or PVC Pipe will be a flanged fitting.

4. All pipe sizes are to be minimum inside diameters for HDPE pipe. All pipe inside diameters shall be a nominal 8-inch diameter. Pipe outside diameter shall DIPS sizing. Pipe shall be GREEN in color or have GREEN color stripes.

5. Materials used for the manufacturer of polyethylene pipe and fittings shall be high density, black PE 3608 meeting the following physical property requirements.

Property	Test Method (1)	Nominal Value
Material Designation	PPI/ASTM	PE 3608
Material Classification	D3350	345464E (color)
Density	D1505	0.947 (color)
Flow Rate	D1238 (190/21.6)	8.5
Flexural Modulus	D790	>130,000
Tensile strength @ yield	D638	3,200
ESCR	D1693	F_0>10,000
ESCR, compressed ring	F1248	F_0>10,000
UV stabilizer (C)	D1603	2%
Elastic modulus	D638	110,000
Brittleness temperature	D746	<-180°F
Melting Point	D789	261
Vicat softening temperature	D1525	255
Hardness	D2240	65
Thermal expansion	D696	9×10^{-5}
Volume resistivity	D991	2.6×10^{16}
HDB @ 73.4ºF	D2837	1600
HDB @ 140ºF	D2837	800

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

6. Pipe and fittings shall be manufactured from identical material meeting the requirements listed and shall be designed for a 200 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 1600 psi at 73.4ºF and 800 psi at 140ºF. The pipe and fitting manufacturer shall have an independent PPI Material Listing in accordance with PPI TR-3 and TR-4.

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

8. 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.

9. 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.

E. Fusible PVC: Force Main (HDD):

1. Fusible polyvinylchloride pipe shall meet the requirements of AWWA C900 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4” through 12”, ASTM D1784 Rigid Poly (Vinyl Chloride)(PVC) Compounds and Chlorinated Poly (Vinyl Chloride)(CPVC) Compounds, ASTM D2152 Test Method for Degree of Fusion of Extruded Poly (Vinyl Chloride)(PVC) Pipe and Molded Fittings by Acetone Immersion, ASTM D2241 Poly (Vinyl Chloride)(PVC) Plastic Pipe (SDR-PR).

2. Pipe for force main piping shall be DR 9. Manufacturers shall verify the suitability of pipe for the intended applications.

3. Fitting for connection to Ductile Iron Pipe will be a flanged fitting.

4. All pipe sizes are to be minimum inside diameters for Fusible PVC pipe. All pipe inside diameters shall be a nominal 8-inch diameter. Pipe outside diameter shall DIPS sizing. Pipe shall be green in color or have green color stripes.

5. Materials used for the manufacturer of the polyvinylchloride pipe shall conform to cell classification 12454 per ASTM D1784.

F. Bolted Mechanical Couplings and Adapters (TO BE USED ON FORCE MAIN, 4” DIAMETER AND LARGER ONLY):

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. Smith Blair.

   b. Romac.

   c. Dresser.

G. PVC Pipe:

1. 4" - 15" Diameter:

   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. 18” - 27” 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 794 specification for Poly Vinyl Chloride (PVC) Large Diameter Ribbed Gravity Sewer 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.

H. 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.

I. Wye Connections:

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

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

J. Sweeping Tee:

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

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

3. Sweeping Tees will be as manufactured by:

a. Plastic Trends, MI.

b. Specified Fittings, WA.

K. Cleanouts:

1. Construction shall be in accordance with the International Plumbing Code (2009).

2. Cleanouts shall be installed at all changes in vertical and horizontal directions greater than 45 degrees. Where changes in direction are less than 45 degrees, cleanouts shall be located every 90 feet.

3. On new lateral construction and/or lateral replacement, test tees shall be installed as indicated on the Detail Drawings.

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

5. Cleanouts located in paved areas or in areas where vehicular traffic may occur require a cleanout cover to be installed. Acceptable manufacturers:

a. General Engineering Company, Frederick, MD.

b. Or approved equal.

L. Detection Tape:

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" 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” above the pipe (see Trench Detail).

PART 3 EXECUTION

3.01. LAYING PIPE

A. General:

1. 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.

2. Each section of pipe shall rest upon 6”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 $\pm$ ¼-inch.

3. 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.

4. 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.

5. 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.

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

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

8. Diversion of Sewage during Construction.

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

1) If by-pass pumping is required, provide stand-by pump equivalent to the largest by-pass 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 required materials necessary to accomplish the work.

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

9. Contractor shall maintain a log of service connection locations and lateral pipe lengths and sizes. 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.

3.02. CLEANOUTS

A. Service Laterals:

1. All service laterals 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 (2000) requirements. 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.

3.03. 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.

END OF SECTION

SECTION 02706

HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01. RELATED WORK

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 2 Specification Section, apply to this Section

1.02. WORK INCLUDED

A. This section consists of all pressure pipe installation that will be permitted to be installed by horizontal directional drilling methods (HDD).

1.03. QUALITY ASSURANCE

A. The Contractor shall retain the services of a horizontal directional drilling specialist who can provide at least three (3) references of previous similar projects completed requiring similar skills.

1.04. SUBMITTALS

A. Submit a complete detailed design procedure and method for each installation showing the following as a minimum:

1. Layout sketches, indicating pit dimensions and locations.

2. Proposed line and grade of the drilling.

3. Complete details and specifications of the materials and equipment to be used to compete the drilling installation. Locating system shall have a minimum of 5 frequencies, Bluetooth transfer technology, ability to measure pullback pressures and mud pressure, have Log-While-Drilling software.

4. Size and type of drill pipe.

5. Drilling fluid information.

6. Drilling fluid disposal plan.

7. Sequence of operations.

8. A list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable).

9. A safety plan.

1.05. JOB CONDITIONS

A. If an obstruction is encountered that prohibits the forward action of the drilling operation or pipe installation, and it becomes evident that it will be impossible to advance the drill head or the pipe, operations shall cease and the pipe will be abandoned in place and filled completely with grout. Drilling shall restart at a second location approved by Engineer. Any such additional cost associated with such a restart at a new location shall be borne by the contractor.

B. The HDD operation, once started, shall be continuous until the HDD is completed.

C. The rig shall be capable of the push/pull capacity, rotational speed, torque, and horsepower requirements, including size and capacity of the drilling fluid pump, to successfully complete the HDD.

D. During construction, the surfaces of all areas including, but not limited to roads, streets, and driveways shall be maintained on a daily basis to produce a safe, desirable, and convenient condition. Streets shall be swept and flushed after backfilling, and recleaned as dust, mud, stones and debris caused by the work, or related to the work, accumulates. The construction site shall be left clean at the end of each working day to the satisfaction of Engineer.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.01. PERFORMANCE

A. The Contractor shall keep drilling logs. These logs shall include specific dates, time and locations (x, y, z positioning), soil conditions, drilling data such as depth, angle, rate of penetration, and utility crossings. Drilling logs shall be accurate to facilitate the production of record drawings. The “x,y,z” locations shall be no further than 10’ apart. Four (4) copies of the drilling logs shall be provided to Engineer.

B. The HDD Contractor shall calibrate its tracking and locating equipment at the beginning of each work day.

C. The HDD Contractor shall monitor and record the alignment and depth readings provided by the tracking system:

1. Every 5 feet for normal conditions.

2. Every 5 feet alignment for normal conditions.

D. All drilling operations shall include reaming of the pilot hole prior to installation of the product line. The pilot hole shall be reamed to a minimum size of 1.5 times outside diameter of the product line. Reamer shall be chosen to match the soil conditions encountered.

E. A wireline steering tool system shall be used for all drilling over 500’, or drilling beneath a water course. Short shallow drilling operations may be guided via a walkover system subject to the approval of the Engineer.

F. The driller shall use two-way radio or cellular phone communication between the drill rig operator and the pipe pull-back crew to assure that the pipe begins moving immediately upon the operator's commencement of the pull-back operation.

G. The drill pipe shall be connected to the product line using a pull head or pulling eye and swivel. A reamer shall be placed between the drill pipe and pull head to insure that the hole stays open during the pull-back.

H. The Contractor shall employ the services of a certified fuser. The entire length of the pipe, for the drilling operation, shall be fused prior to installation. Contractor shall provide all necessary rollers to accommodate movement of the pipe above ground during the pull-back operation. Contractor shall provide necessary means (i.e. scaffold mounted rollers with a minimum vertical clearance) to maintain access roads and driveways during pull-back operations.

I. All restoration for pits, service access, etc. shall be in accordance with the requirements of the project manual.

END OF SECTION

SECTION 02720

SERVICE LATERAL AND BUILDING SEWER INSTALLATION

PART 1 GENERAL

1.01 WORK INCLUDED

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

1.02 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. **North Londonderry Township Authority requires this pipe to be six (6) inches in diameter.**

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. The North Londonderry Township Authority requires this pipe to be at least four (4) inches in diameter.

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

D. Any pipe with less than three (3) feet of cover which is located in an area where any type of vehicular traffic will occur must be made of Ductile Iron.

E. Laterals are to be located so they do not go under existing and/or proposed driveways. If the lateral must be located under the driveway the pipe material will be Ductile Iron.

1.03 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 10 years, have supplied such materials for at least 5 years of the 10-year period, and have at least 5 installations in successful operation for at least 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 completed prior to the line being placed into service.

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 10psi. 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 the North Londonderry Township Authority.

3. Cleaning.(Performed by the 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 North Londonderry Township Authority.

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. Test pressure shall be set at 5 psi and the test shall be allowed to run for five minutes, excluding the two (2) minute stabilization, if any air had to be added.

   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-half (1/2) 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 the North Londonderry Township 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.

1.04 SUBMITTALS

A. Submit shop drawings or catalog cuts, as appropriate, for materials listed under Article 2.01 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.

1.05 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

2.01 MATERIALS

A. PVC pipe (4 and 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 North Londonderry Township 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. See detail drawings.

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:

1. Pipe and Fittings:

a. Unplasticized polyvinyl chloride (PVC) gravity sewer pipe and fittings shall conform to ASTM D1784. 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 (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 min. @ 60 to 100 degrees F.

2) 1 hour min. @ 40 to 60 degrees F.

3) 2 hours min. @ 20 to 40 degrees F.

4) 4 hours min @ 0 to 20 degrees F.

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

C. Cast Iron Pipe (4 and 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. House Traps (If required) –(Should Leave This As Is):

1. House traps shall be factory assembled and shipped as a one-piece unit. SDR 35 fittings and bell stubs shall be Harco and manufactured in accordance with ASTM D-3034. SDR 35 fittings and bell hubs shall be molded in one piece with elastometric joints. Gasketed sockets depths shall meet the requirements of ASTM D-3034 sections 6.2 and 7.3.2. Gaskets shall conform to ASTM F-477.

2. Acceptable Manufacturer (No substitutes allowed):

a. The Harrington Corp., Lynchburg, VA

3. House traps may be constructed of multiple PVC pipe pieces and fittings if the Harrington one piece unit is not readily available.

E. Rigid Pipe Couplings:

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

2. Rigid pipe couplings are to be used in all cases when re-connecting SDR 35 pipe, no

exceptions.

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

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

5. Approved manufacturers:

   a. GPK Products, Inc., Fargo, ND.

   b. Or equal.

F. 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.

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.

G. Cleanouts:

1. Construction shall be in accordance with the latest International Plumbing Code (2009).

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 degrees. Where changes in direction are less than 45 degrees 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 Manufacturer

a. East Jordan Iron Works, Inc., Model No. 1565

b. Or approved equal.

PART 3 EXECUTION

3.01 LAYING PIPE

A. There shall be a 10 foot horizontal separation between water service and service lateral/building sewer.

B. 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.

C. Pipe to pipe connections shall be made in accordance with Pipe Reconnection Detail.

D. 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.

E. Provide sweeping and sanitary tees as indicated on Detail Drawings.

F. 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 4 inches shall be laid at a grade not less than ¼ inch per foot.

2. Lateral pipe having an inside diameter of 6 inches shall be laid at a grade not less than 1/8 inch per foot.

G. 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.

H. 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.

I. 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.

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

K. At time when pipe laying is not in progress, the open ends of the pipe shall be closed by watertight plug.

L. Inspect pipe and fittings for defects or damage prior to lowering in the trench.

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

N. Use of a hydrohammer for compaction shall not be permitted within a minimum of 4 feet of the top of the pipe.

O. Install pipe couplings and adapters in accordance with manufacturer's written instructions.

3.02 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. Sweeping and sanitary 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.

3.03 CLEANOUTS

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

B. Changes in direction.

1. Cleanouts shall be installed in accordance with latest International Plumbing Code (2000) 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.

C. Cast Iron Cleanout Covers (Traffic Boxes)

1. Cleanout covers shall be installed on all cleanouts.

3.02 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.

3.03 AIR TESTING

A. Air testing shall be performed utilizing test equipment supplied by the CONTRACTOR 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 half (1/2) 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 know 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 test 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 a test pressure of 5 psi 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.

END OF SECTION

Refer to Building Sewer / Service Lateral General Outline on Next Page

North Londonderry Township

Building Sewer/Service Lateral Construction

1. New Construction:

   A. Plan Submittal prior to construction recommended.

   B. Refer to diagram on opposite side of this page for more info.

   C. Any pipe less than 3' of cover must be cast iron or ductile iron.

   D. For 4" Building sewer use eccentric 4x6 adapter fitting (flexible coupling not allowed).

   E. Wall Sleeve shall be required that is next pipe size larger than building sewer.

   F. There shall be a five-foot separation of building sewer/service lateral and water service.

   G. Pipe Material Types:

      1) SDR 35:

         a) 4" – 2% min slope.

         b) 6"- 1% min slope.

      2) Schedule 40:

         a) Only permitted within 3 ft of building.

         b) Must transition to SDR 35 before first cleanout with listed and labeled adapter.

   H. Testing:

      1) Air Testing:

         a) 4" pipe- 5psi for 5 minutes.

         b) 6" pipe- 5psi for 5 minutes.

         c) Gauge must be read in 1/2 PSI increments.

      2) Visual Testing.

   I. Cleanouts:

      1) 90' maximum spacing.

   J. Building traps-Not permitted.

   K. Cast iron Cleanout Covers:

      1) Shall be East Jordan Iron Works.

2) Required to be on site for inspection.

2. Repair:

A. Testing:

1) Visual Test only.

B. Pipe Material Types:

1) SDR 35.

2) Schedule 40:

a) Only permitted where SDR 35 is nonexistent at sewer main.

C. Building traps:

1) Only permitted to replace existing trap.

D. Coupling Types:

1) Repair coupling:

a) Listed and labeled for use with corresponding pipe material.

2) Fernco:

a) Must have stainless steel shear collar with stainless clamps.

b) Only permissible for a change in pipe material (i.e. Clay to PVC or A.C to PVC).

Not permitted to change PVC types (i.e. Schedule 40 to SDR 35).

SECTION 02764

MANHOLE REHABILITATION – RESIN LINING

PART 1 GENERAL

1.01. RELATED DOCUMENTS

A. Drawings and general provisions of Contact, including General and Supplementary Conditions and Division 1 Specifications.

B. Division 2 Specifications, as applicable, including proprietary specifications of individual system and product manufacturer.

C. Reference ASTM specifications as listed below:

ASTM C-109	Compressive Strength of Hydraulic Cement Mortars
ASTM C-307	Tensile Strength of Hydraulic Cement Mortars
ASTM D-543	Resistance of Plastics to Chemical Reagents
ASTM D-638	Standard Test Method for Tensile Properties of Plastics
ASTM D-695	Standard Test Method for Compressive Properties of Rigid Plastics
ASTM D-790	Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics
ASTM D-4060	Test Methods for Abrasion
ASTM D-2240	Test Method for Hardness
ASTM D-2990	Test for Tensile, Compressive and Flexural Creep and Creep Rupture in Plastics

1.02. WORK REQUIRED

A. The work includes waterproofing, sealing, structural reinforcement, and corrosion protection of leaking and deteriorated manholes by application of a resin lining system that cures to form an interior hardened shell.

1.03. SUBMITTALS

A. Shop Drawings - The Contractor shall submit manufacturer's technical data for the product/system. Liner thickness and design calculations shall be included and must be stamped by a registered professional engineer.

B. Installer Certification - The Contractor shall provide written certification that Contractor is a manufacturer certified installer of the product.

C. Samples - The Contractor shall submit, for verification purposes, samples of the product to be installed.

D. Statement of Warranty – The Contractor shall submit a Statement of Warranty meeting the requirements of paragraph 1.6 of this Section.

1.04. QUALITY ASSURANCE

A. All materials shall be accompanied by test reports certifying conformance to the ASTM standards listed herein.

B. Materials shall be shipped, stored, and handled in a manner consistent with the written recommendations of the manufacturer.

C. The effectiveness of the resin liner shall be verified by a post-installation visual inspection. A written inspection report shall be furnished to the Owner.

D. Acceptance vacuum testing of the resin lining shall be performed by drawing ten (10) inches of mercury for one (1) minute. Allowable drop is one (1) inch in 60 seconds.

E. No payment will be made until the manhole has satisfactorily passed the vacuum test.

1.05. WARRANTY

A. The Contractor shall warrant the liner installation for a period of ten (10) years. During the warranty period, any defects in the liner shall be repaired in a manner satisfactory to the Owner/Engineer. The Contractor shall bear any and all costs associated with repair of the liner during the warranty period.

PART 2 PRODUCTS

2.01. LINER SYSTEM

A. General Design/Installation Characteristics:

1. Lining of the existing manhole shall result in a monolithic structure conforming to the shape and contour of the existing manhole. Lining system will become structural as defined by industry standard design similar to those defined in ASTM F-1216.

2. The liner shall be completely watertight, free of any joints or openings other than influent and effluent pipes and cover frame opening.

3. The liner shall protect the existing manhole surfaces from hydrogen sulfide corrosion.

4. Minimum dry thickness of 250 mils or greater depending on ground water conditions. Assume full height ground water conditions for design. Final thickness will be as specified by the manufacturer.

B. Structural Properties:

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

Tensile Strength	ASTM D-638	7,450 psi
Compressive Strength	ASTM D-695	19,000 psi
Flexural Strength	ASTM D-790	14,000 psi

Flexural Modulus (Initial)	ASTM D-790	735,000 psi
Flexural Modulus (Long Term)	ASTM D-790	529,000 psi

C. Resin:

1. The resin based materials shall be used to form the sprayed or inverted structurally enhanced monolithic liner covering all interior surfaces of the structure including benches and inverts of manholes.

D. Acceptable Manufacturers (NO substitutes allowed):

1. SprayWall® manufactured by Sprayroq, Inc.

PART 3 EXECUTION

3.01. PRE-INSTALLATION CLEANING AND OTHER PREPARATIONS

A. Steps shall be taped/covered prior to applying the resin.

B. The interior surface of the manhole, including base, shall be thoroughly cleaned to remove all internal foreign materials that would prevent proper installation of the liner.

C. Active leaks shall be sealed/plugged prior to spraying the resin. Applying the resin shall not be permitted if active leaks exist in the manhole. Acceptable plugging/sealing methods include grout or grout injection or other methods recommended by the liner system manufacturer.

D. Structural deficiencies that exist in the manhole substrate shall be repaired to ensure proper performance of the liner system. This includes deficiencies in the cone, walls, invert channels, and benches. Invert channels and benches shall be rebuilt/repaired as required to facilitate smooth flow of wastewater through the manhole.

3.02. INSTALLATION

A. General:

1. No application shall be made unless the ambient temperature inside the structure is 50^{O} F or higher.

2. The inside surfaces of the manhole shall be dry prior to applying the resin. The drying of the inside surfaces of the manhole shall be specified by the resin manufacturer.

3. The Contractor shall apply the resin in accordance with the manufacturer's specific detailed instructions.

4. The manhole cone, walls, channel(s), and benches shall be sprayed.

B. Resin Liner Installation and Curing:

1. Contractor shall perform any by-pass pumping in accordance with paragraph 3.4 of this section.

2. Contractor shall spray the resin liner in accordance with the manufacturer and by certified installer.

3. If an additional application is required, the initial application shall be permitted fully cure before applying the second coat.

3.03. POST-INSTALLATION VISUAL INSPECTION

A. The Contractor shall perform a visual inspection to verify proper curing and integrity of the liner. If any ridges, wrinkles, sags, or other defects are observed on the walls, bench and channel(s), the Contractor shall make the repair(s) in accordance with the manufacturer's standards.

B. The Contractor shall document the inspection and provide the Owner with a written inspection report.

3.04. BYPASS PUMPING/SEWAGE FLOW CONTROL

A. If required, the Contractor shall be responsible for bypass flow pumping to apply the resin liner. The pump and bypass lines shall be of adequate capacity and size to handle the flow. The Contractor shall take care to prevent spills and discharges of raw wastewater to the ground, trenches, and State waters. Any fines levied by local, state, or federal agency due to Contractor action or inaction shall be paid by the Contractor. Any spills and discharges shall be properly cleaned up, at Contractor expense, and reported. The Contractor shall be responsible for any property damage caused by wastewater handling. Refer to Section 02715 - Sanitary Sewer Flow Control.

END OF SECTION

SECTION 03410

PLANT-PRECAST STRUCTURAL CONCRETE

PART 1 GENERAL

1.01. RELATED DOCUMENTS

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

1.02. SUMMARY

A. Extent of plant precast concrete work as shown on drawings and in schedules.

B. Plant precast concrete includes the following:

1. Vaults and Chambers.

C. Related Accessories: The following precast accessories and related products are found in this section:

1. Access Hatches.

2. Access Ladders.

3. Ladder Safety Extensions.

1.03. PERFORMANCE REQUIREMENTS

A. Delegated Design: Design precast structural concrete, including comprehensive engineering analysis by a qualified professional engineer registered in the State of Pennsylvania, using performance requirements and design criteria indicated.

B. Structural Performance: Provide precast structural concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:

1. Live Loads: Structures shall be designed to withstand the applied wheel loading on the top slab, from an H20 truck axle per AASHTO LRFD Bridge Design Specifications.

2. Lateral Earth Pressure: Design vaults for lateral pressures from surrounding soils, hydrostatic pressure (groundwater) and surcharge:

a. Saturated Soils unit weight – 130 pcf.

b. Angle of Internal Friction – 30 degrees..

c. Coefficient of Active Earth Pressure – 0.33

d. Coefficient of Passive Earth Pressure – 3.00.

e. Coefficient of At-Rest Earth Pressure – 0.50.

f. Coefficient of Friction – 0.40.

g. Groundwater – at finish grade.

h. Surcharge – 2 feet of soil.

3. Buoyant Uplift Resistance: Design vaults to resist uplift based on a maximum groundwater elevation at finish grade.

1.04. SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.

C. Shop Drawings: Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of precast structural concrete units:

1. Include and locate openings larger than 10 inches.

2. Indicate location of each precast structural concrete unit by same identification mark placed on panel.

3. Indicate relationship of precast structural concrete units to adjacent materials.

1.05. QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer:

1. Participates in PCI's Plant Certification program and is designated a PCI-certified plant as follows:

a. Group C, Category C1 - Precast Concrete Products (no prestressed reinforcement).

B. Design Standards: Comply with ACI 318 and design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.

C. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."

1.06. DELIVERY, STORAGE, AND HANDLING

A. Support units during shipment on shock-absorbing material in same position as during storage.

B. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that would cause cracking or damage.

C. Lift and support units only at designated points shown on Shop Drawings.

1.07. COORDINATION

A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 PRODUCTS

2.01. MOLD MATERIALS

A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes:

1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

2.02. REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Steel Bar Mats: ASTM A 184/A 184M, fabricated from, deformed bars, assembled with clips.

C. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.03. CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.

B. Supplementary Cementitious Materials: Use of the following materials is permitted, in accordance with the criteria of ACI 318:

1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.

2. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.

3. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 3S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.

D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.

E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture:

1. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.

2. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.

2.04. CONCRETE MIXTURES

A. Prepare design mixtures for each type of precast concrete required:

1. Limit use of fly ash to 25 percent replacement of portland cement by weight, granulated blast-furnace slag to 40 percent of portland cement by weight; and silica fume to 10 percent of portland cement by weight.

B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.

C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.

D. Normal-Weight Concrete Mixtures: Proportion by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi.

2. Maximum Water-Cementitious Materials Ratio: 0.45.

E. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.

F. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

G. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.05. MOLD FABRICATION

A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified:

1. Form joints are not permitted on faces exposed to view in the finished work.

2. Edge and Corner Treatment: Uniformly chamfered.

2.06. FABRICATION

A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."

B. Cast-in access doors in precast structural concrete slabs as indicated on the Contract Drawings.

C. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings without Engineer's approval.

D. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement:

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.

2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.

3. Place reinforcement to maintain at least 3/4-inch minimum coverage. Increase cover requirements according to ACI 318 when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.

4. Place reinforcing steel strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.

5. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses.

F. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.

G. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.

H. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units:

1. Place backup concrete mixture to ensure bond with face-mixture concrete.

I. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116:

1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

J. Comply with ACI 306.1 procedures for cold-weather concrete placement.

K. Comply with PCI MNL 116 procedures for hot-weather concrete placement.

L. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that will not show in finished structure.

M. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

N. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Engineer's approval.

2.07. FABRICATION TOLERANCES

A. Fabricate precast structural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 product dimension tolerances.

2.08. COMMERCIAL FINISHES

A. Commercial Grade: Remove fins and large protrusions and fill large holes. Rub or grind ragged edges. Faces must have true, well-defined surfaces. Air holes, water marks, and color variations are permitted. Limit form joint offsets to 3/16 inch.

B. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.

2.09. SOURCE QUALITY CONTROL

A. Strength of precast structural concrete units will be considered deficient if units fail to comply with ACI 318 requirements for concrete strength.

B. If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, employ a qualified testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M:

1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Engineer.

2. Cores will be tested in an air-dry condition or, if units will be wet under service conditions, test cores after immersion in water in a wet condition.

C. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Engineer's approval.

2.10. JOINT SEALING GASKET

A. Provide preformed plastic gaskets for all horizontal joints between sections:

1. Flexible plastic gasket-type sealant shall be butyl rubber, meeting the requirements of Federal Specification SS-S-210A, and shall conform with the applicable requirements of ASTM C-361, Section 5.7.'

2. Sealing compound shall be provided in extruded rope form of minimum 1" cross section. Size of sealant shall be in accordance with the manufacturer's recommendations and of sufficient size to obtain squeeze-out of material around the entire interior and exterior circumference of the vaults.

3. Joint surfaces shall be primed and sealant applied in conformance with the written specifications of the sealant manufacturer.

2.11. VAULTS AND CHAMBERS

A. Provide precast concrete units, including base slab, walls and top slab, to the dimensions shown on the drawings.

B. At manufacturer's option, the base slab may be cast monolithically with the walls or cast independently of the walls, and assembled in the field.

C. Manufacturer shall be aware of the need for provisions to install an access ladder on the interior of the tank, and for attaching and installing vent pipes on the top slab, as shown on the drawings.

D. Access hatches will be provided under this section and cast into the top slab.

2.12. ACCESS HATCHES

A. General: Provide manufactured hatch cast in concrete top slab, at the location shown and to the nominal dimensions indicated:

1. Minimum design live load shall be as follows: AASHTO H20 Wheel Load.

2. Hatch shall be designed for exterior exposure with a perimeter gutter frame to convey rainwater away from the hatch.

3. Hatch shall be provided with stainless steel hardware and shall automatically lock in 90 degree position.

4. Provide hatch orientation on shop drawing submittal and coordinate hatch leaf and hinge orientation with Owner.

B. Materials:

1. Door Leaf: ¼ inch aluminum diamond pattern plate equipped with slam lock and removable handle, compression spring operators and hold-open arm. Provide lockable hasp. Minimum hatch open shall be 2'x2'.

2. Hinges: Stainless steel.

3. Hardware: Stainless steel.

4. Frame: Gutter type ¼ inch aluminum channel with perimeter flanged anchors and 1-½" drainage coupling:

a. Provide 1-1/2" PVC pipe and either cast into slab or suspend from bottom of slab.

b. Drain to tank exterior with minimum ½ cubic yard of AASHTO No. 67 stone wrapped in PennDOT 408, Section 212, Class 1 Geotextile, with minimum 1 foot cover.

C. Finishes: Mill-finish:

1. Apply bituminous coating where frame comes into contact with concrete.

D. Warranty: Manufacturer supplied guarantee against defects in material or workmanship for a period of five (5) years.

E. Manufacturer: Subject to compliance with requirements, provide hatches by one of the following:

1. Pennsylvania Insert Corporation.

2. Halliday Products.

3. Approved Equal.

2.13. ACCESS LADDERS

A. The side rails shall be fiberglass reinforced pultruded isophthalic polyester or vinyl ester with OSHA safety yellow pigment. An industrial grade polyurethane yellow coating may be applied to the finished ladder for outdoor application.

B. The side rails shall be 2" square tube with a wall thickness of .156" of greater. The rungs shall be 1" diameter thermal cure rod with a pigmented epoxy, nonskid grit surface.

C. All joints and rungs shall be epoxied and riveted.

D. Ladders shall be shop assembled, and may be pre-drilled and prepared for field attachments of standoff clips.

E. All cut or machined edges, holes, and abrasions shall be sealed with a resin compatible with the resin matrix used in the structural shape.

F. Ladders shall be fastened to concrete tank with stainless steel mechanical or adhesive anchors.

2.14. LADDER SAFETY EXTENSION

A. General - Provide post with telescoping tubular section that has been manufactured explicitly for ladder use

B. Post shall be fastened to ladder rungs and lock automatically when fully extended

C. Post shall be a stainless steel fabrication.

D. All hardware shall be stainless steel.

E. Available Manufacturers:

1. Pennsylvania Insert Corporation.

2. Halliday Products.

3. Approved Equal.

PART 3 EXECUTION

3.01. EXAMINATION

A. Examine foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02. INSTALLATION

A. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection:

1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.

2. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.

B. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.

C. Field cutting of precast units is not permitted.

D. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.

3.03. ERECTION TOLERANCES

A. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.

3.04. REPAIRS

A. Repair precast structural concrete units if permitted by Engineer:

1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units has not been impaired.

B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.

C. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Engineer.

END OF SECTION

SECTION 11330

ABOVE GROUND PUMP STATIONS

PART 1 GENERAL

1.01. WORK INCLUDED

A. Above Ground Pump Station and Accessories.

B. Pump force main.

1.02. 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 a 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

2.01. 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 of equal size. Pumps shall be sized so that only one (1) pump is required for pumping normal peak flows. Style of pump

shall be determined based on the design parameters of the station and is dictated by the Authority.

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. Interior of all wet wells is to be sprayed with an epoxy lining system.

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. Backup power shall be sized to run all equipment simultaneously. There shall be a fuel supply on site to supply power for 5 days of normal influent flow. Diesel fuel shall be used and the tank shall be 275 gallon minimum capacity.

8. Omni-Site Cellular Alarm System.

9. Visible exterior alarm light.

10. Public water service provided to the inside of the building with a minimum of one slop sink, on demand water heater and one hose bib.

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. PVC or HDPE force main piping shall be considered by the Authority on a case by case basis.

13. Primary level control shall be a pressure transducer with 4-20mA output and a backup level control shall be a multi-float system.

14. Air release valve(s) as required.

15. Hydraulic driven influent grinder. To be Muffin Monster brand appropriately sized.

16. Bypass pumping connections.

17. Restroom to include a water closet and lavatory may be required on a case by case basis per the Authority's request.

18. Underground vaults that are not designated to hold water shall have a gravity drain pipe that drains to wet well.

19. Safe Hatch Safety Grate System on all hatches.

20. Magnetic Flow Meter.

21. Electric Unit Heaters.

22. 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).

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

3.01. START-UP TESTING

A. The DEVELOPER or CONTRACTOR is responsible for all start up testing of the new station.

END OF SECTION

SECTION 11400

SUBMERSIBLE GRINDER PUMP STATIONS

PART 1 GENERAL

1.01. WORK INCLUDED

A. Submersible Grinder Pump Station and Accessories.

B. Grinder pump force main.

1.02. 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. Use only equipment on Engineer's List of Approved Grinder Pump Station Equipment.

3. 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. (From Engineer's List of Approved Grinder Pump Station Equipment.)

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.

C. List of Approved Grinder Pump Station Equipment:

1. Only equipment from the Engineer's List of Approved Grinder Pump Station Equipment shall be acceptable. Said List shall be maintained by the ENGINEER and will be available upon request.

2. To be considered for placement on the approved list, the developer, supplier or supplier's representative must submit a written request to the ENGINEER to have the equipment placed on the approved list. The request must include data demonstrating that the grinder pump station equipment meets the requirements of paragraph 2.01 of this section. Information to be submitted includes but is not limited to Manufacturer's literature, illustrations, specifications and engineering data defining materials of construction, dimensions, weights, pump and motor performance and complete electrical schematics.

3. A separate request for placement on the approval list shall be made for each different type of equipment made by a given manufacturer and approval will be granted on a model number basis such that only those model numbers on the list will be acceptable. The only exception to this requirement is that a pump model not on the list will be acceptable if the pump is made by the same manufacturer a pump on the list, the two pumps differ only in motor speed, horsepower or impeller diameter and the two pumps have identical designs and materials of construction.

4. Placement on the List of Approved Grinder Pump Station Equipment does not constitute approval of performance of the equipment in actual use and satisfactory performance of the equipment shall be the responsibility of the DEVELOPER.

5. For each request to have equipment placed on the approved list, the ENGINEER will evaluate the equipment and record the time required to evaluate equipment. The DEVELOPER, supplier or other person making said request shall reimburse the AUTHORITY for the charges of the ENGINEER irrespective of whether, or not the ENGINEER accepts the equipment for placement on the list.

PART 2 PRODUCTS

2.01. 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, level control 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 DEVELOPER shall furnish to the AUTHORITY one (1) spare grinder pump for each five (5) installed. In the event that one (1) to four (4) pumps are installed, the DEVELOPER shall submit a total of one (1) backup pump of identical specification.

6. 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 N. Main Street
   Mansfield, OH 44902
   (419) 522-1511

   Pump Model SGV201-MS

   c. Environment One.

   d. Or approved equal. Approved equal shall be approved by the Authority.

7. The DEVELOPER shall use pumps of the same make and model in each installation that are also of the same make and model as the spare pumps provided to the AUTHORITY.

8. Abbreviations:

   a. ANSI - American National Standard Institute.

   b. A.S.T.M. - American Society for Testing Materials.

   c. A.W.W.A. - American Water Works Association.

   d. A.A.S.H.T.O. - 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 3450 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 1-¼ 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. The high water alarm float switch shall be normally closed.

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 2100 pounds shall be provided for pump installation and removal.

e. A 1 ¼ 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 1 ¼-inch bronze gate valve, 1 ¼-inch stainless steel pipe, and a 1 ¼-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" and have other dimensions as shown in the Detail Drawings.

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.

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 V.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 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° and shall be held in closed position by quarter-turn door latches. The outer door shall have a minimum horizontal swing of 180° 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.

2.02. PRESSURE PIPE (FORCE MAIN)

A. General:

1. Pressure pipe shall be polyethylene plastic pipe of 1 ¼ inch in diameter.

2. Pressure pipe to DR 26

3. Approved Manufacturers:

a. Plexco Plastic Piping Systems.

b. Engineer Approved equal.

PART 3 PART 3 EXECUTION

3.01. 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. The AUTHORITY shall approve the proposed location.

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 (2) 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 A.A.S.H.T.O. 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 A.A.S.H.T.O. 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

NORTH LONDONDERRY TOWNSHIP AUTHORITY
SANITARY SEWER
STANDARD DETAIL DRAWINGS

MANHOLES DETAILS: (MH)

1. Precast Concrete Manhole with Precast Concrete Base – Type1
2. Precast Concrete Manhole with Precast Concrete Base – Type2
3. Inside Drop Manhole
4. Manhole Steps
5. Heavy Duty Self-Sealing Frame and Cover
6. Heavy Duty Water Tight Frame and Cover
7. Typical Plan of Manhole Channels
8. Manhole Gasket
9. Leveling Rings, Concrete Riser and Bolted Frame Details
10. Poured Concrete Riser for Street Grades of 4% or Greater
11. Manhole Pipe Gaskets
12. Manhole Coring Gasket Detail (Kor-N-Seal)

BUILDING SEWERS/SERVICE LATERALS: (LAT)

1. Service Lateral – Shallow Sewer
2. Service Lateral – Deep Sewer
3. Building Sewer
4. Service Lateral Connection to Existing Sewer Main
5. Service Lateral Disconnection from Existing Sewer Main
6. Cleanout/Test Tee Cap Protection Casting
7. Simplex Sewage Grinder Pump Station
8. Typical Electrical Layout (for Grinder)

FORCEMAIN DETAILS: (FM)

1. Flush Chamber
2. Air Release Valve Chamber
3. Forcemain Locator Assembly
4. Horizontal Thrust Block Details
5. Concrete Thrust Block Details

TRENCH DETAILS: (TRENCH)

1. Trench Backfill Detail in Paved Areas
2. Trench Backfill Detail in Unpaved Areas
3. Unsuitable Material Excavation Detail
4. Bentonite Clay Dam Detail
5. Concrete Encasement Detail

SEWER PIPING DETAILS: (SEW)

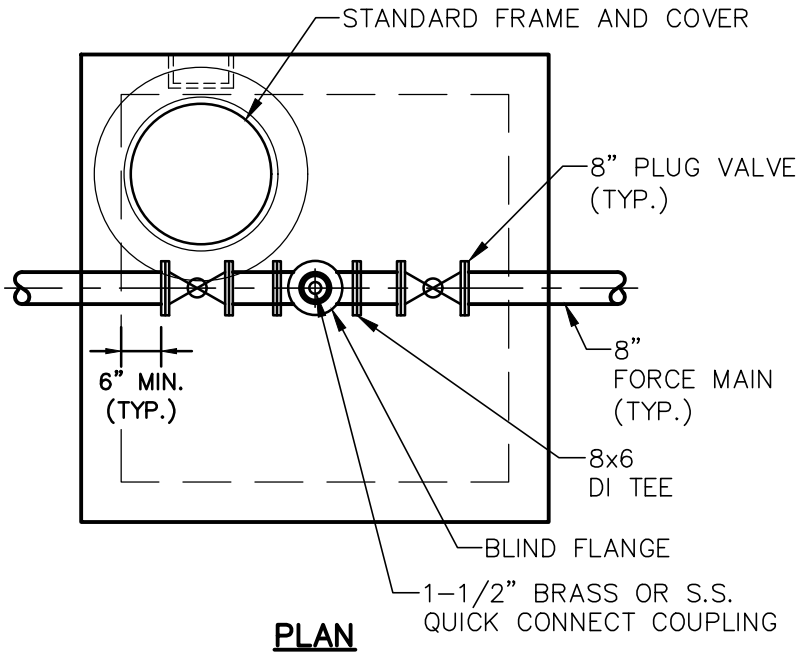
1. Pipe Reconnection Detail
2. Casing Details for Pipe Boring/Tunnels

LOW PRESSURE SANITARY SEWER DETAILS: (LP)

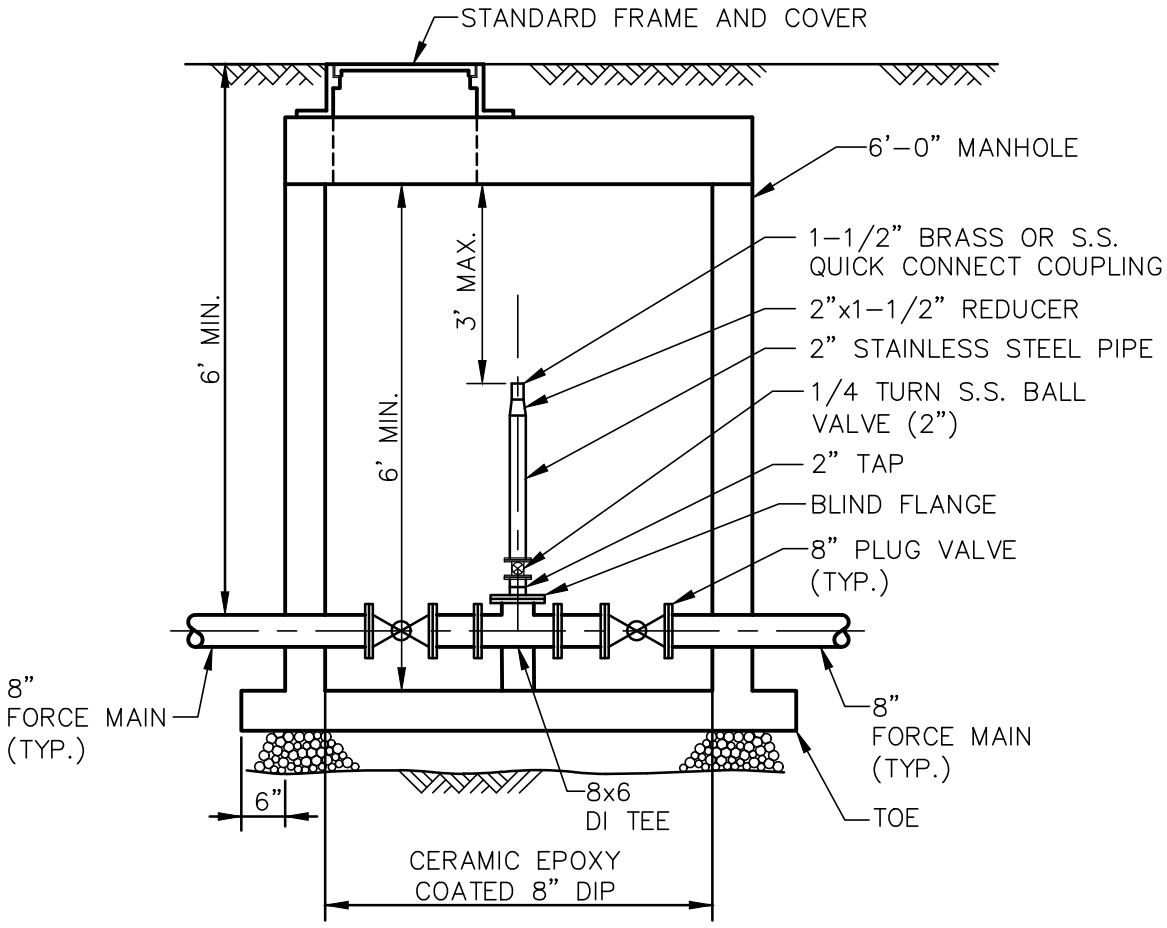
1. Typical Grinder Pump Installation Detail - Elevation
2. Typical Grinder Pump Installation Detail – Plan
3. E-One Control Panel Detail
4. E-One Grinder Pump Station
5. Simples Grinder Pump Station
6. Typical Electrical Layout
7. Low Pressure Service Line Connection at Gravity Main and/or Low Pressure Main
8. Low Pressure Sewer Discharge to Manhole
9. In-Line Cleanout /Valve Pit for Low Pressure Sewer Main
10. In-Line Terminal Cleanout for Low Pressure Sewer Main
11. In-Line Valve Pit for Low Pressure Building Service Line
12. Curb Stop and Box Detail

GREASE INTERCEPTOR DETAILS: (GR)

1. Typical Grease Interceptor to Sampling Vault Connection - Plan and Section



PLAN



SECTION

FILE NAME: FM-1-FLUSH-CHAMBER.dwg

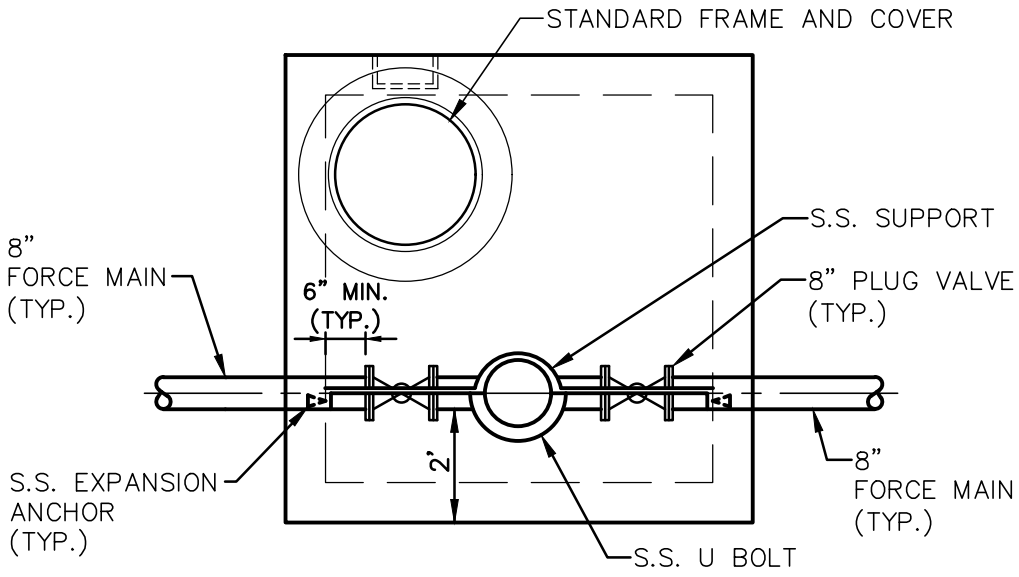
STANDARD DETAILS

FLUSH CHAMBER

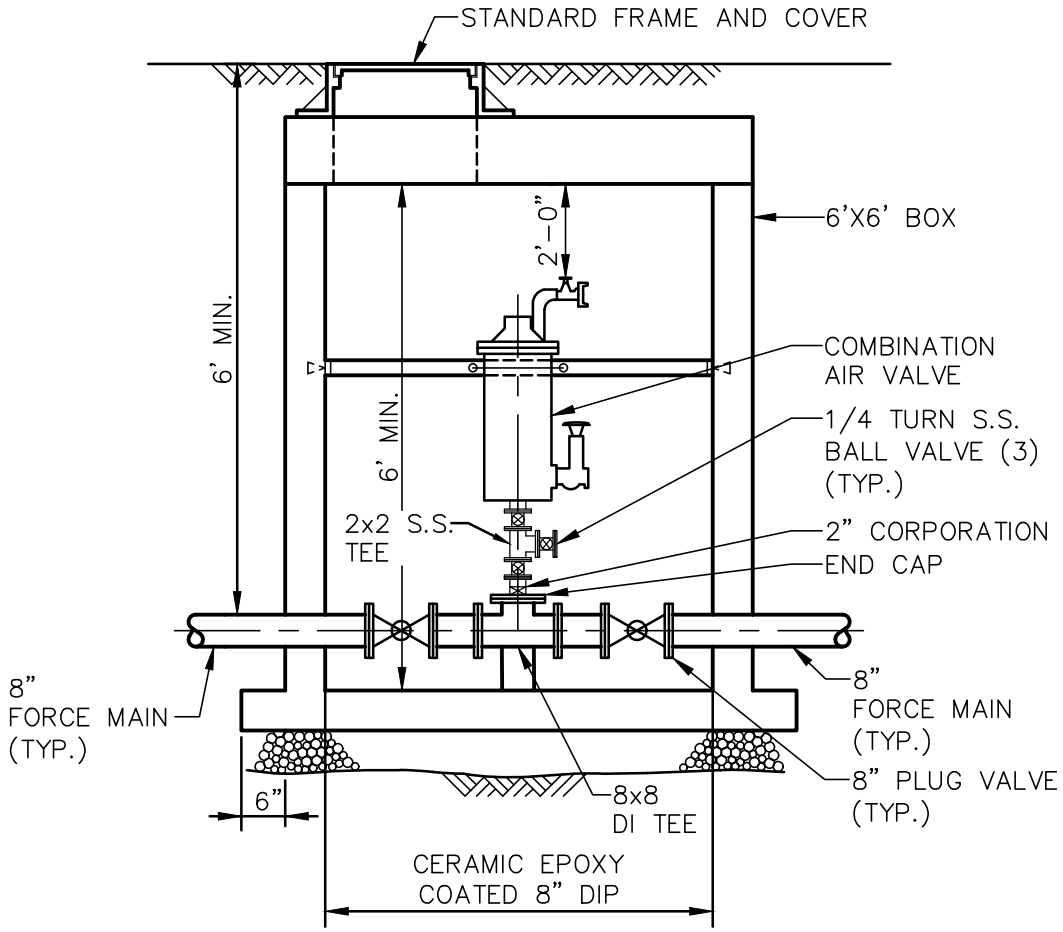
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	FM-1



PLAN



SECTION

FILE NAME: FM-2-AIR-RELEASE.dwg

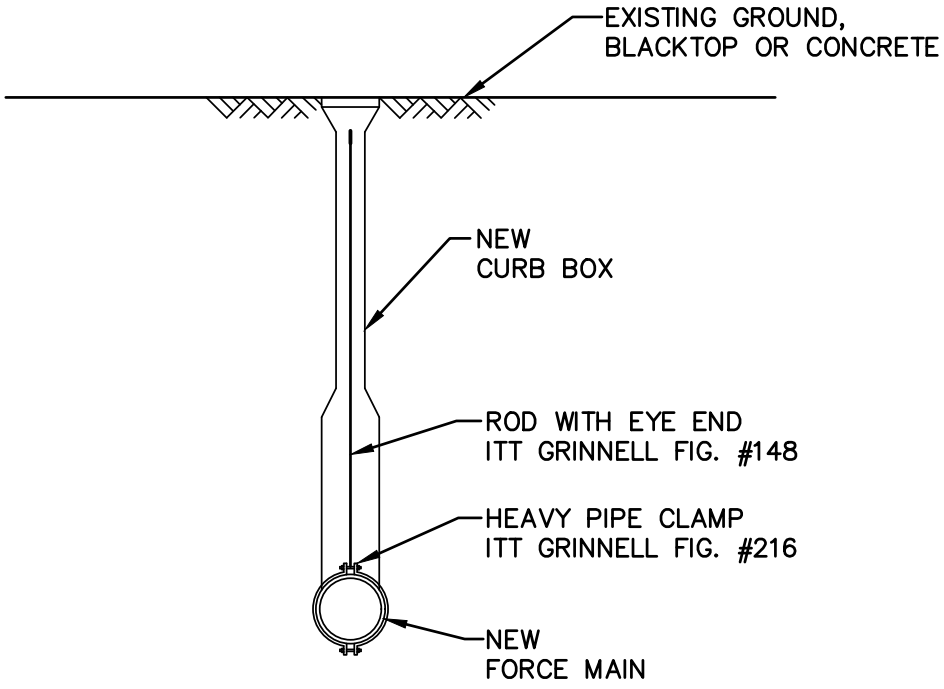
STANDARD DETAILS

AIR RELEASE VALVE CHAMBER

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	FM-2



FILE NAME: FM-3-FMLOCATOR.dwg

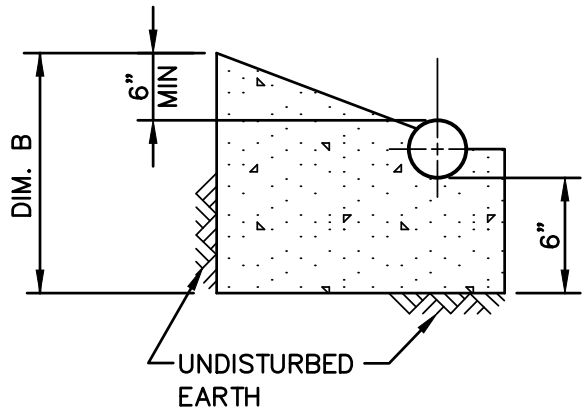
STANDARD DETAILS

FORCEMAIN LOCATOR ASSEMBLY

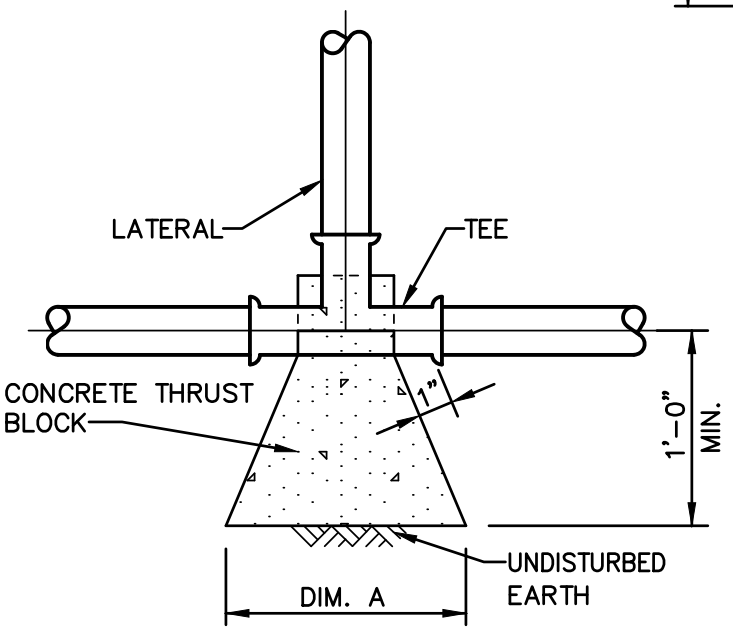
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

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

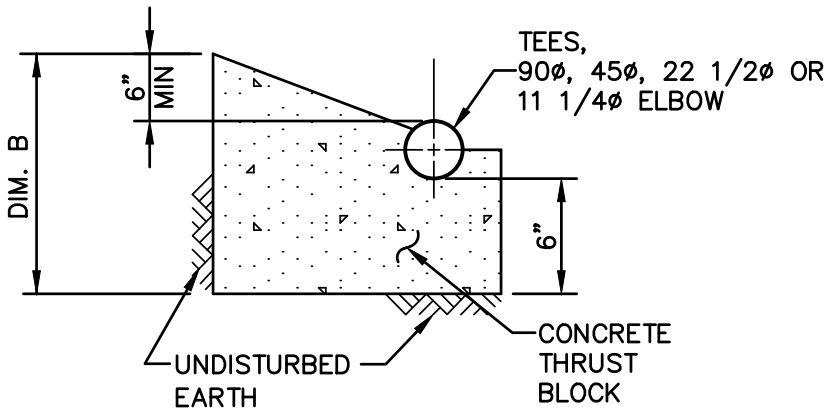
HORIZONTAL THRUST BLOCK DETAILS FORCE MAIN

NORTH LONDONDERRY TOWNSHIP AUTHORITY

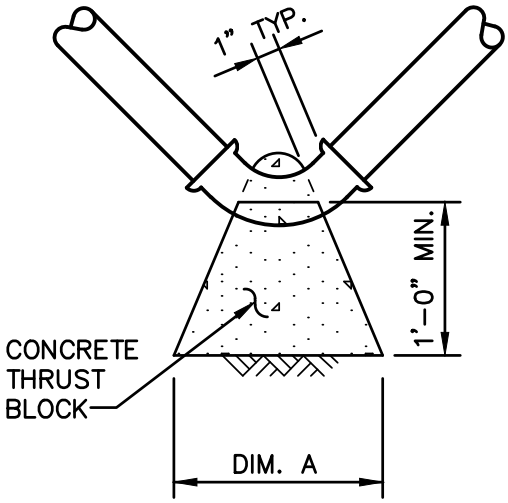
DATE	REVISIONS
2/18	DWG. CREATED

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



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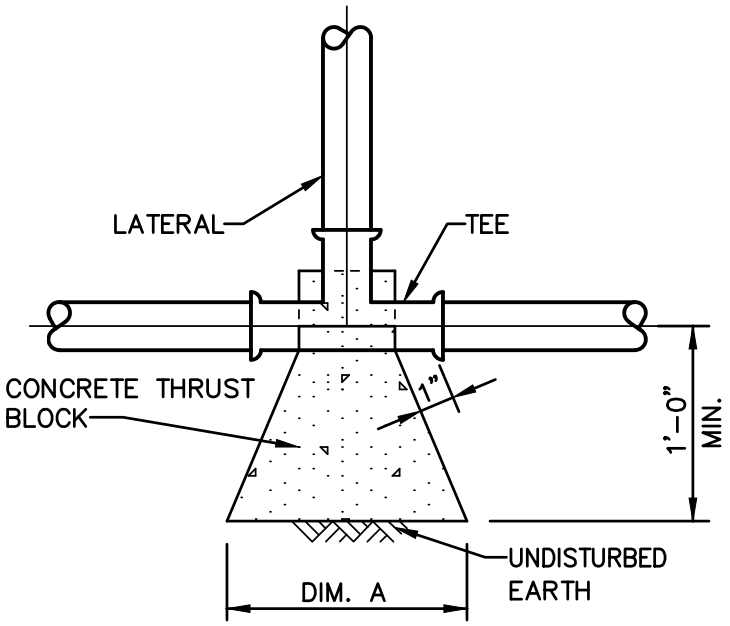


TEES

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

NORTH LONDONDERRY TOWNSHIP AUTHORITY

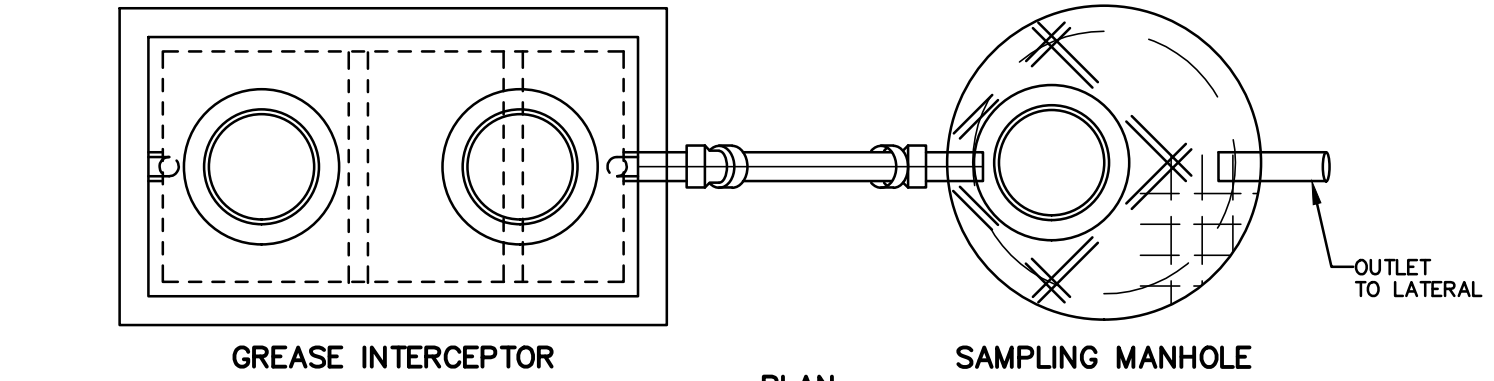
DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	FM–5

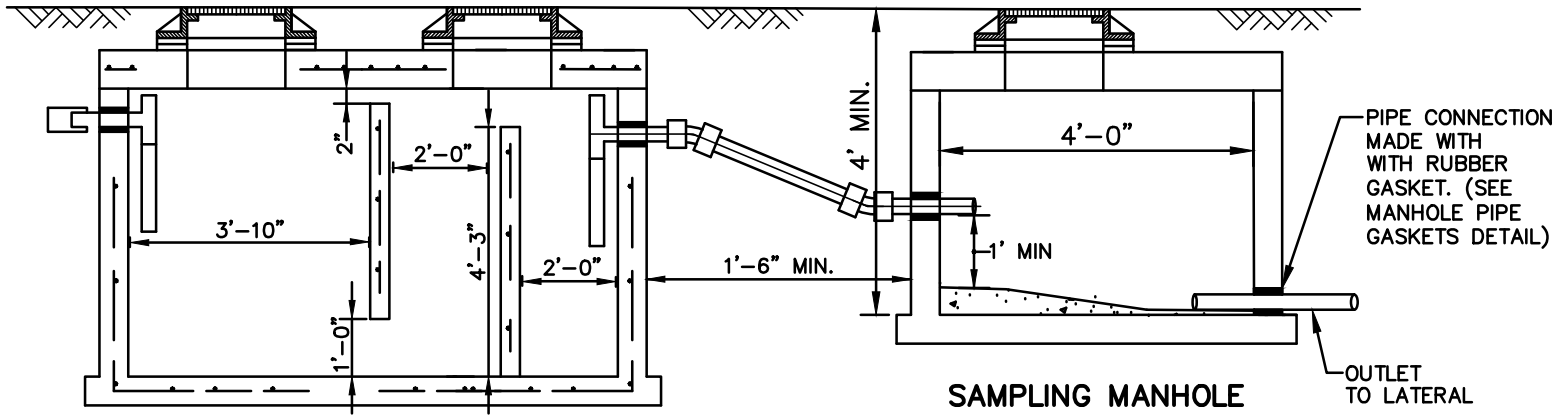
STANDARD DETAILS

TYPICAL GREASE INTERCEPTOR TO SAMPLING MANHOLE CONNECTION

NORTH LONDONDERRY TOWNSHIP AUTHORITY



PLAN



SECTION

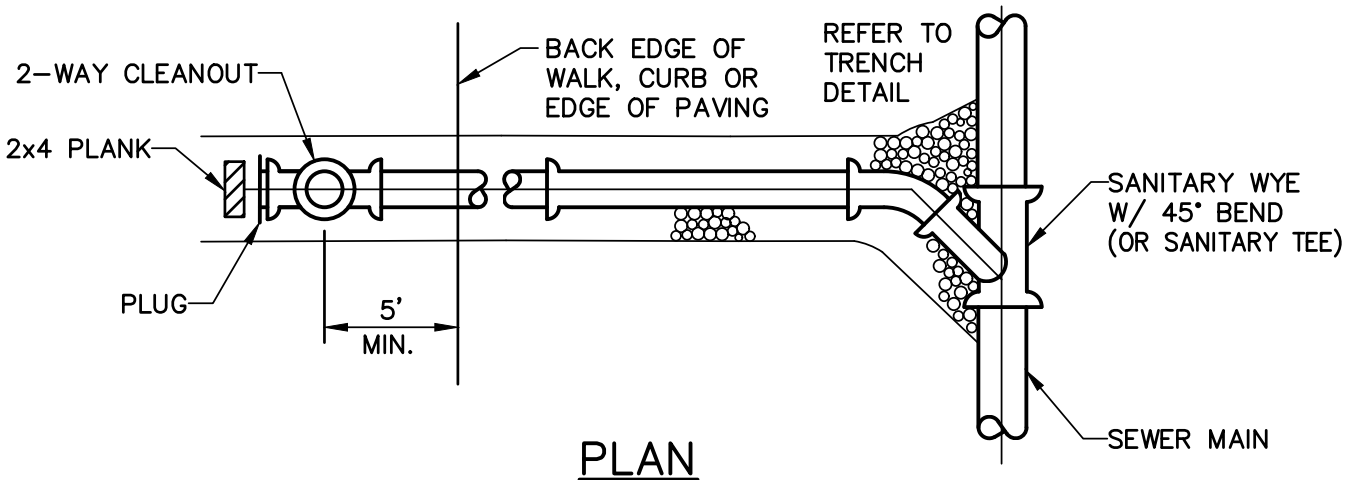
NOTES:

1. MINIMUM SIZE OF OF GREASE TRAP PERMITTED IS 1,000 GALLONS.
2. GREASE INTERCEPTOR SIZE AND DESIGN SHALL BE THE RESPONSIBILITY OF THE DESIGN PROFESSIONAL OF RECORD.
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.

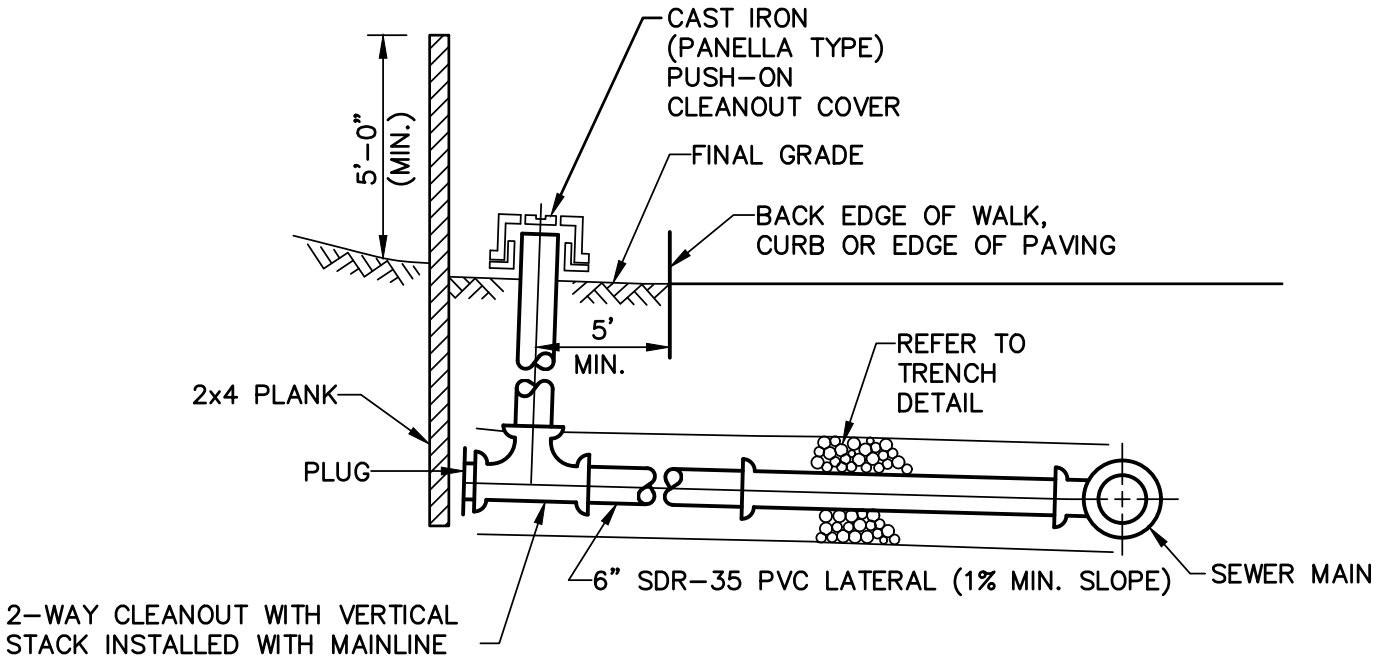
DWG. NO.	SCALE
GR-1	NO SCALE

REVISIONS	DWG. CREATED	DATE
		2/18

FILE NAME: GR-1-GreaseTrap-Vault.dwg



PLAN



SECTION

NOTES:

1. CURB CLEANOUT NOT TO BE LOCATED IN SIDEWALK, DRIVEWAYS OR BENEATH OTHER CURBLINE UTILITIES.
2. CLEANOUT TO BE LOCATED BETWEEN CURB AND SIDEWALK

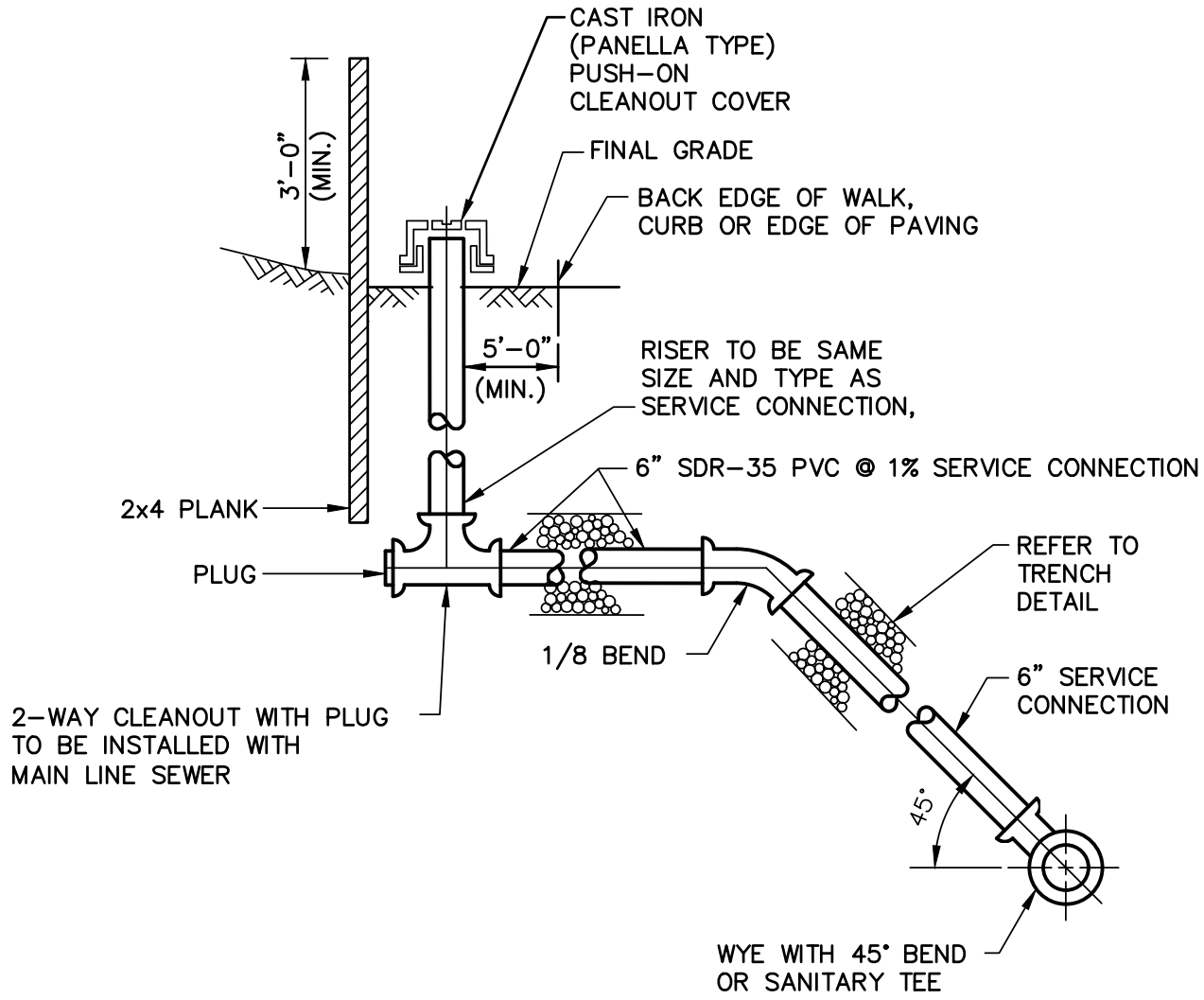
FILE NAME: LAT-1-SHALLOW.dwg

STANDARD DETAILS

SERVICE LATERAL - SHALLOW SEWER

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED
SCALE: NO SCALE	DWG. NO.: LAT-1



ELEVATION

NOTES:

1. CURB CLEANOUT NOT TO BE LOCATED IN SIDEWALK, DRIVEWAY OR BENEATH OTHER CURBLINE UTILITIES.
2. CLEANOUT TO BE LOCATED BETWEEN SIDEWALK AND CURB.

FILE NAME: LAT-2-DEEP.dwg

STANDARD DETAILS

SERVICE LATERAL - DEEP SEWER

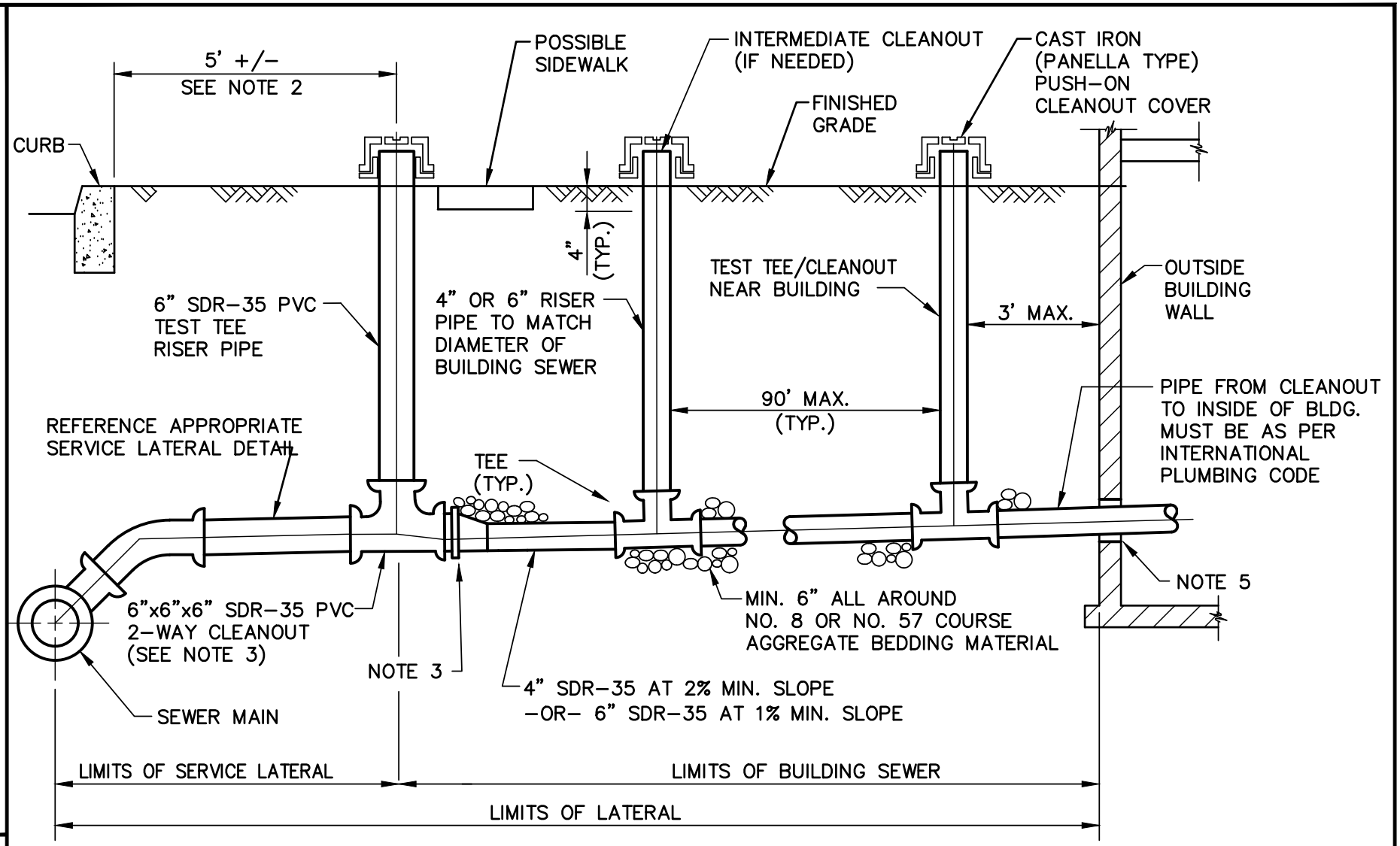
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED
SCALE: NO SCALE	DWG. NO.: LAT-2

NORTH LONDONDERRY TOWNSHIP AUTHORITY

STANDARD DETAILS

BUILDING SEWER



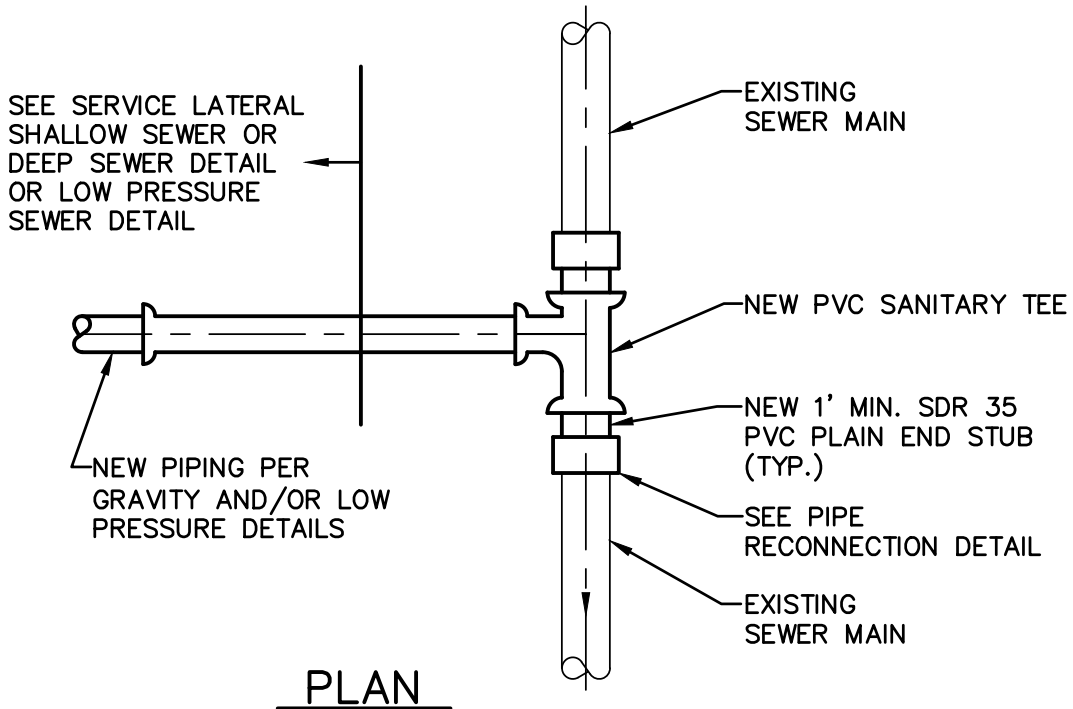
ELEVATION

NOTES:

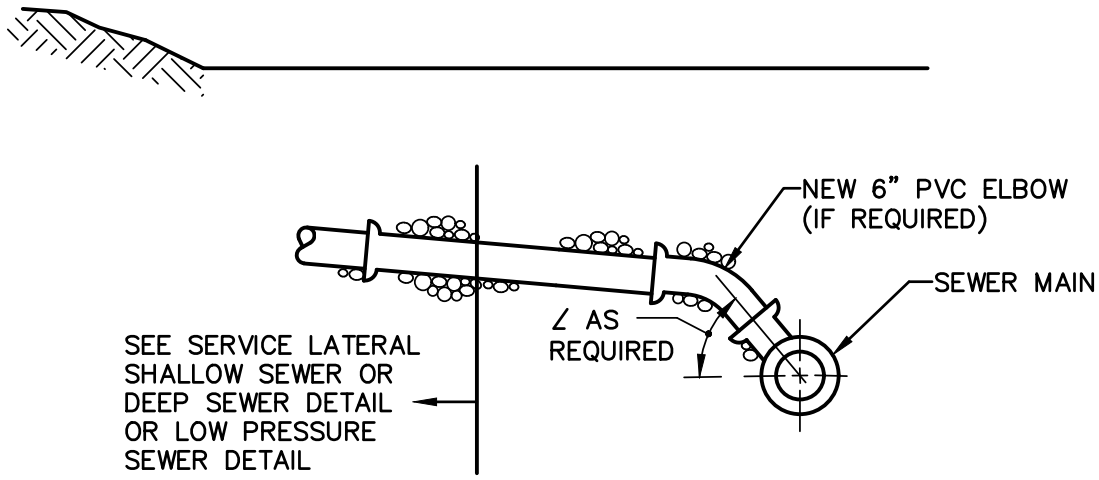
1. PIPE SIZES AND MATERIALS TO BE IN ACCORDANCE WITH AUTHORITY REQUIREMENTS.
2. LOCATE CURB CLEANOUT BETWEEN CURB AND SIDEWALK, BUT NOT UNDERNEATH ANY CURB SIDE UTILITIES. IF THERE IS NO CURB, LOCATE CLEANOUT AT EDGE OF RIGHT-OF-WAY.
3. FOR 4" BUILDING SEWER, USE ECCENTRIC 4"x6" ADAPTER FITTING FOR TRANSITION TO TEST TEE (4"x6" FLEXIBLE COUPLING NOT ALLOWED).
4. CLEANOUT/TEST TEE SPACING IS 90' MAXIMUM.
5. WALL SLEEVE (REFER TO PAGE 615 P2603.4 OF THE IRC.
6. ANY PIPE LESS THAN 3 FEET OF COVER SHALL BE DUCTILE IRON.
7. REFER TO PAGE 645 AND 646 P2905.4.2 OF THE IRC.

SCALE	DATE	REVISIONS
NO SCALE	2/18	
FILE LAT-3	DWG. CREATED	

FILE NAME: LAT-3-BLDGSEWER.dwg



PLAN



ELEVATION

NOTES:

1. EXISTING MAIN SEWER TO BE SAW CUT.

FILE NAME: LAT-4-CONNTOMAIN.dwg

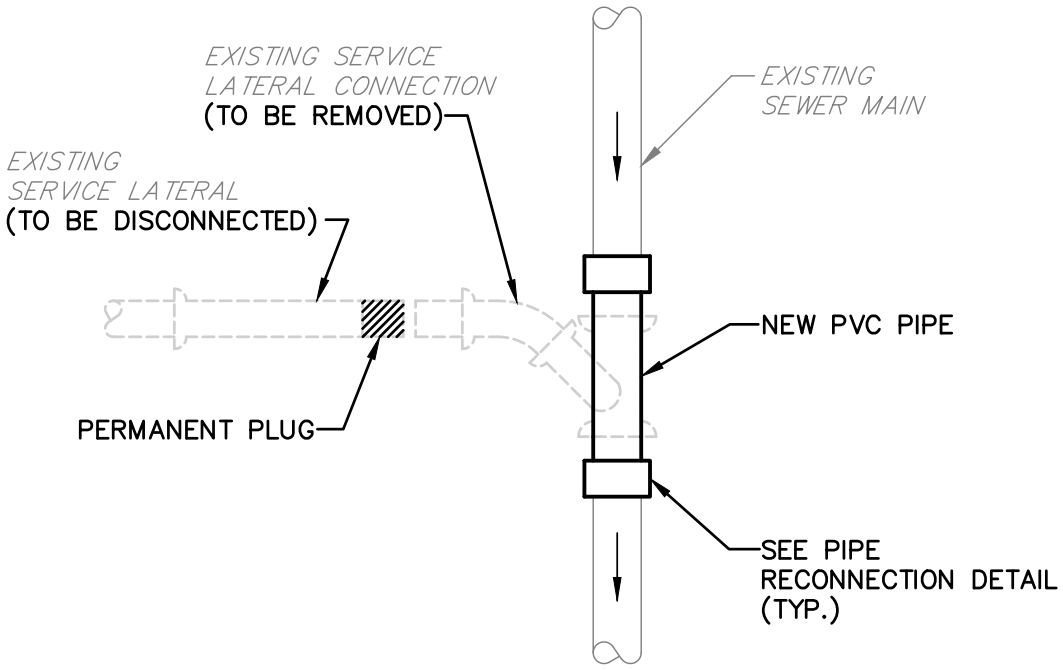
STANDARD DETAILS

SERVICE LATERAL CONNECTION TO EXISTING SEWER MAIN

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-4



PLAN

NOTES:

1. EXISTING MAIN SEWER TO BE SAW CUT.

FILE NAME: LAT-5-DISCONNECTION.dwg

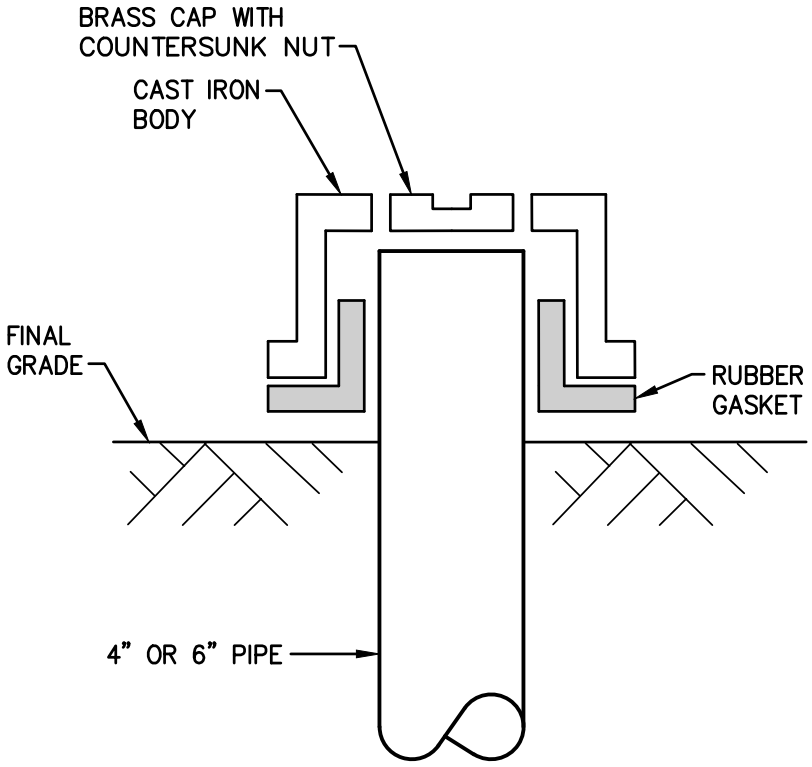
STANDARD DETAILS

SERVICE LATERAL DISCONNECTION FROM EXISTING SEWER MAIN

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-5



SECTION

FILE NAME: LAT-6-CLEANOUTCAP.dwg

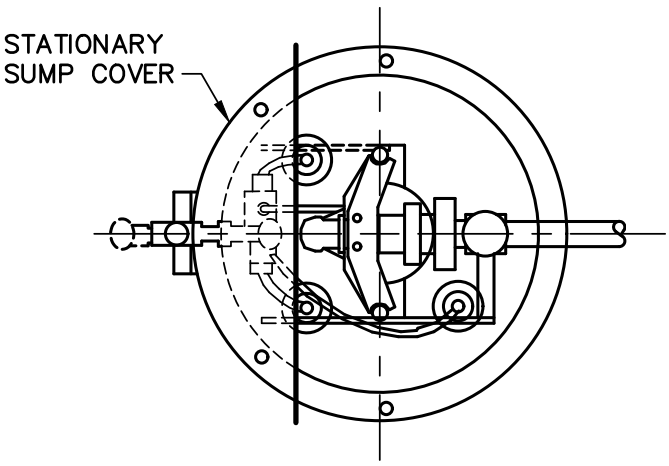
STANDARD DETAILS

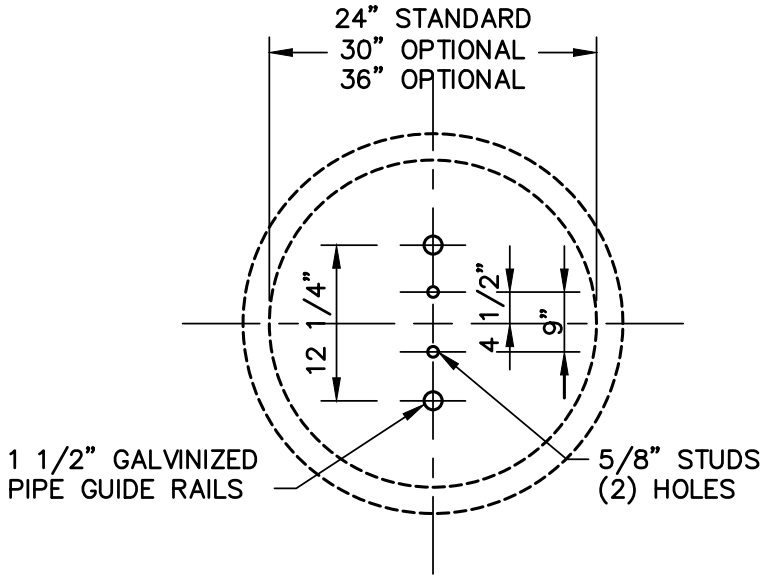
CAST IRON (PANELLA TYPE) PUSH-ON CLEANOUT COVER

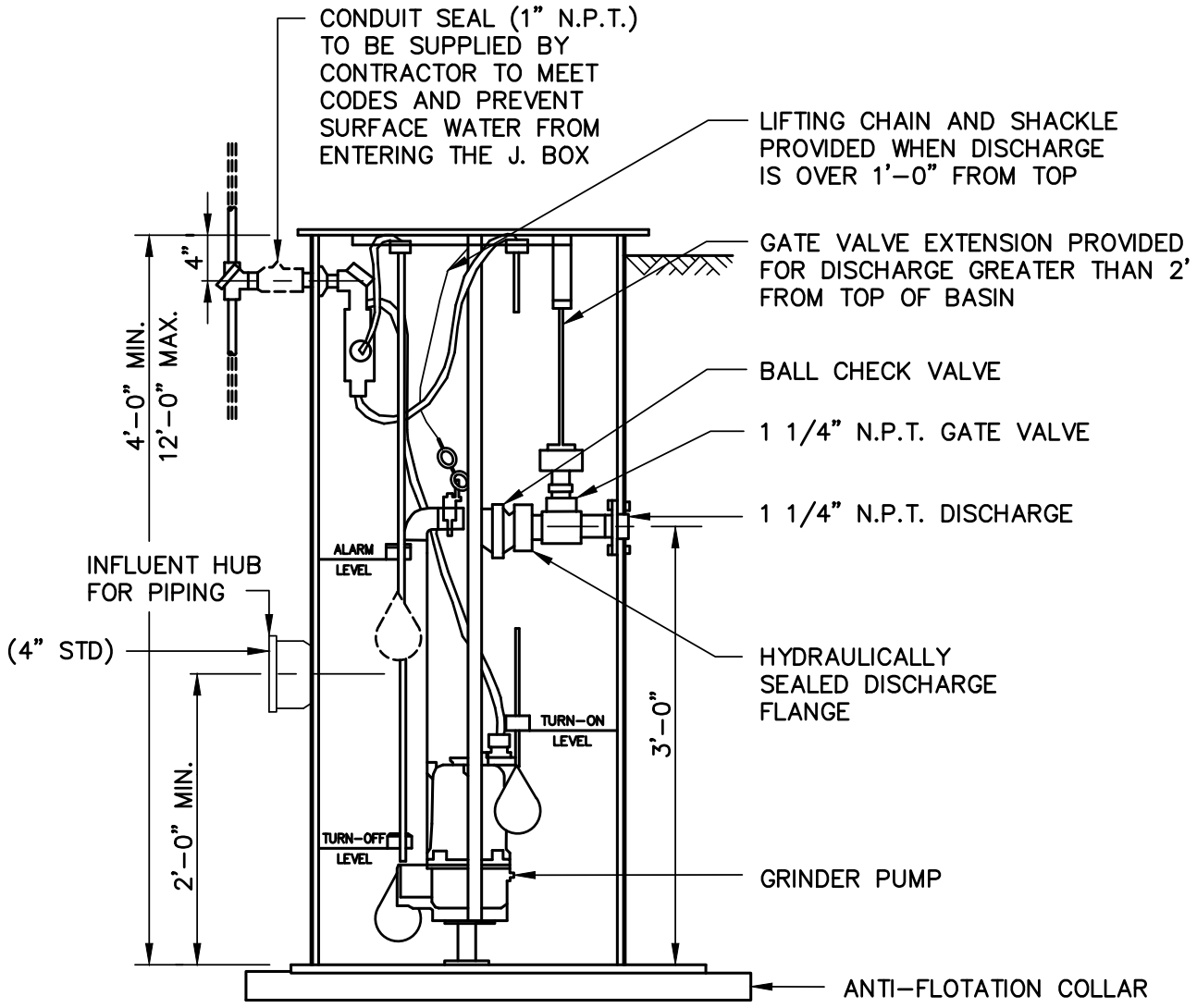
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-6







FILE NAME: LAT-7-GRINDERPUMP.dwg

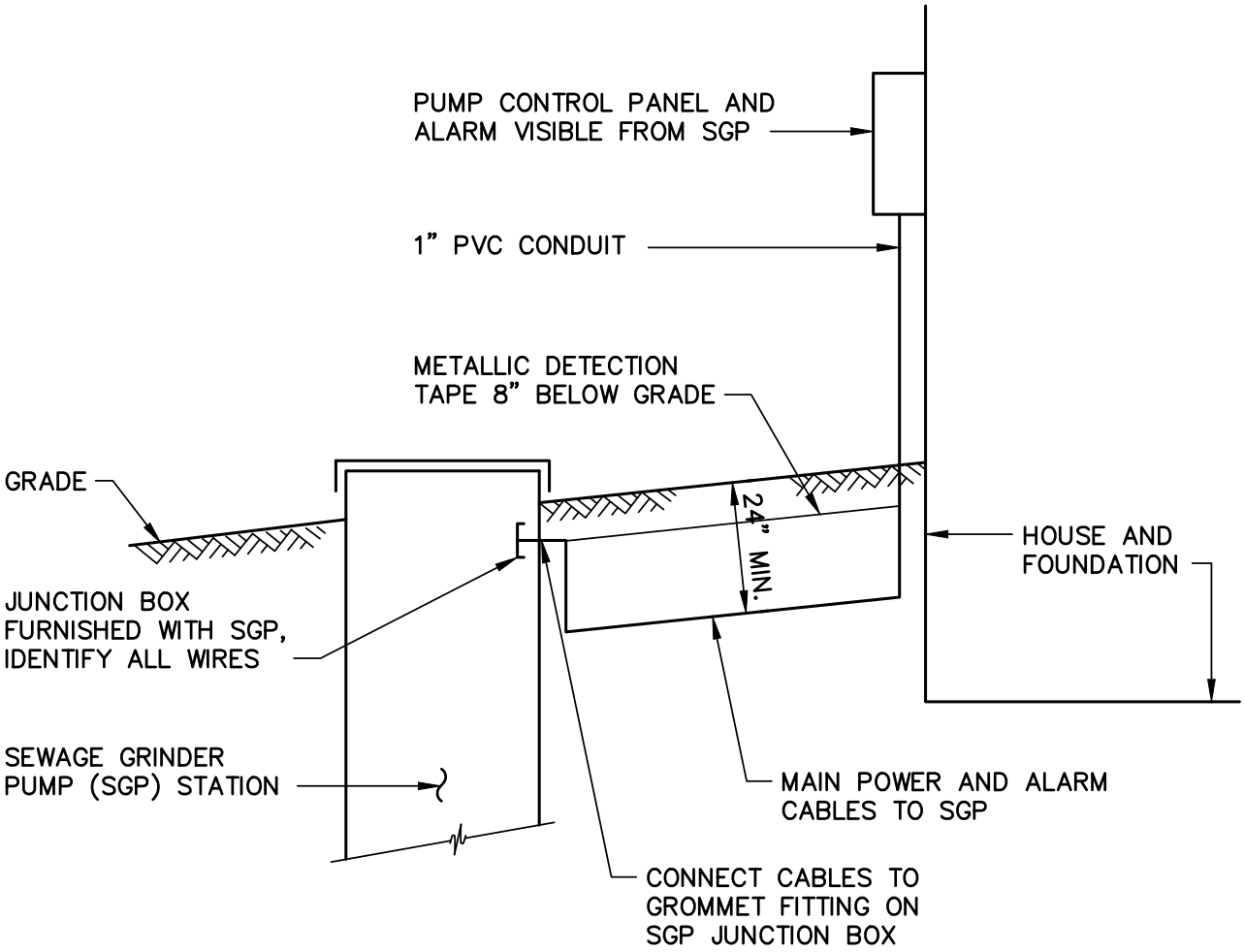
STANDARD DETAILS

SIMPLEX SEWAGE GRINDER PUMP STATION

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-7



FILE NAME: LAT-8-GRINDERELEC.dwg

STANDARD DETAILS

TYPICAL ELECTRICAL LAYOUT

NORTH LONDONDERRY TOWNSHIP AUTHORITY

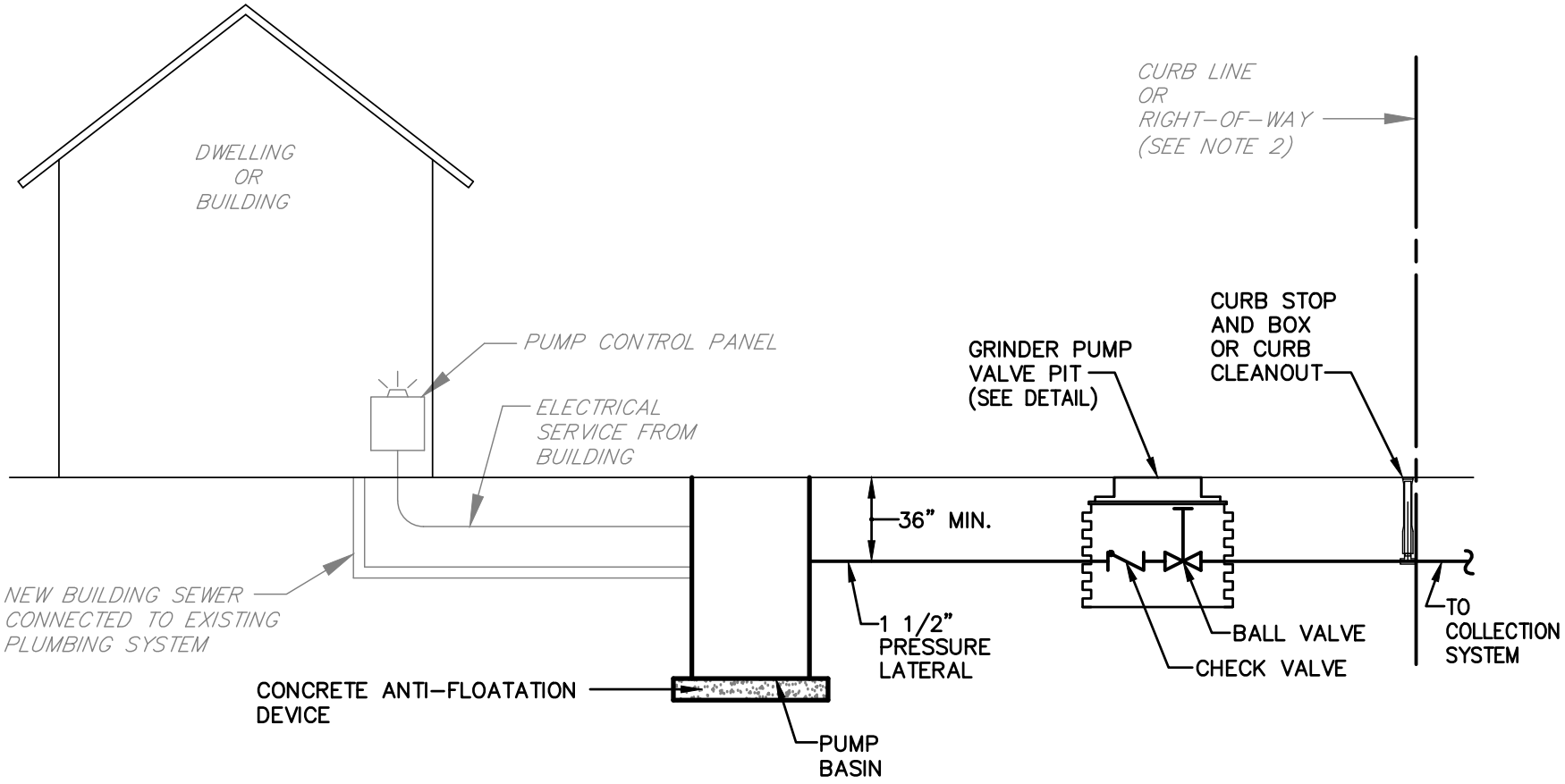
DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-8

TYPICAL GRINDER PUMP INSTALLATION DETAIL

STANDARD DETAILS

NORTH LONDONDERRY TOWNSHIP AUTHORITY



NOTES:

1. PROVIDE CHECK VALVE AND BALL VALVE IN VALVE PIT ONLY REQUIRED WHEN CONNECTING TO L.P.S. MAIN.

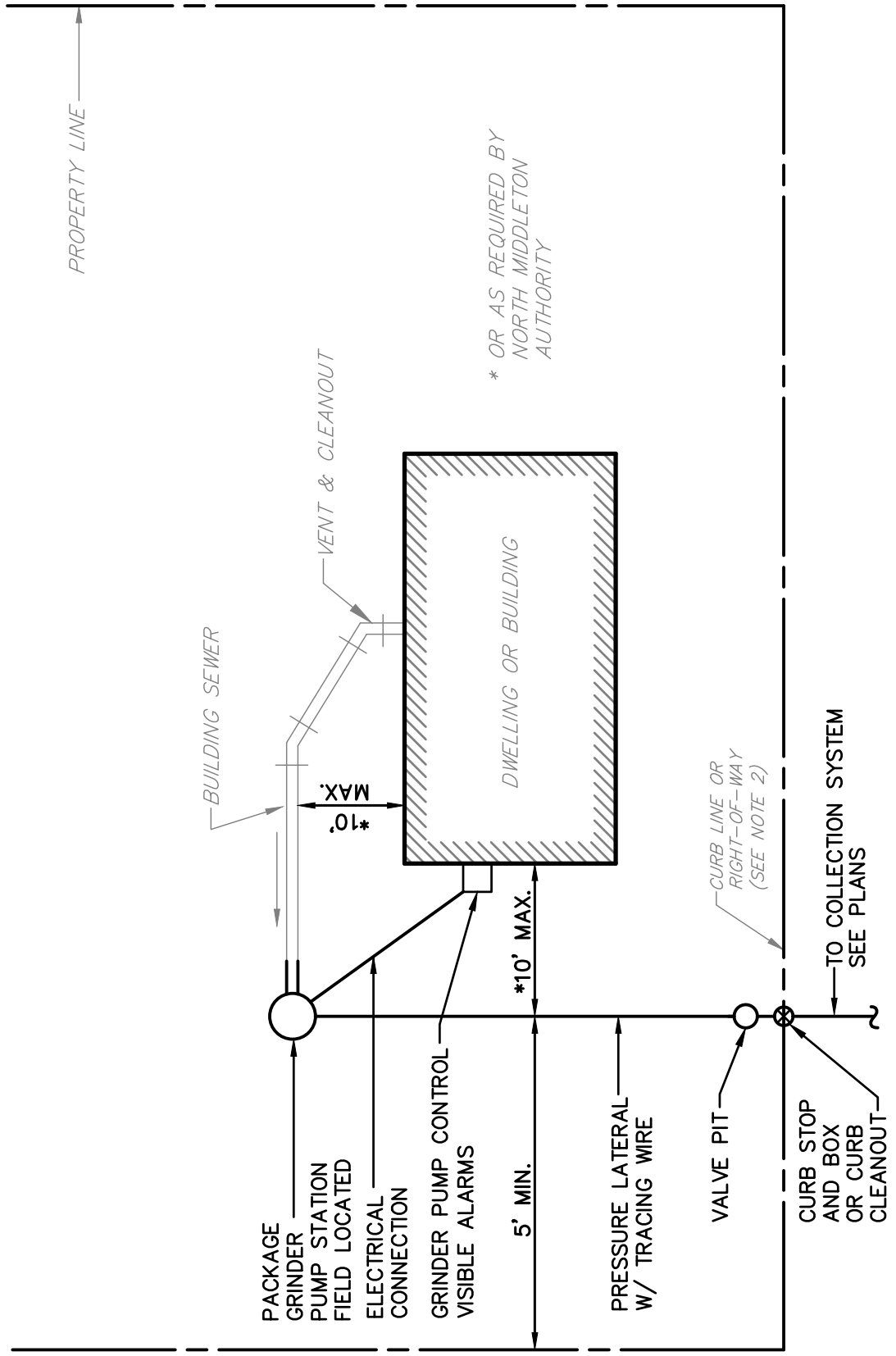
2. REFER TO LAT-1 DETAIL FOR LOCATION.

DATE	REVISIONS
2/18	DWG. CREATED

SCALE: NO SCALE

DWG. NO. LP-1

FILE NAME: LP-1-2-GRINDPMPINST.dwg



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

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-2

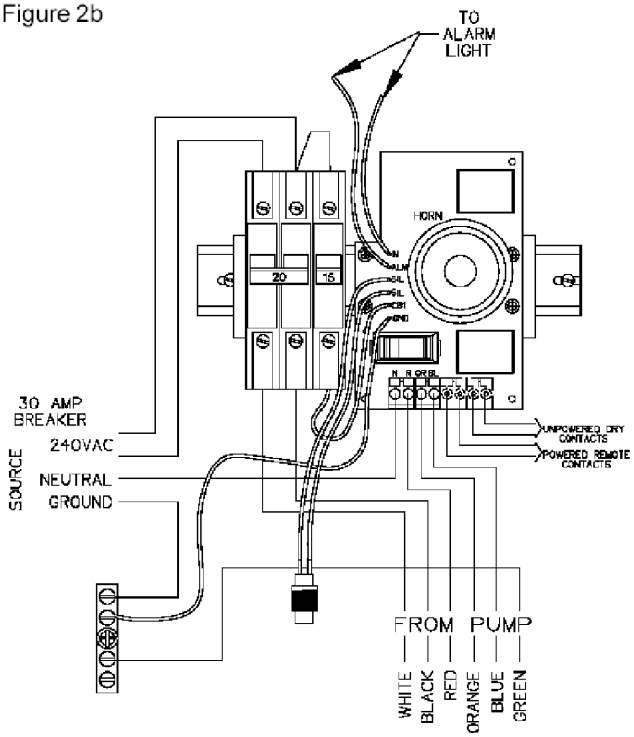
Environment One Grinder Pump Feature Identification:

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

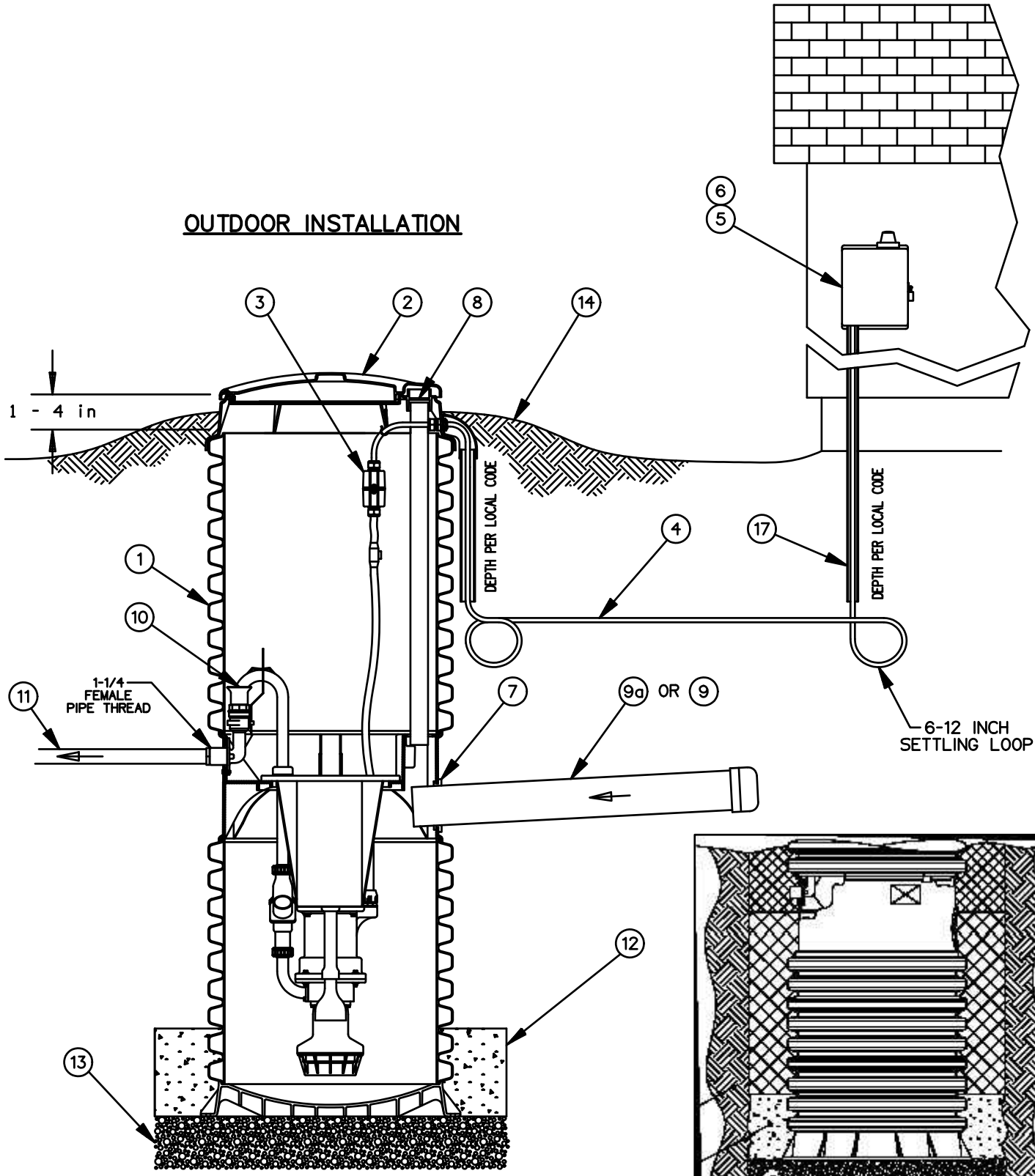
ENVIRONMENT ONE GRINDER PUMP FEATURE IDENTIFICATION – 240 VOLT WIRING

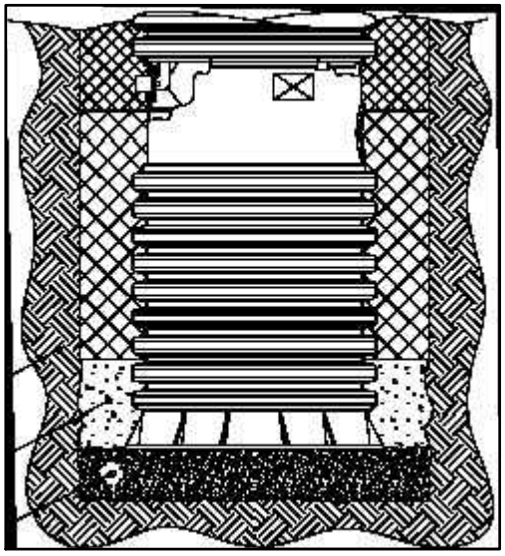
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP–3

OUTDOOR INSTALLATION





POURED IN-PLACE

FILE NAME: LP-3-4-EONEGRINDERPUMP.dwg

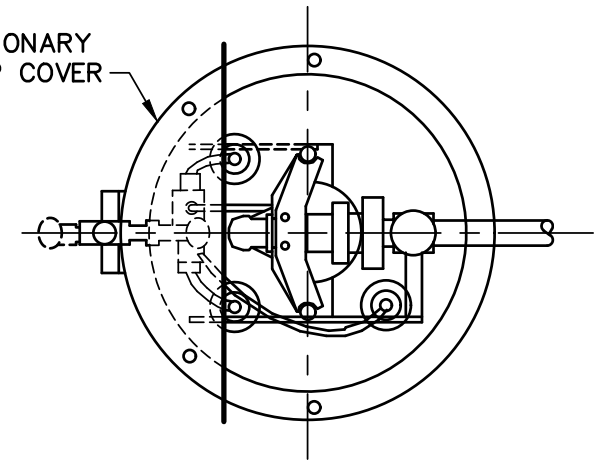
STANDARD DETAILS

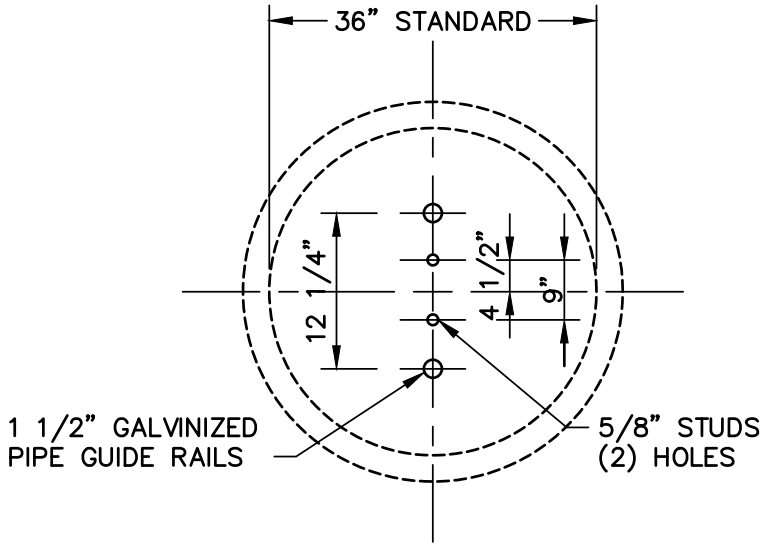
ENVIRONMENT ONE GRINDER PUMP OUTDOOR INSTALLATION - POURED IN-PLACE

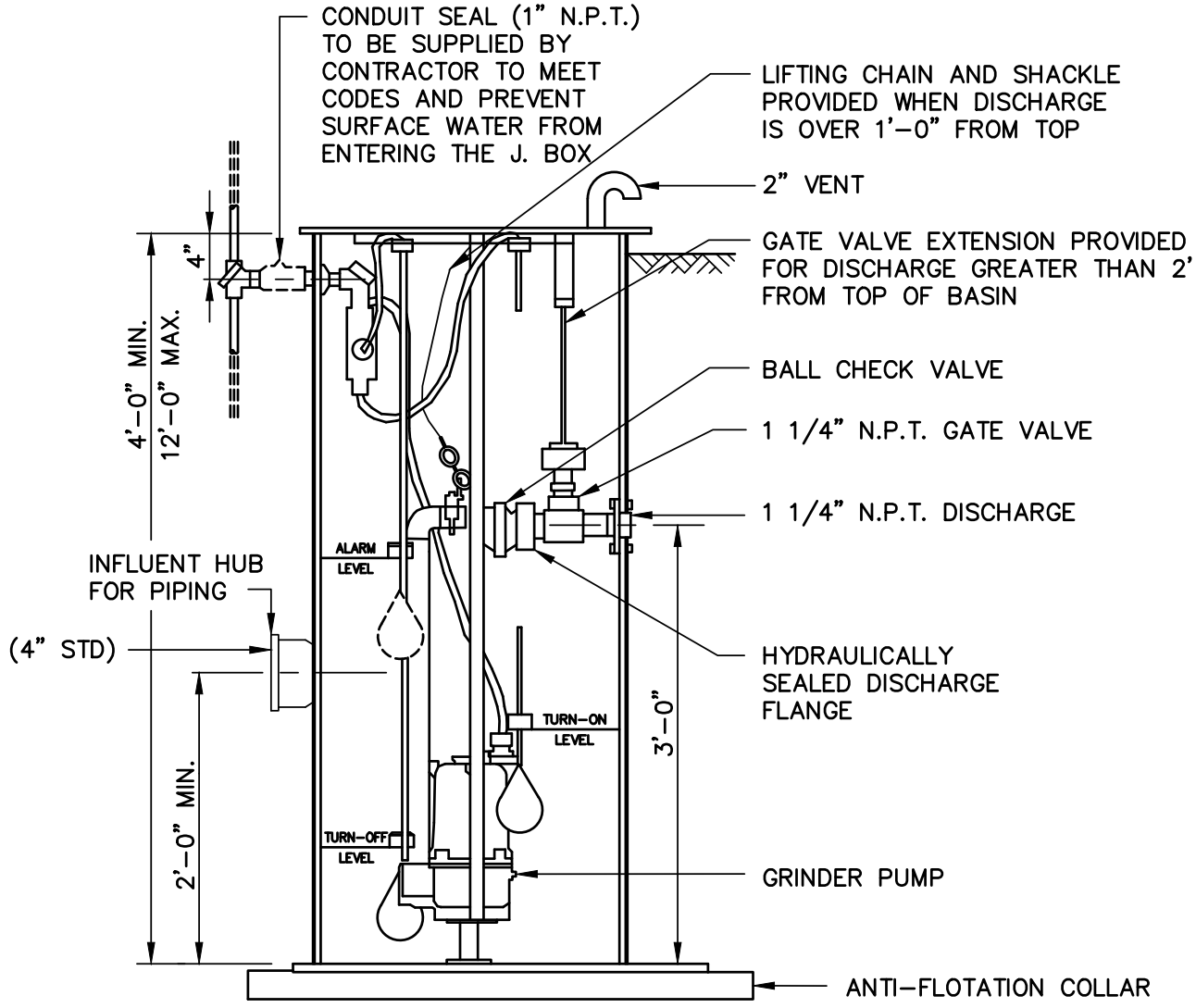
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-4







FILE NAME: LP-5-GRINDERPUMP.dwg

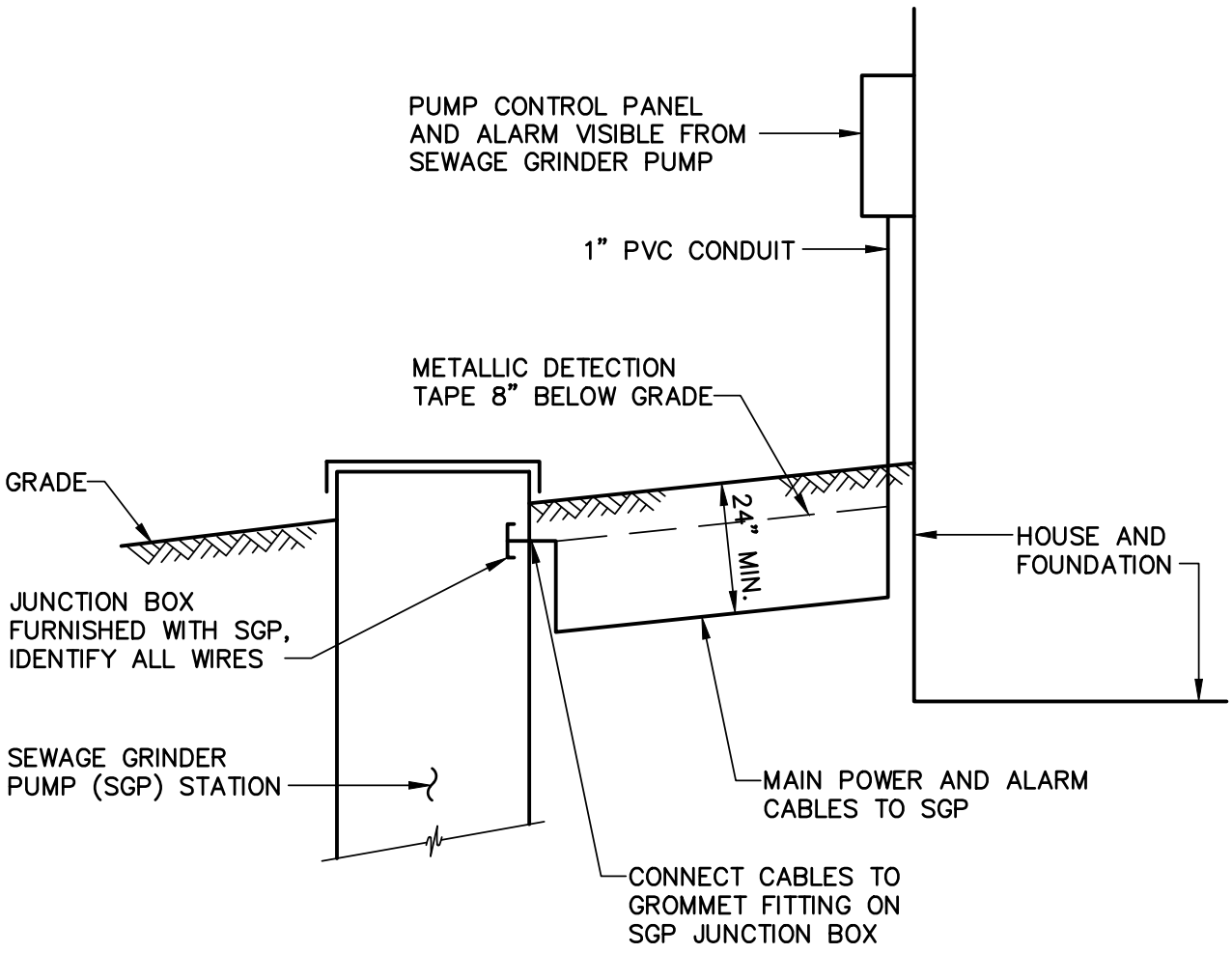
STANDARD DETAILS

SIMPLEX SEWAGE GRINDER PUMP STATION

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-5



FILE NAME: LP-TYPELEC.dwg

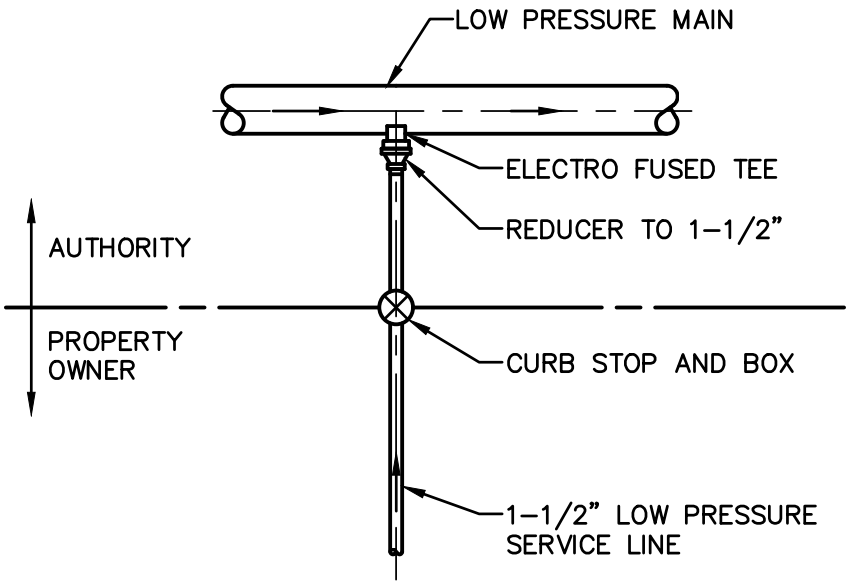
STANDARD DETAILS

TYPICAL ELECTRICAL LAYOUT

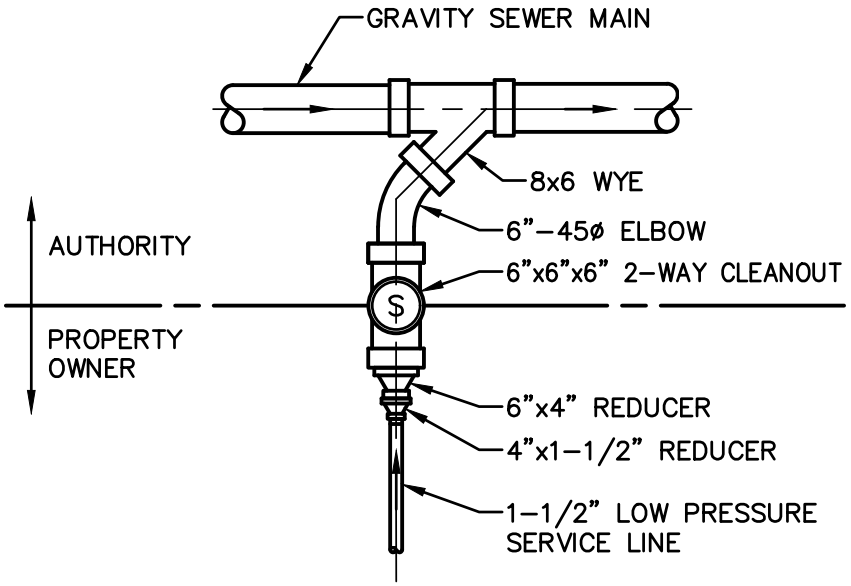
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-6



PLAN



PLAN

FILE NAME: LP-7-LOWPRSCONN.dwg

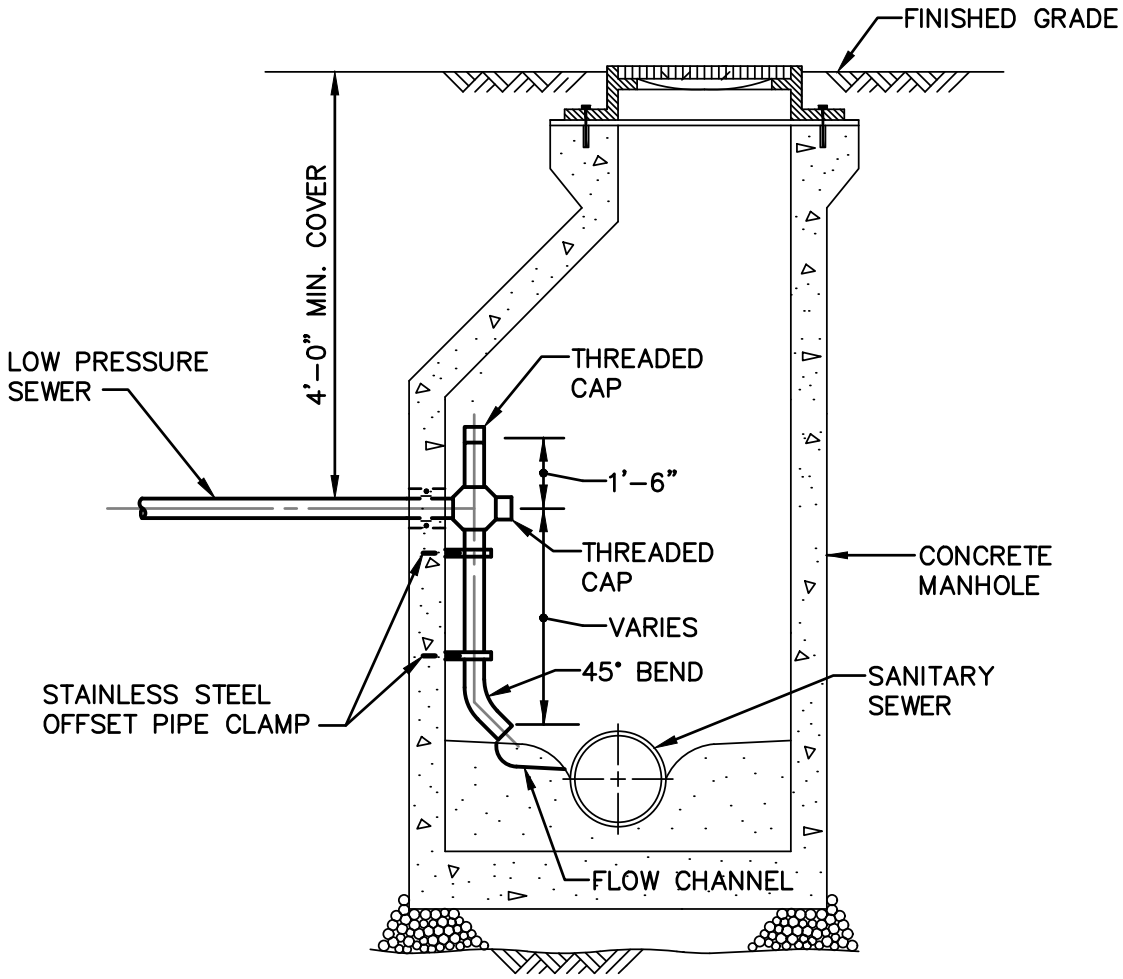
STANDARD DETAILS

LOW PRESSURE SERVICE LINE CONNECTION AT GRAVITY/PRESSURE MAIN

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

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

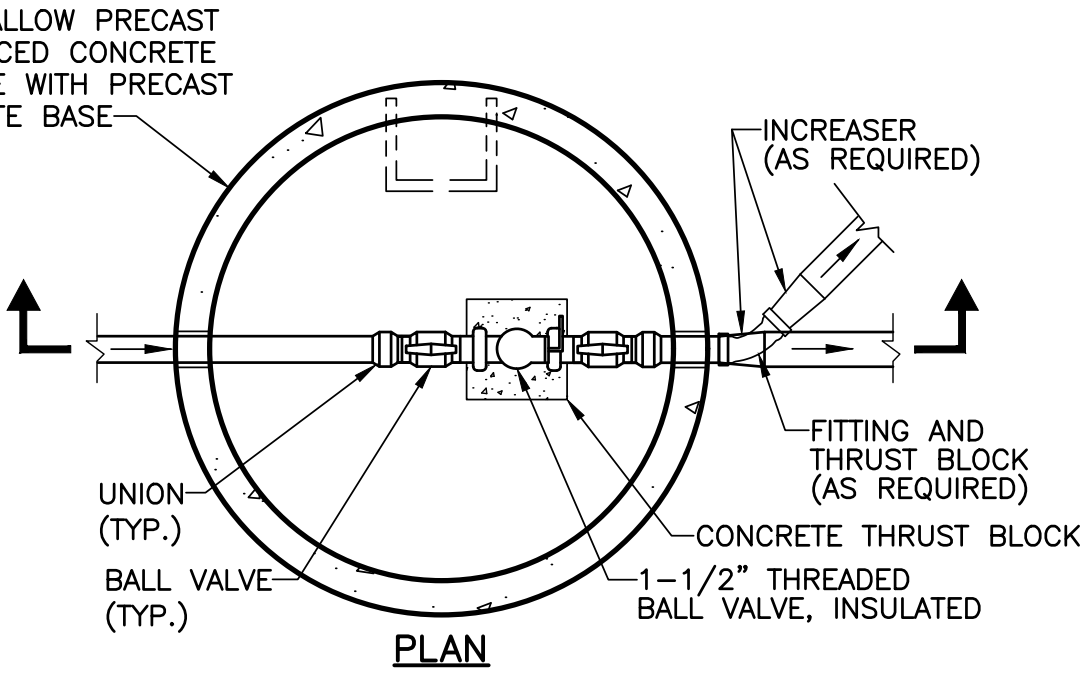
STANDARD DETAILS

LOW PRESSURE SEWER DISCHARGE MANHOLE

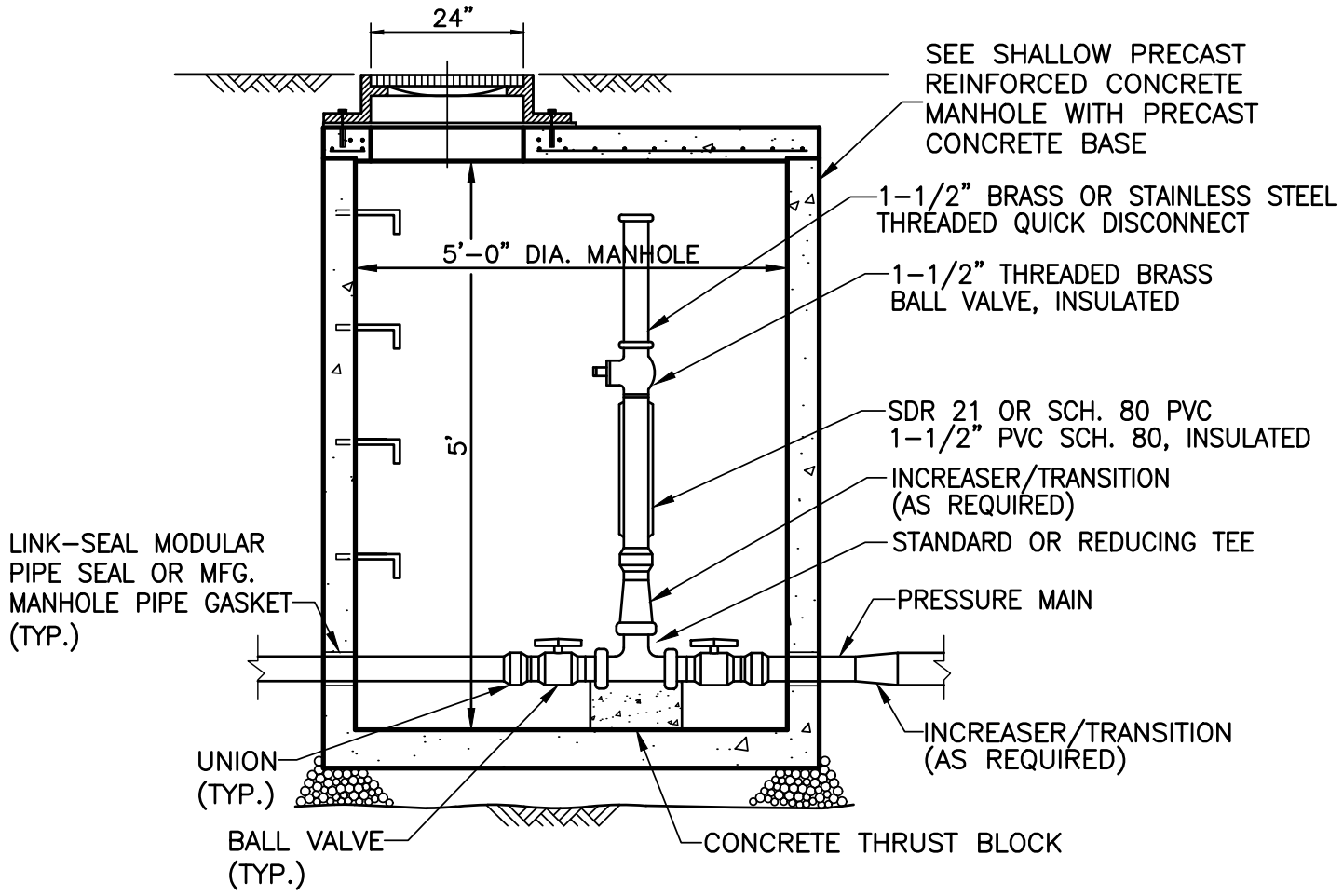
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-8



PLAN



SECTIONAL ELEVATION

FILE NAME: LP-7-IN-LINE-CO-VALVE.DWG

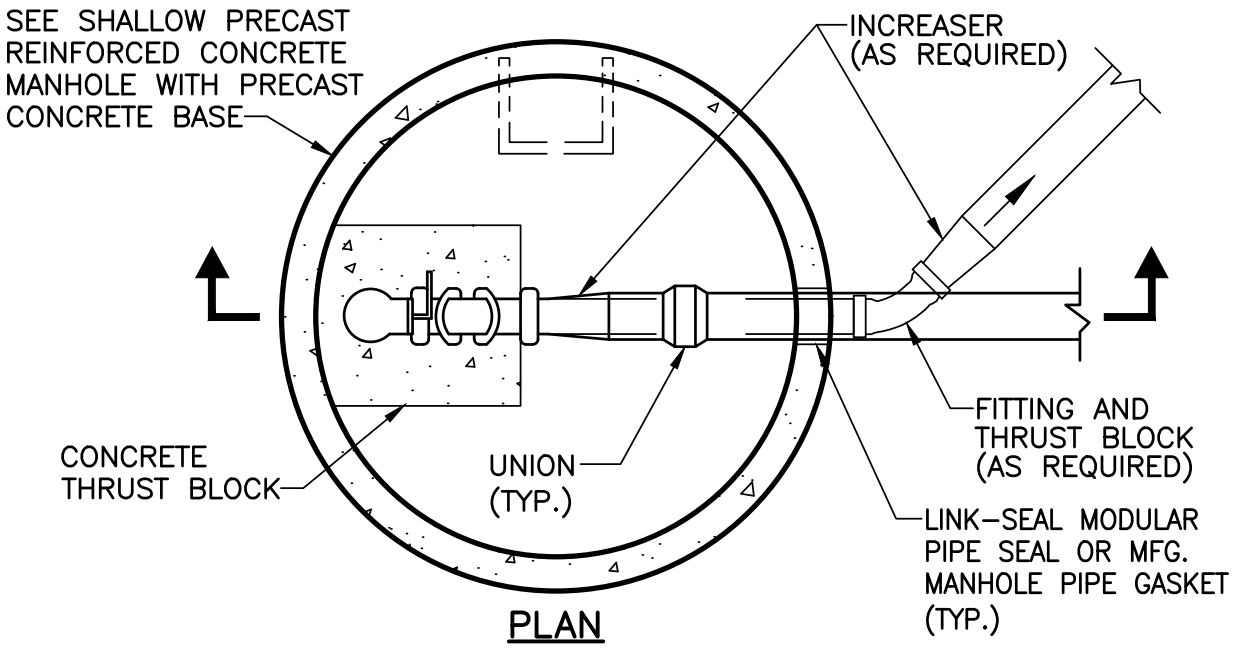
STANDARD DETAILS

IN-LINE CLEANOUT/VALVE PIT FOR LOW PRESSURE SEWER MAIN

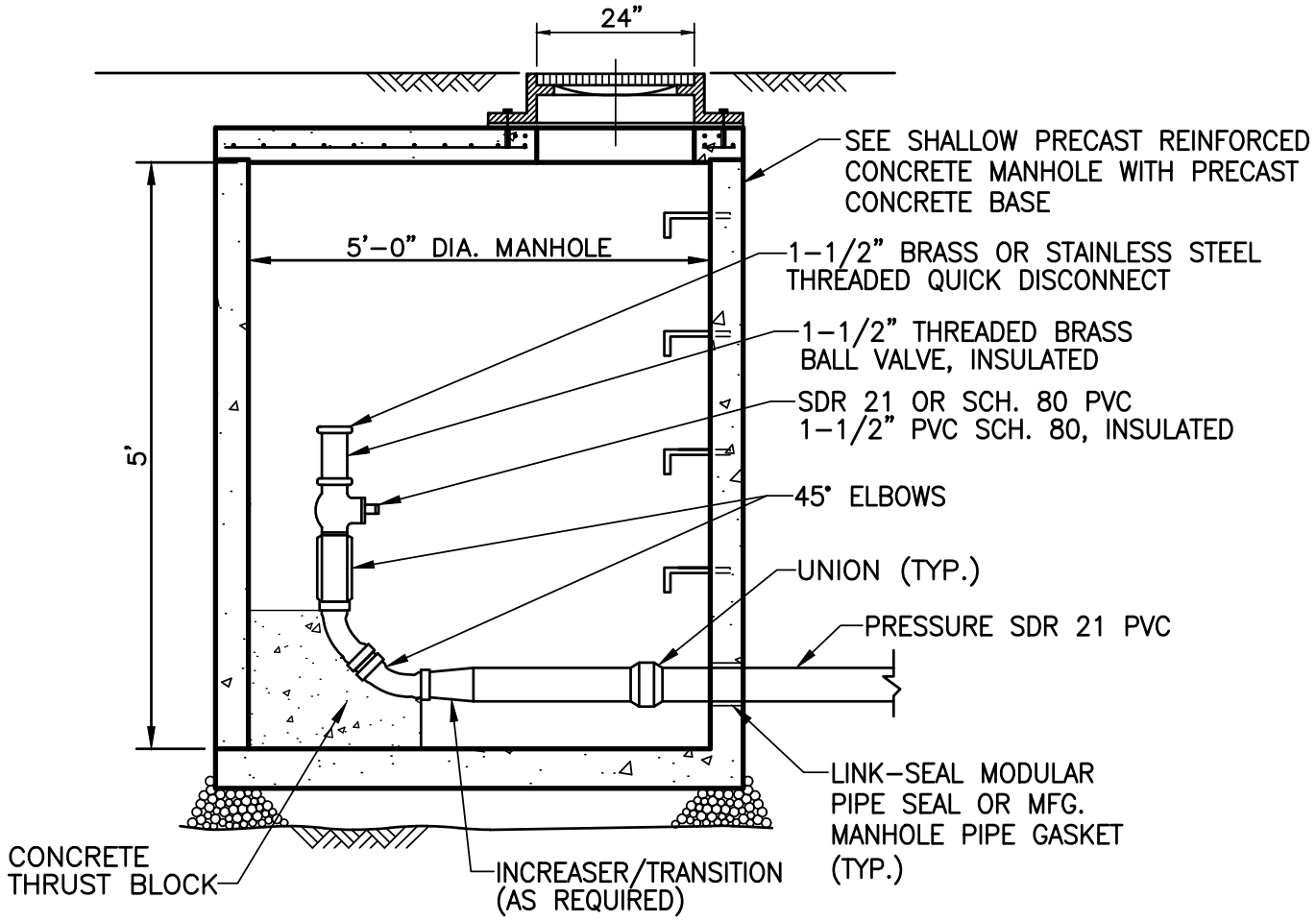
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-9



PLAN



SECTIONAL ELEVATION

FILE NAME: LP-8-IN-LINE-TERM-CO.dwg

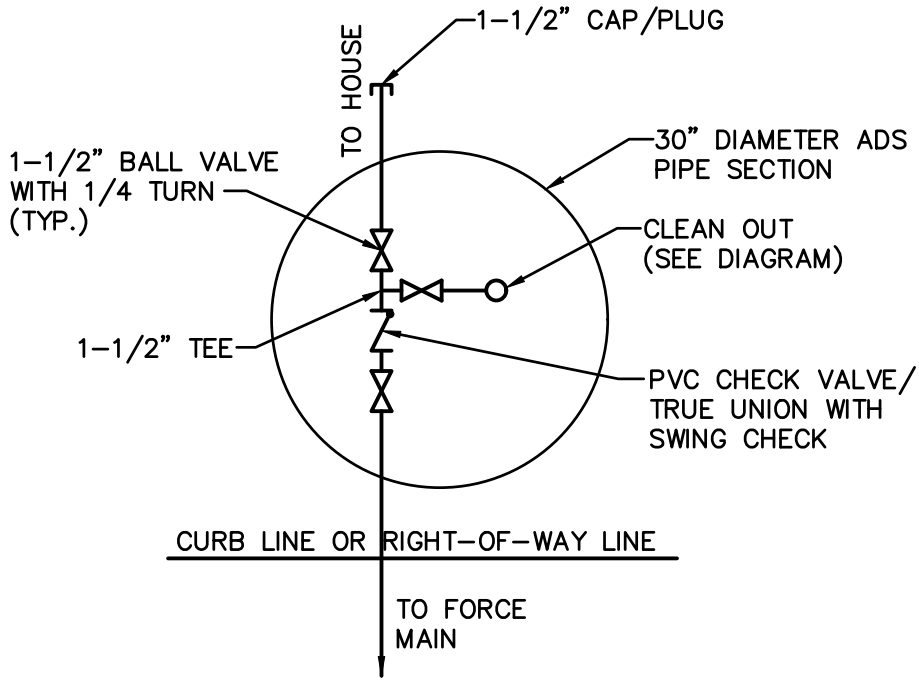
STANDARD DETAILS

IN-LINE TERMINAL CLEANOUT FOR LOW PRESSURE MAIN

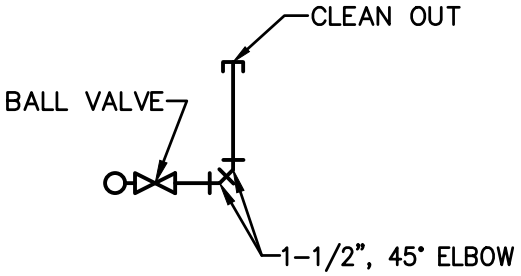
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

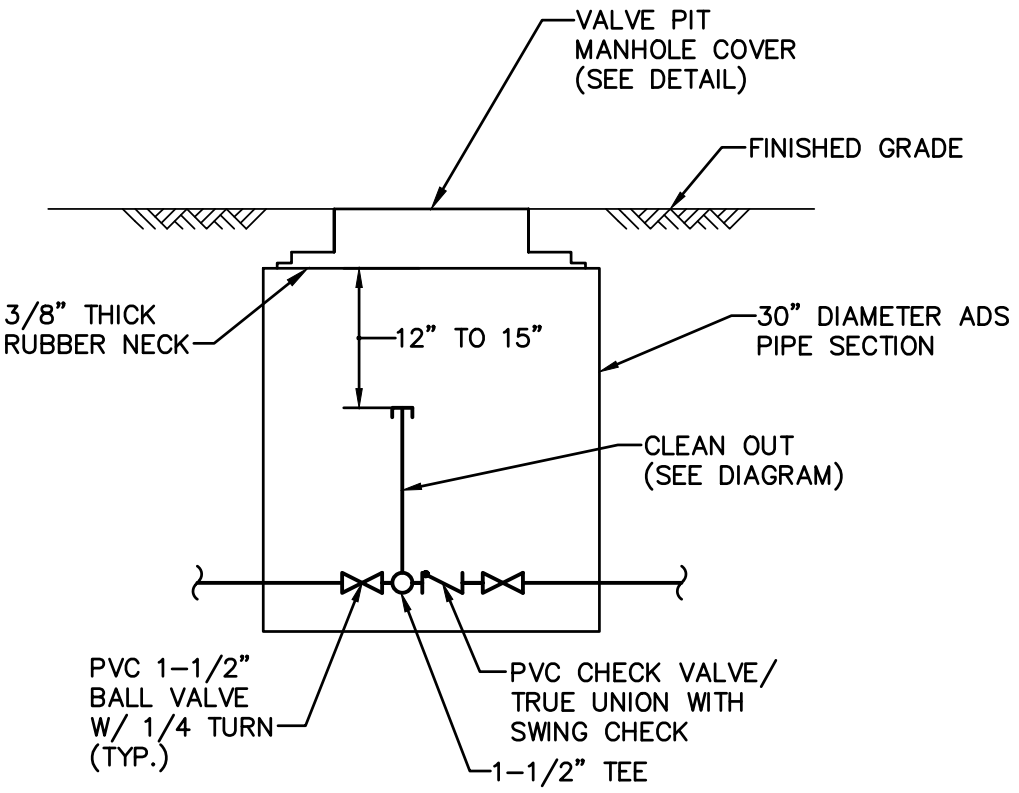
SCALE	DWG. NO.
NO SCALE	LP-10



PLAN VIEW



TEE DIAGRAM



SECTION VIEW

FILE NAME: LP-VALVEPITDET.dwg

STANDARD DETAILS

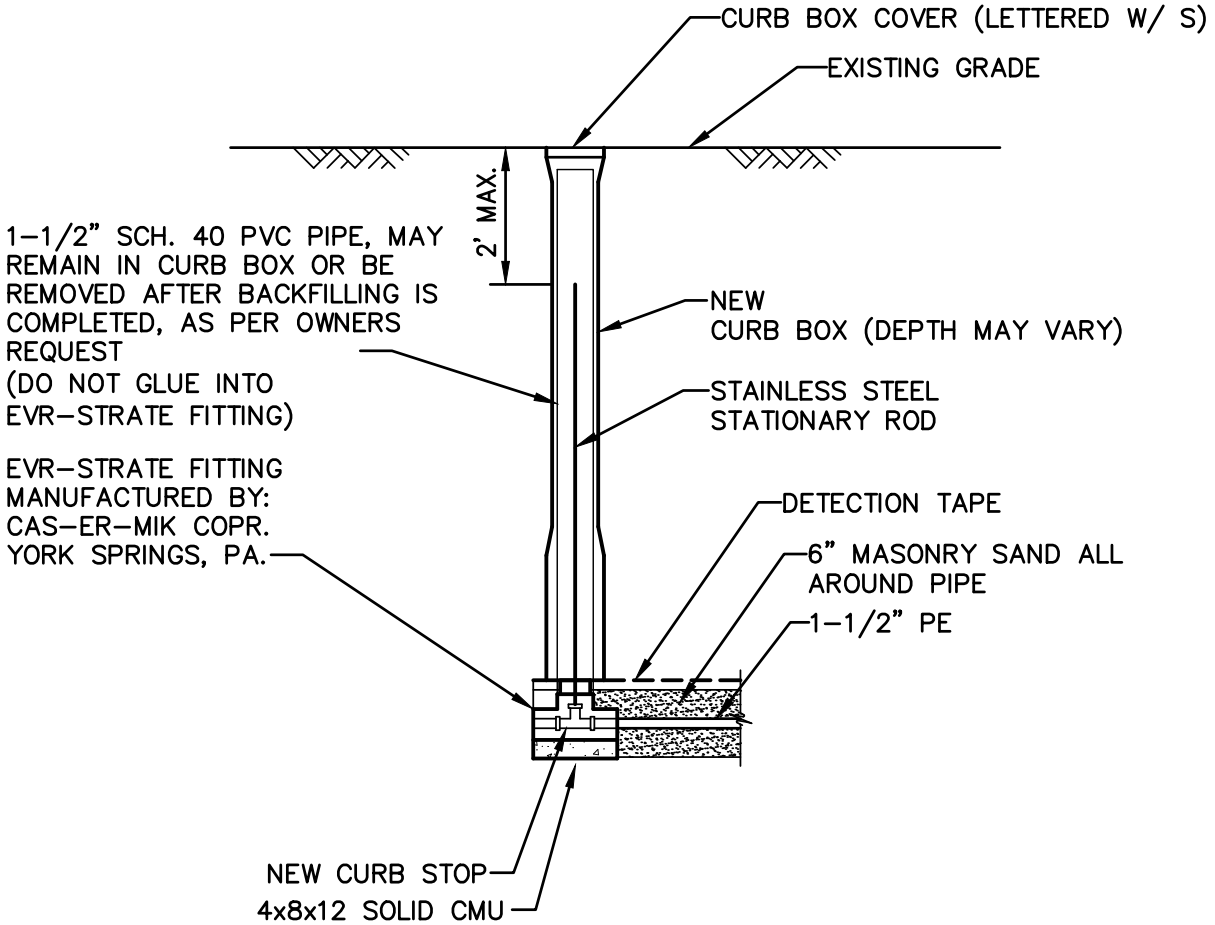
IN LINE VALVE PIT DETAIL BUILDING SEWER

NOTE: FOR NON-TRAFFIC AREAS ONLY

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-11



FILE NAME: LP–17–CURBSTOP.dwg

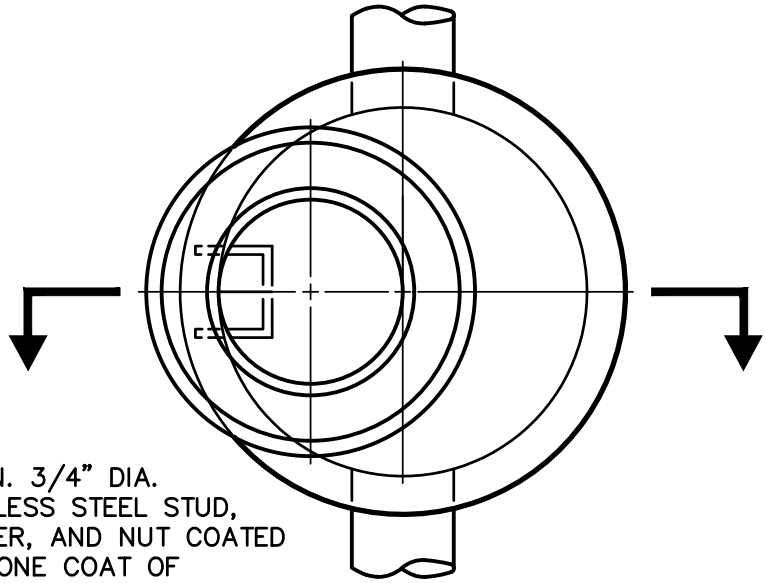
STANDARD DETAILS

CURB STOP AND BOX DETAIL

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP–12

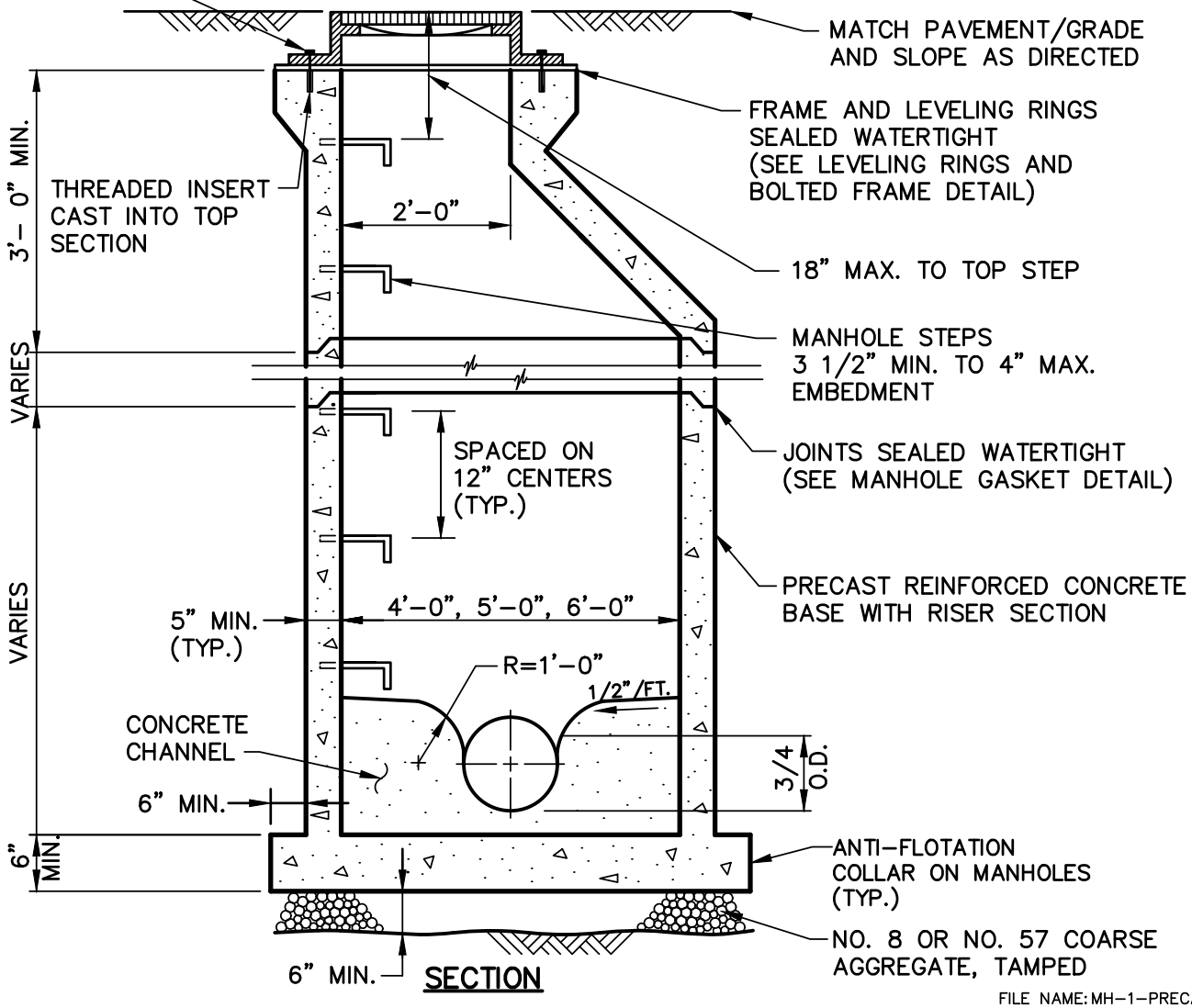


4" MIN. 3/4" DIA. STAINLESS STEEL STUD, WASHER, AND NUT COATED WITH ONE COAT OF STANDARD ASPHALT INSTALLATION

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.



FILE NAME: MH-1-PRECAST.dwg

STANDARD DETAILS

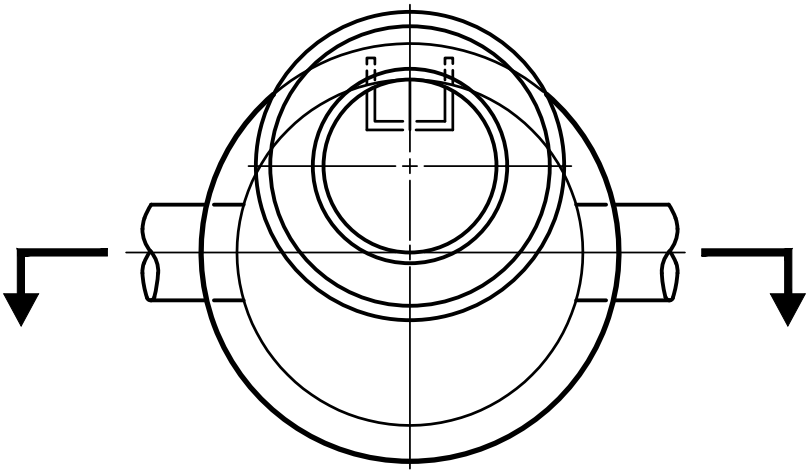
PRECAST CONCRETE MANHOLE WITH PRECAST CONCRETE BASE

NORTH LONDONDERRY TOWNSHIP AUTHORITY

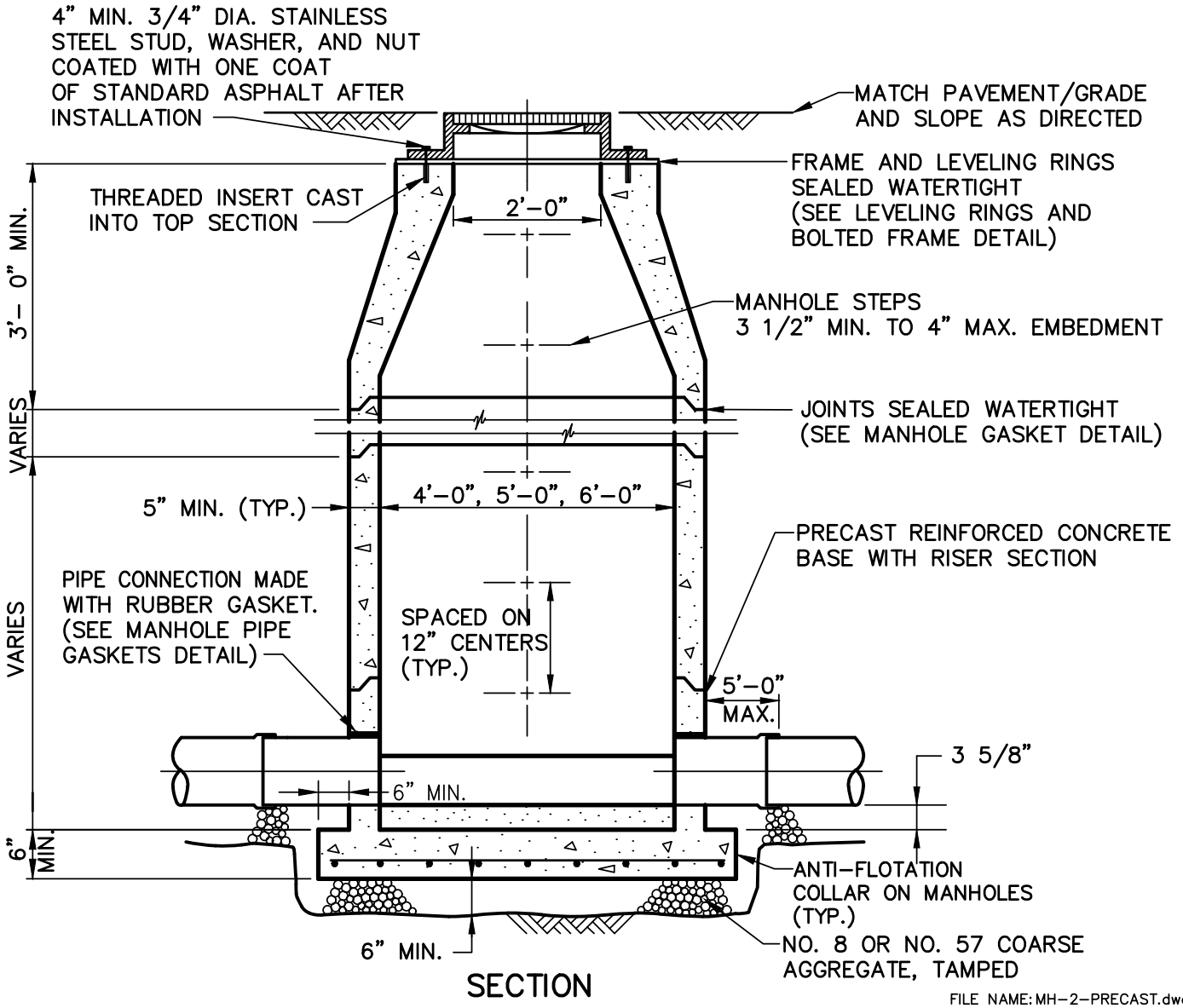
DATE	REVISIONS
2/18	DWG. CREATED
SCALE: NO SCALE	DWG. NO.: MH-1

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

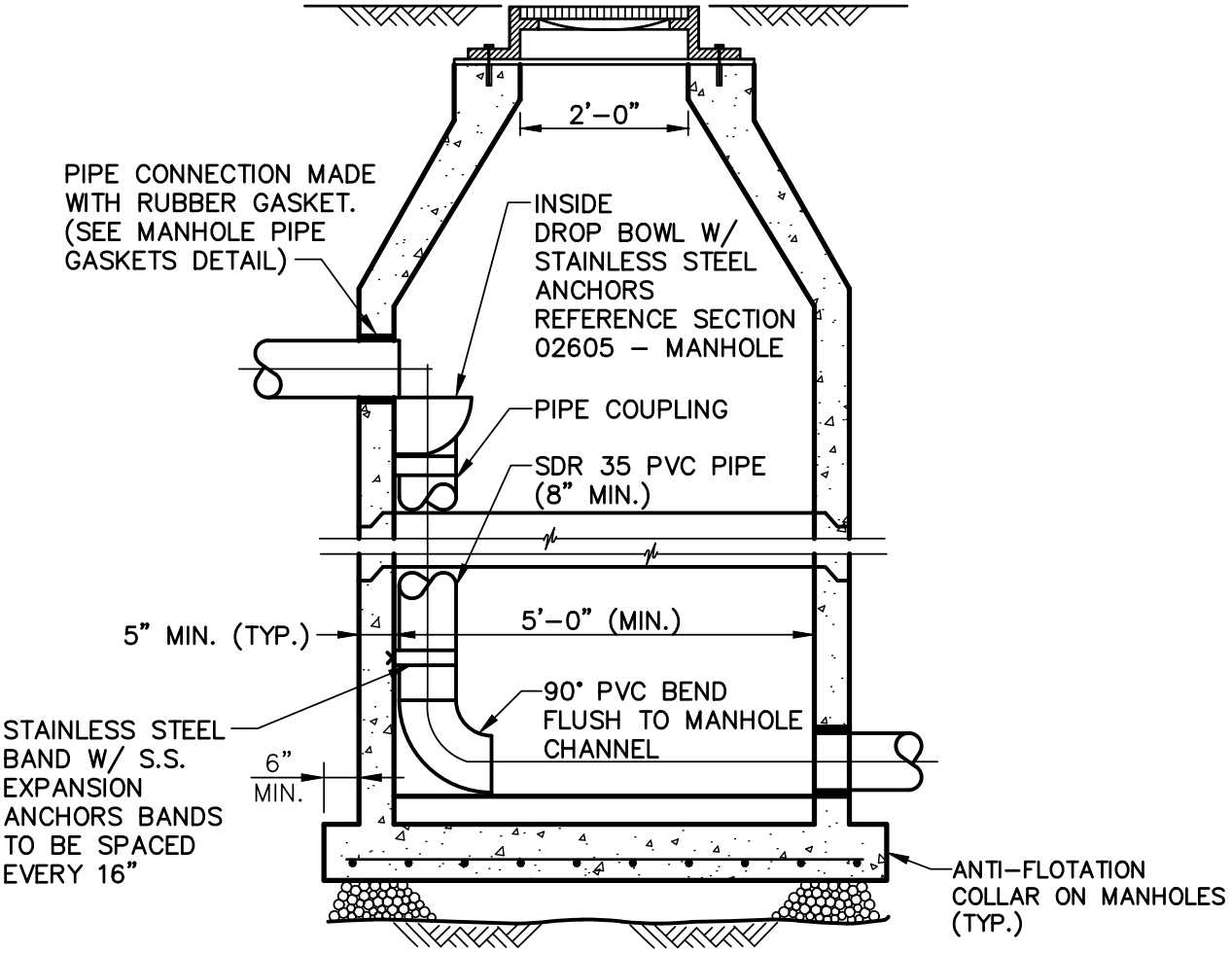
STANDARD DETAILS

PRECAST CONCRETE MANHOLE WITH PRECAST CONCRETE BASE

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-2



SECTION

FILE NAME: MH-3-INSIDEDROP.dwg

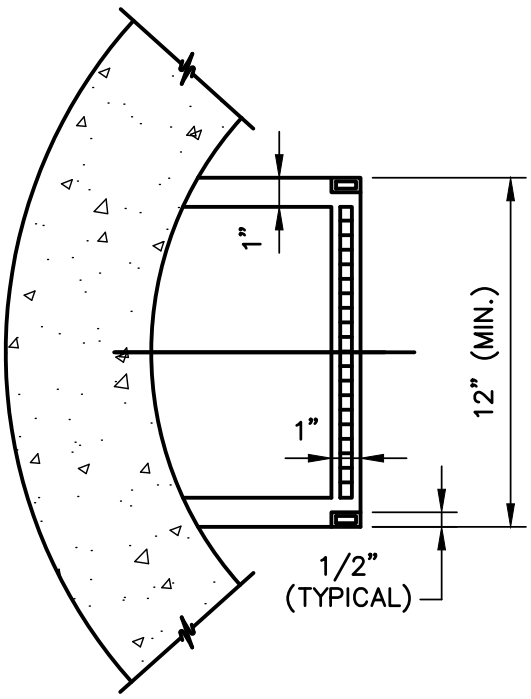
STANDARD DETAILS

INSIDE DROP MANHOLE

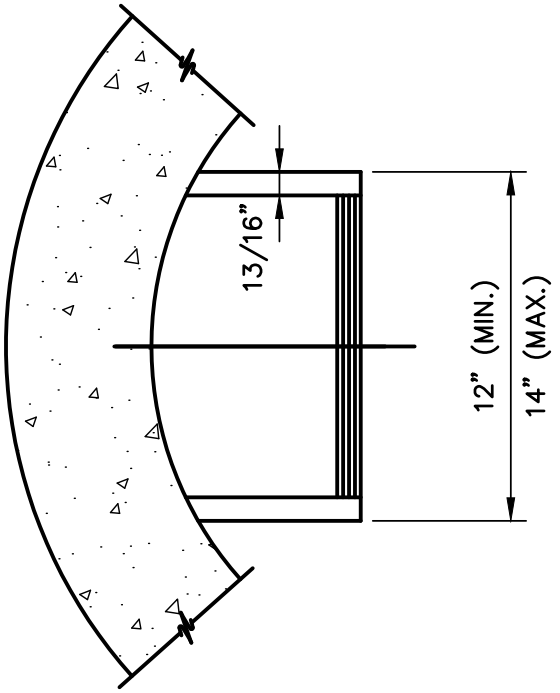
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

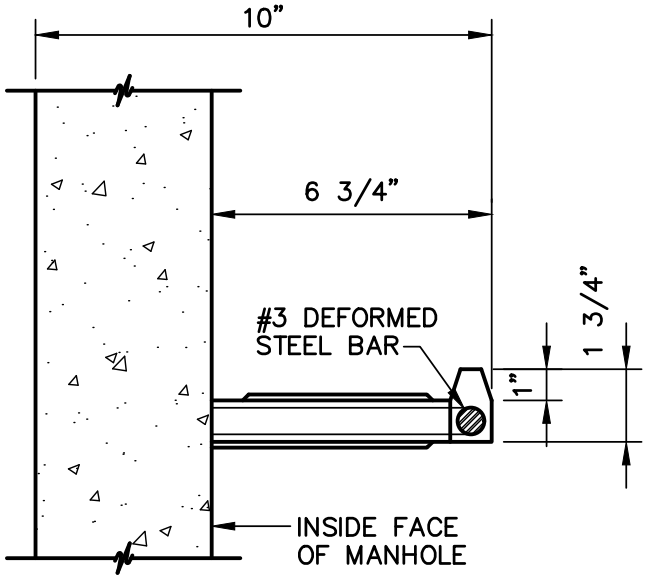
SCALE	DWG. NO.
NO SCALE	MH-3



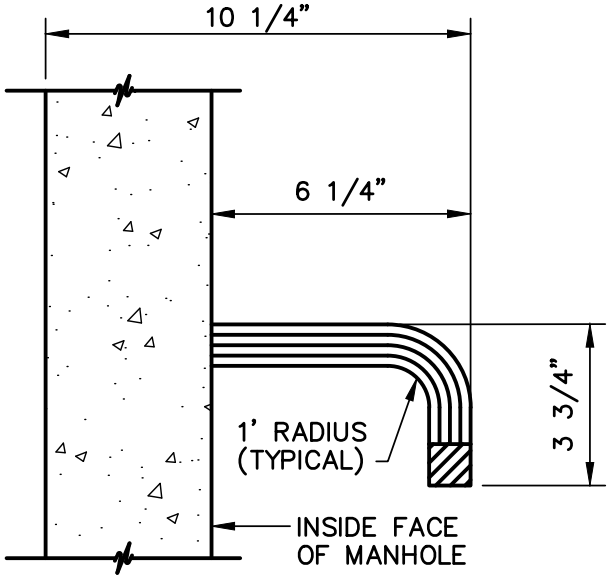
PLAN



PLAN



SECTIONAL ELEVATION
REINFORCED PLASTIC



SECTIONAL ELEVATION
ALUMINUM

FILE NAME: MH-4-STEPS.dwg

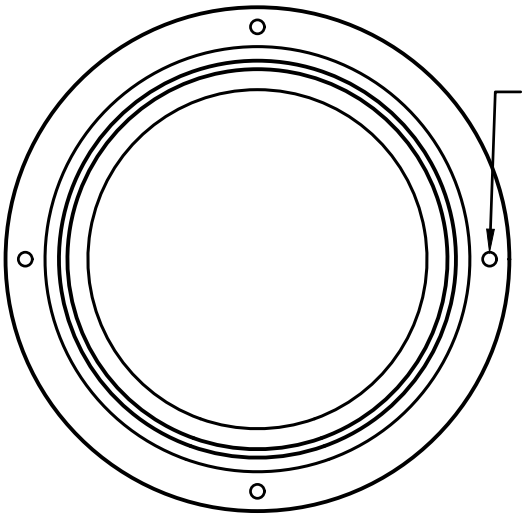
STANDARD DETAILS

MANHOLE STEPS

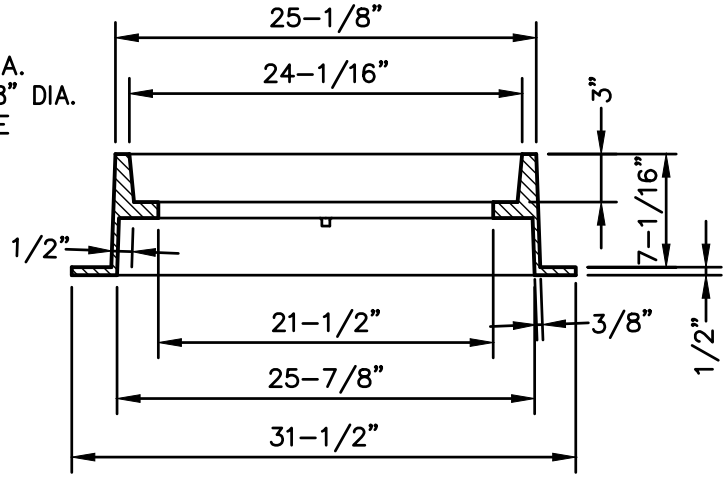
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-4

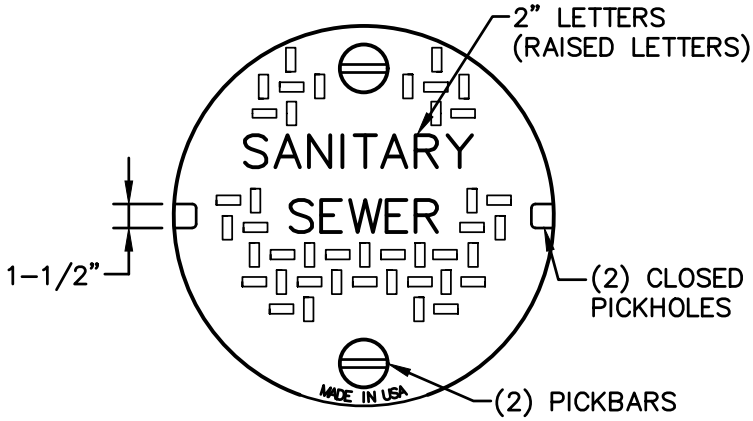


PLAN

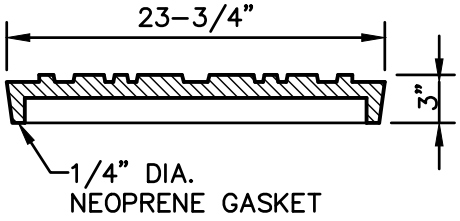


SECTION

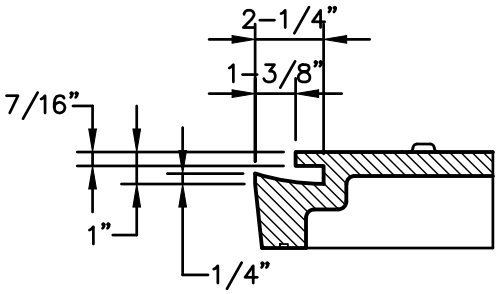
MANHOLE FRAME DETAIL



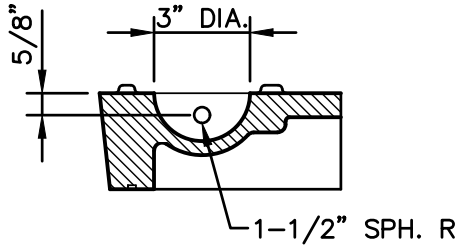
PLAN



SECTION



PICKHOLE DETAIL



PICKBAR DETAIL

MANUFACTURER: EAST JORDON IRON WORKS – FRAME 1835Z1, COVER 1835A1GS

FILE NAME: MH-5-FRAME&COVER.dwg

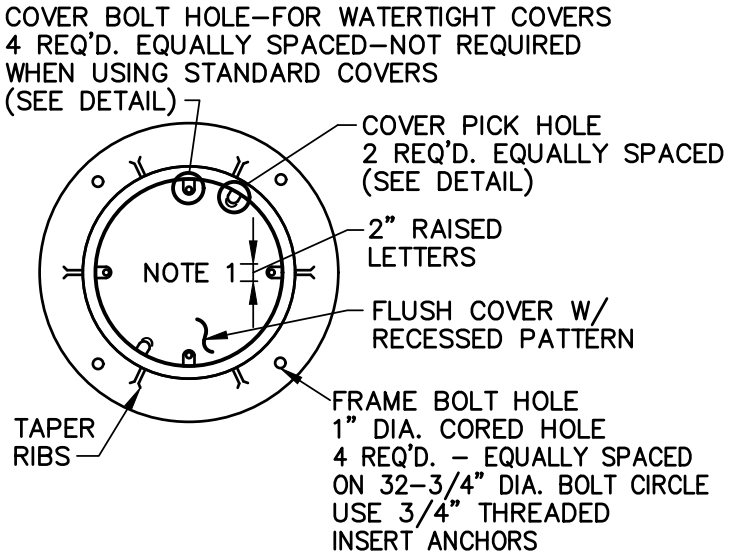
STANDARD DETAILS

HEAVY DUTY SELF SEALING MANHOLE FRAME AND COVER

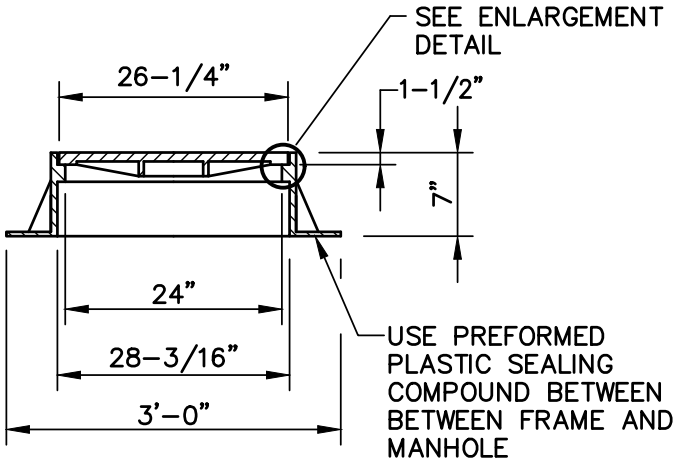
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

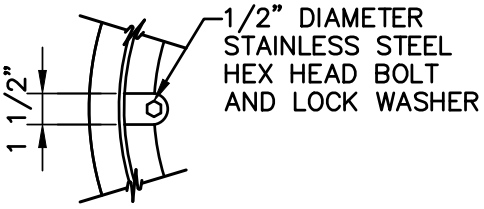
SCALE	DWG. NO.
NO SCALE	MH-5



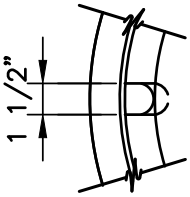
PLAN



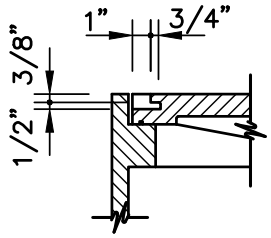
SECTIONAL ELEVATION



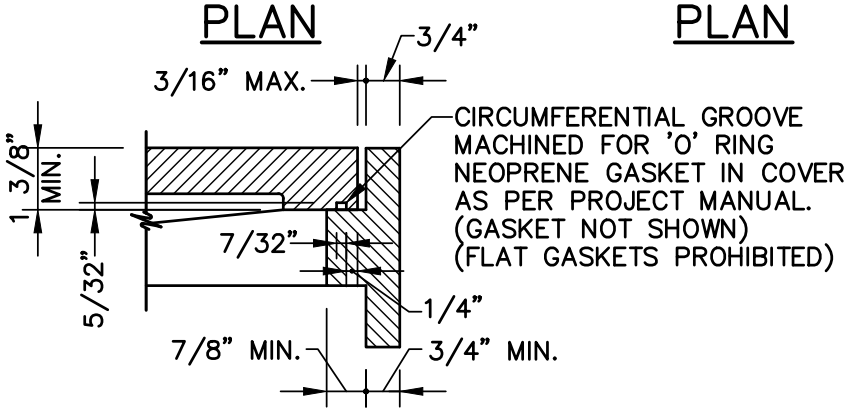
PLAN



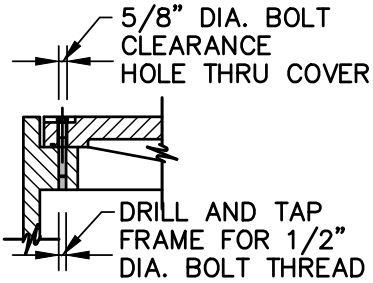
PLAN



SECTIONAL ELEVATION
COVER PICK HOLE



ENLARGEMENT DETAIL



SECTIONAL ELEVATION
COVER BOLT HOLE

NOTES:

1. LETTERING SHALL BE "SANITARY SEWER".
2. ALL MANHOLE FRAMES AND COVERS SHALL BE FOR HEAVY DUTY TRAFFIC, AASHTO HIGHWAY LOADING CLASS HS–20.
3. MANUFACTURER: EAST JORDAN IRON WORKS: FRAME – NO. 1045ZPT; COVER – NO. 1040APT (4 BOLT).
4. FRAME AND COVER TO HAVE BLACK ASPHALTIC COATINGS.

FILE NAME: MH–6–CASTIRON_WT.dwg

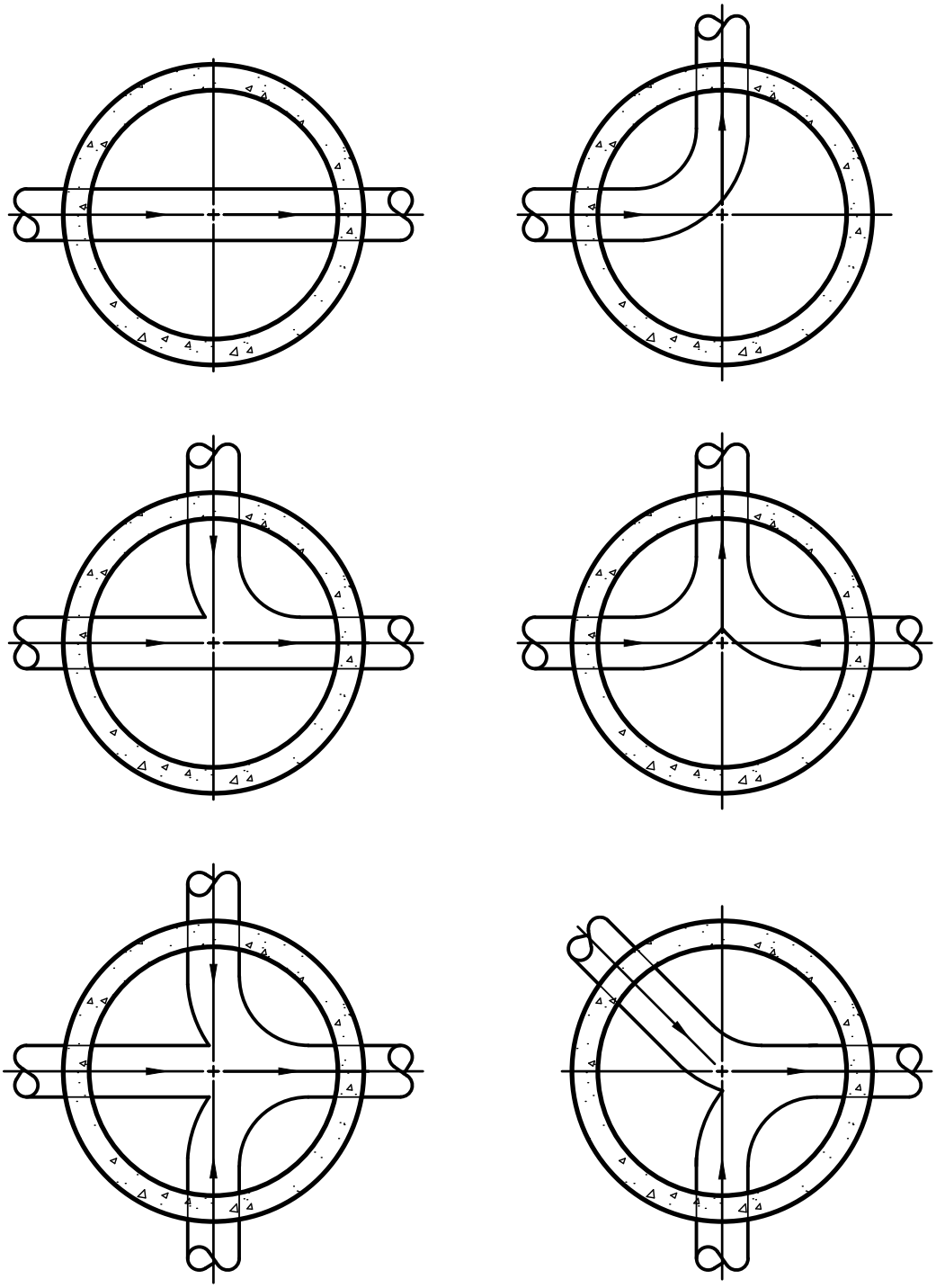
STANDARD DETAILS

HEAVY DUTY WATER TIGHT MANHOLE FRAME AND COVER

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH–6



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

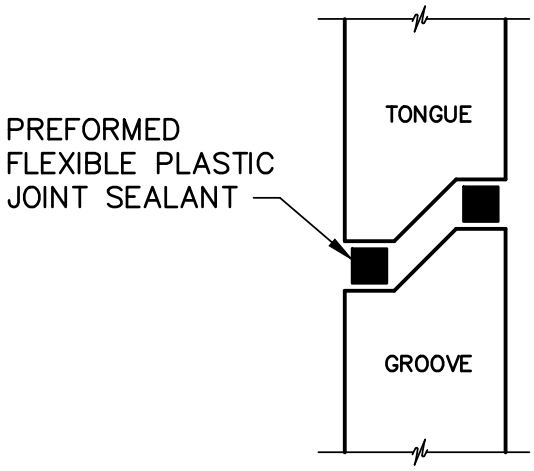
STANDARD DETAILS

TYPICAL PLAN OF MANHOLE CHANNELS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-7



SECTION

FILE NAME: MH-8-GASKET.dwg

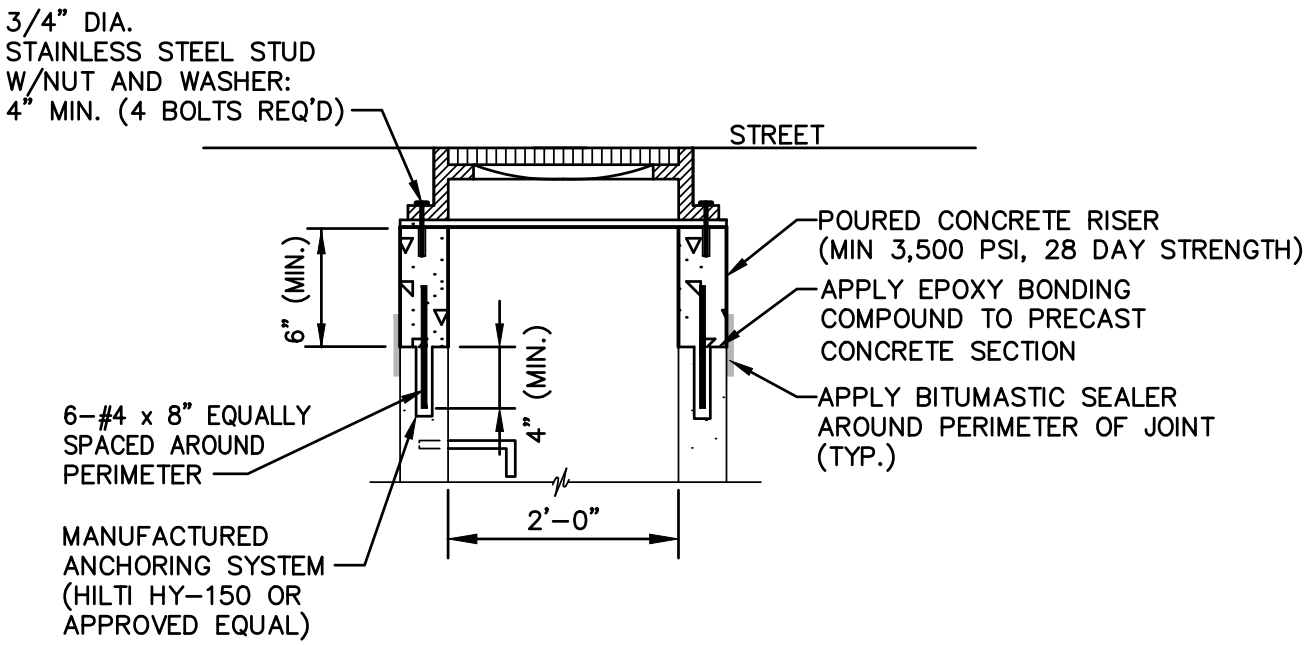
STANDARD DETAILS

MANHOLE GASKET

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

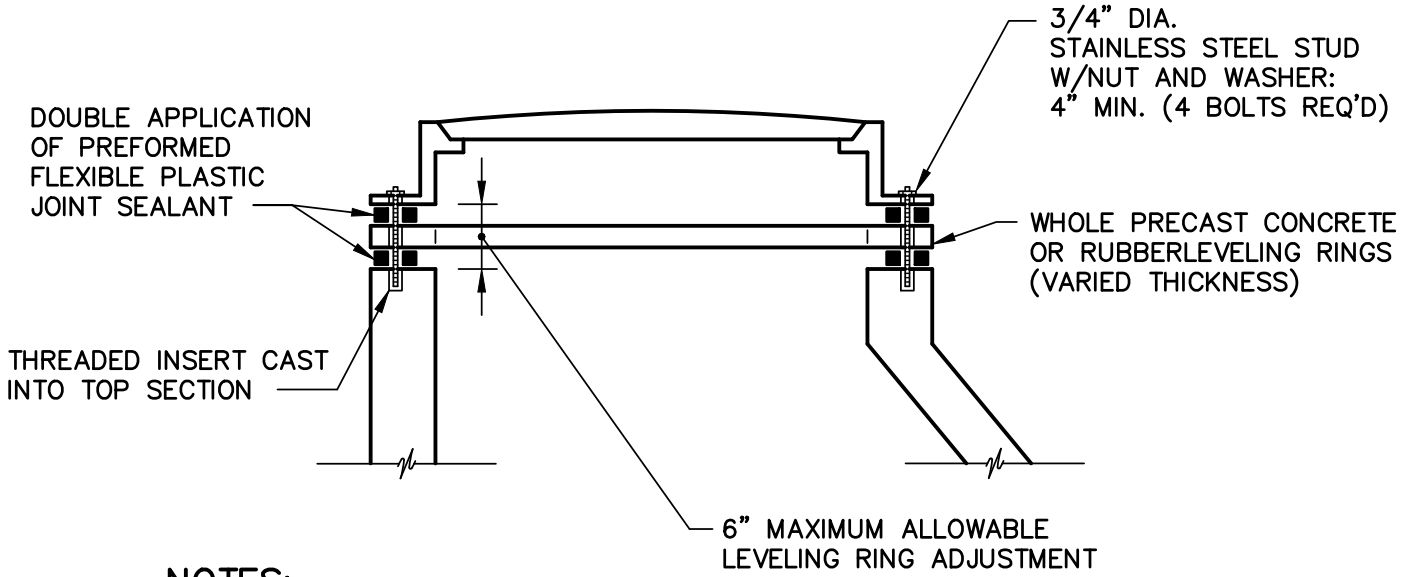
SCALE	DWG. NO.
NO SCALE	MH-8



NOTES:

1. TO BE USED ONLY IN PAVED AREAS. NOT TO BE USED IN ROW AREAS.

SECTION



NOTES:

1. TO BE USED ONLY IN ROW AREAS. NOT TO BE USED IN PAVED AREAS.

SECTION

FILE NAME: MH-9-BOLTEDFRAME.dwg

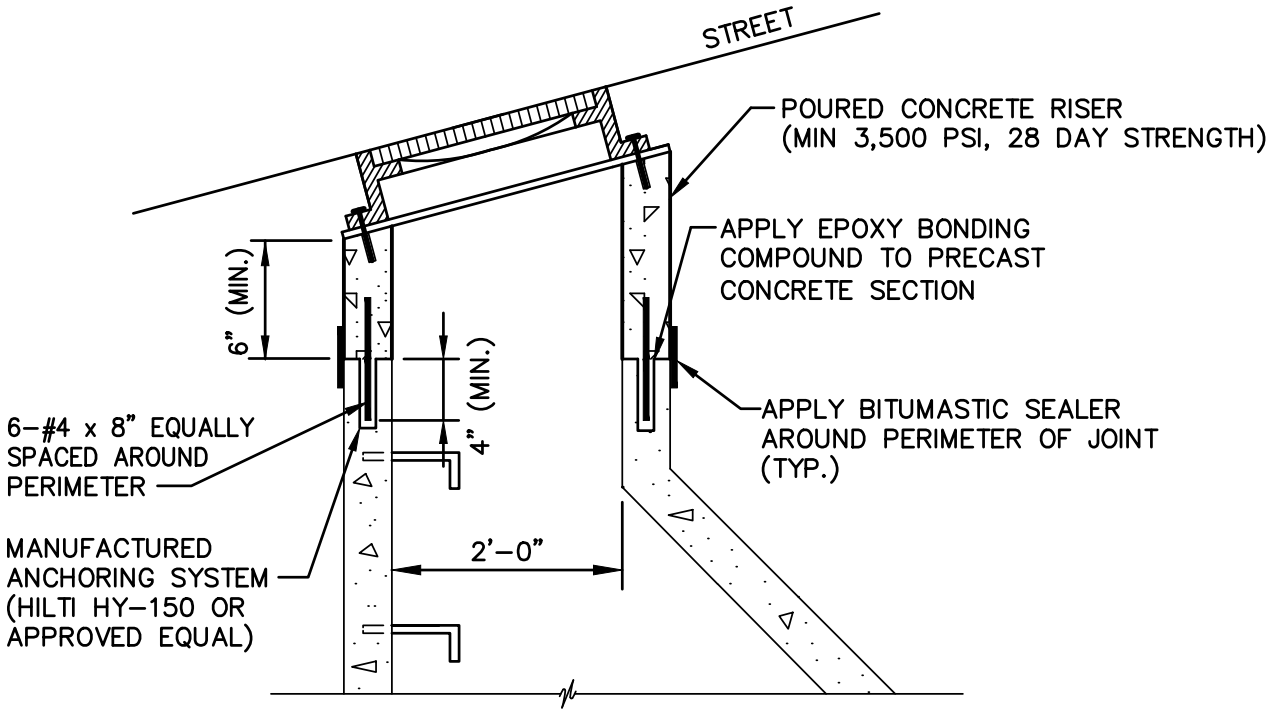
STANDARD DETAILS

LEVELING RINGS, CONCRETE RISER AND BOLTED FRAME DETAILS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-9



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"

FILE NAME: MH-10-CONCRISER-4%.dwg

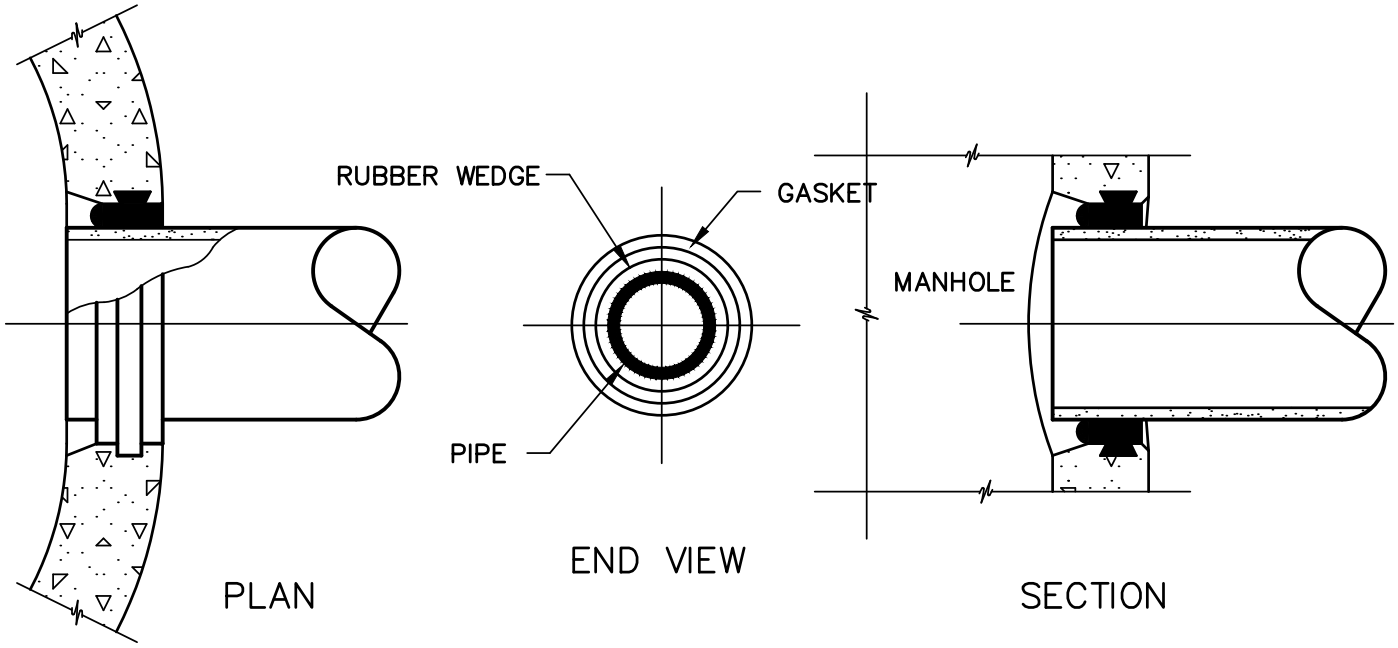
STANDARD DETAILS

POURED CONCRETE RISER FOR STREET GRADES OF 4% OR GREATER

NORTH LONDONDERRY TOWNSHIP AUTHORITY

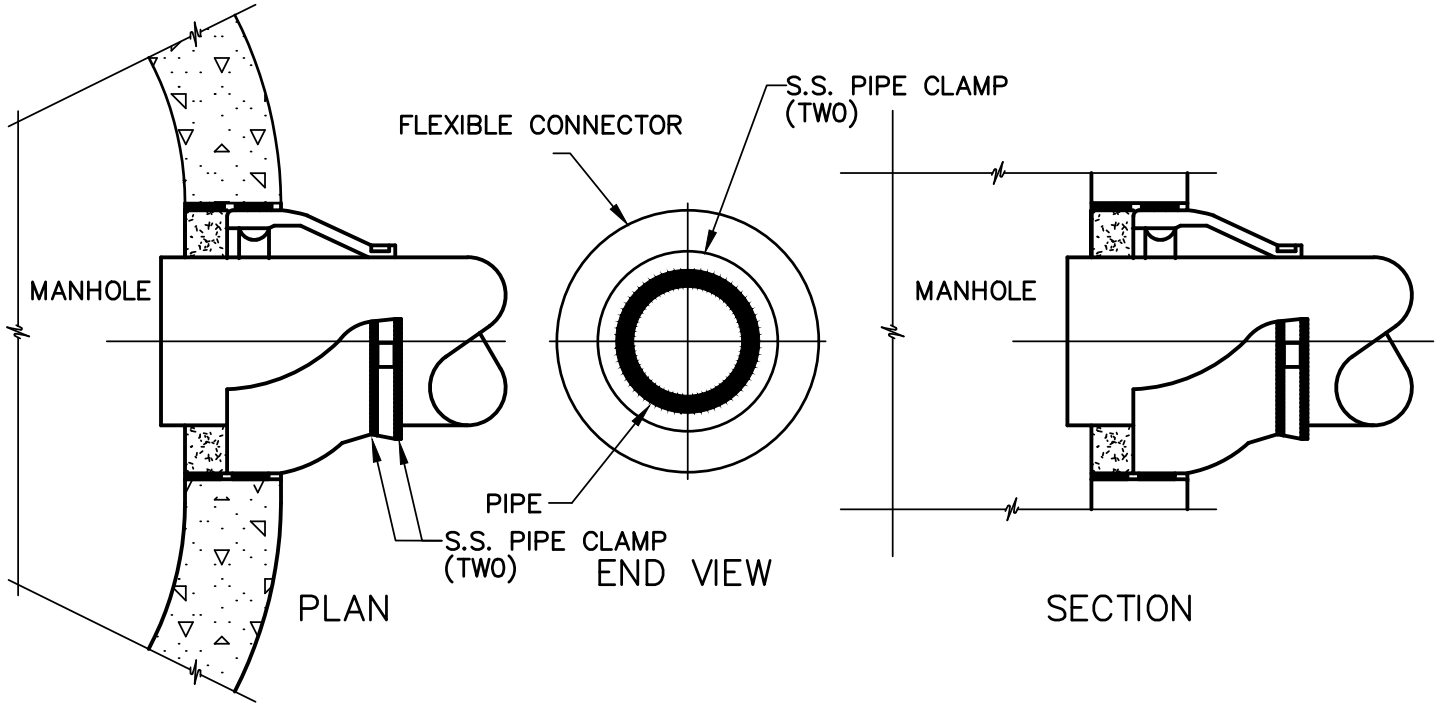
DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-10



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

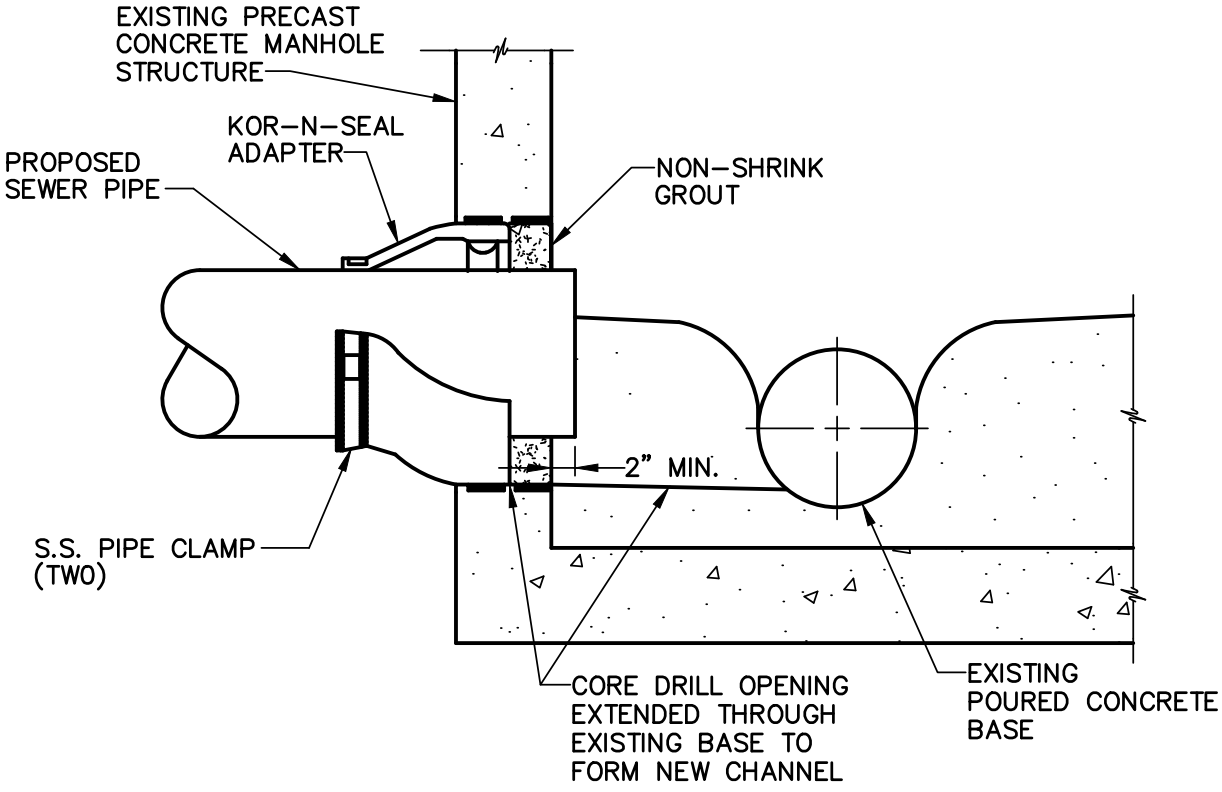
STANDARD DETAILS

MANHOLE PIPE GASKETS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-11



KOR-N-SEAL DETAIL

NOTE:

1. NEW PIPE CHANNEL RECONSTRUCTION IN ACCORDANCE WITH TOWNSHIP REQUIREMENTS.

FILE NAME: MH-12-KORNSEAL.dwg

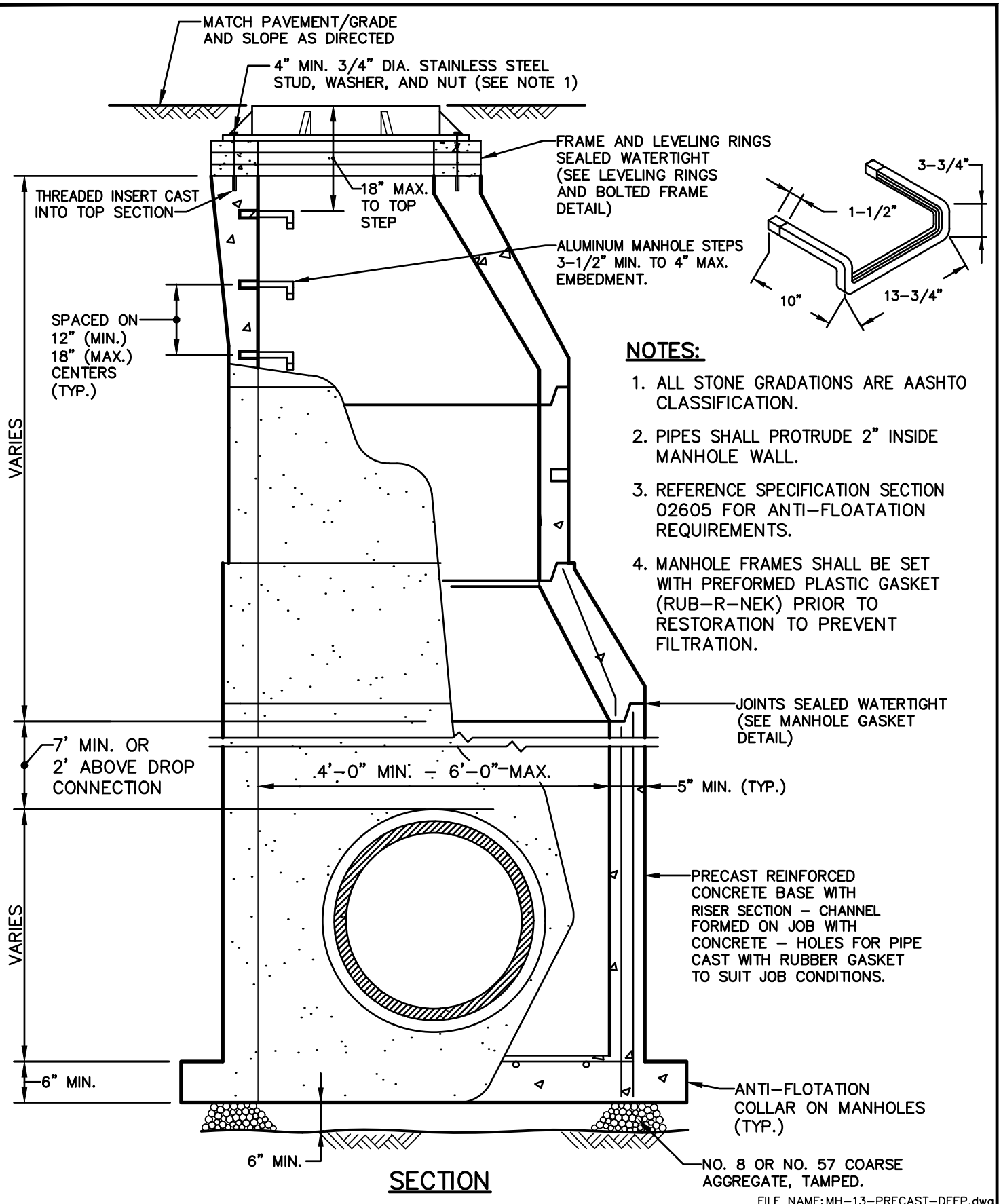
STANDARD DETAILS

MANHOLE PIPE ADAPTERS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-12



NOTES:

1. ALL STONE GRADATIONS ARE AASHTO CLASSIFICATION.
2. PIPES SHALL PROTRUDE 2" INSIDE MANHOLE WALL.
3. REFERENCE SPECIFICATION SECTION 02605 FOR ANTI-FLOATATION REQUIREMENTS.
4. MANHOLE FRAMES SHALL BE SET WITH PREFORMED PLASTIC GASKET (RUB-R-NEK) PRIOR TO RESTORATION TO PREVENT FILTRATION.

SECTION

FILE NAME: MH-13-PRECAST-DEEP.dwg

STANDARD DETAILS

PRECAST CONCRETE MANHOLE WITH PRECAST CONCRETE BASE

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-13

NORTH LONDONDERRY TOWNSHIP AUTHORITY
SANITARY SEWER
STANDARD DETAIL DRAWINGS

MANHOLES DETAILS: (MH)

1. Precast Concrete Manhole with Precast Concrete Base – Type1
2. Precast Concrete Manhole with Precast Concrete Base – Type2
3. Inside Drop Manhole
4. Manhole Steps
5. Heavy Duty Self-Sealing Frame and Cover
6. Heavy Duty Water Tight Frame and Cover
7. Typical Plan of Manhole Channels
8. Manhole Gasket
9. Leveling Rings, Concrete Riser and Bolted Frame Details
10. Poured Concrete Riser for Street Grades of 4% or Greater
11. Manhole Pipe Gaskets
12. Manhole Coring Gasket Detail (Kor-N-Seal)

BUILDING SEWERS/SERVICE LATERALS: (LAT)

1. Service Lateral – Shallow Sewer
2. Service Lateral – Deep Sewer
3. Building Sewer
4. Service Lateral Connection to Existing Sewer Main
5. Service Lateral Disconnection from Existing Sewer Main
6. Cleanout/Test Tee Cap Protection Casting
7. Simplex Sewage Grinder Pump Station
8. Typical Electrical Layout (for Grinder)

FORCEMAIN DETAILS: (FM)

1. Flush Chamber
2. Air Release Valve Chamber
3. Forcemain Locator Assembly
4. Horizontal Thrust Block Details
5. Concrete Thrust Block Details

TRENCH DETAILS: (TRENCH)

1. Trench Backfill Detail in Paved Areas
2. Trench Backfill Detail in Unpaved Areas
3. Unsuitable Material Excavation Detail
4. Bentonite Clay Dam Detail
5. Concrete Encasement Detail

SEWER PIPING DETAILS: (SEW)

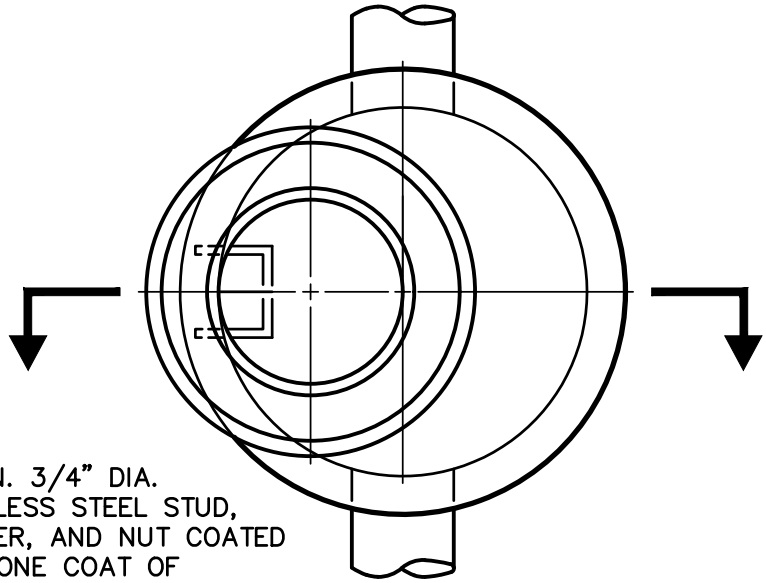
1. Pipe Reconnection Detail
2. Casing Details for Pipe Boring/Tunnels

LOW PRESSURE SANITARY SEWER DETAILS: (LP)

1. Typical Grinder Pump Installation Detail - Elevation
2. Typical Grinder Pump Installation Detail – Plan
3. E-One Control Panel Detail
4. E-One Grinder Pump Station
5. Simples Grinder Pump Station
6. Typical Electrical Layout
7. Low Pressure Service Line Connection at Gravity Main and/or Low Pressure Main
8. Low Pressure Sewer Discharge to Manhole
9. In-Line Cleanout /Valve Pit for Low Pressure Sewer Main
10. In-Line Terminal Cleanout for Low Pressure Sewer Main
11. In-Line Valve Pit for Low Pressure Building Service Line
12. Curb Stop and Box Detail

GREASE INTERCEPTOR DETAILS: (GR)

1. Typical Grease Interceptor to Sampling Vault Connection - Plan and Section

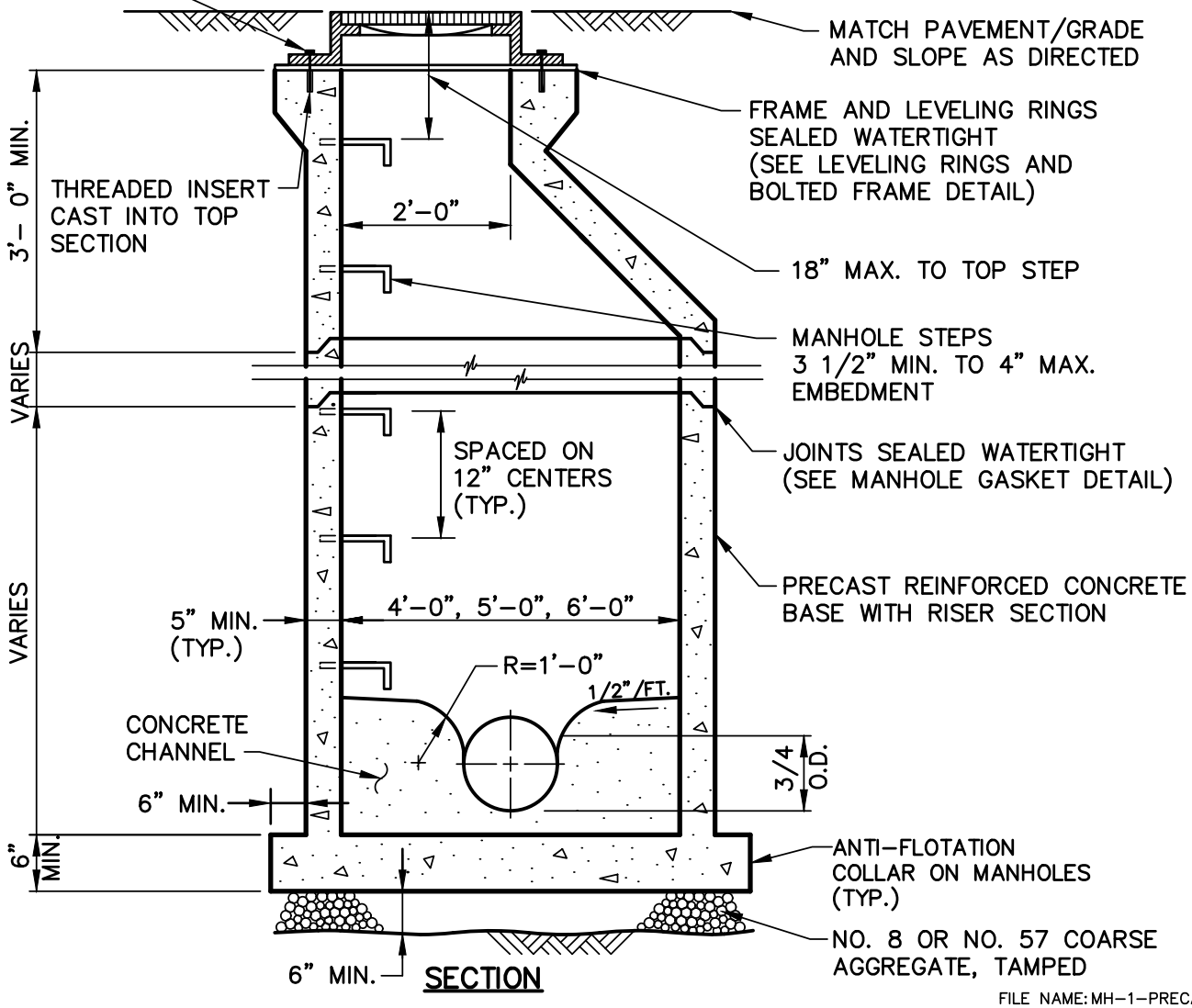


4" MIN. 3/4" DIA. STAINLESS STEEL STUD, WASHER, AND NUT COATED WITH ONE COAT OF STANDARD ASPHALT INSTALLATION

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.



FILE NAME: MH-1-PRECAST.dwg

STANDARD DETAILS

PRECAST CONCRETE MANHOLE WITH PRECAST CONCRETE BASE

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED
SCALE: NO SCALE	DWG. NO.: MH-1

NOTES:

1. BOLTING OF MANHOLE FRAME AND COVER NOT REQUIRED FOR MANHOLES INSTALLED IN PAVED SURFACES.
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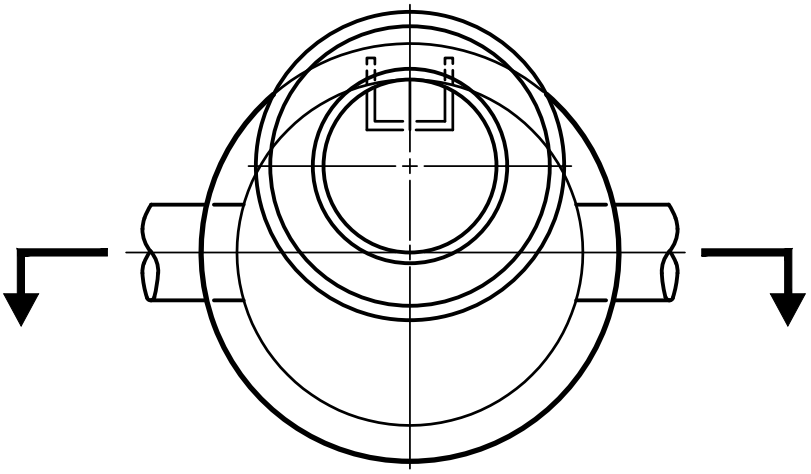
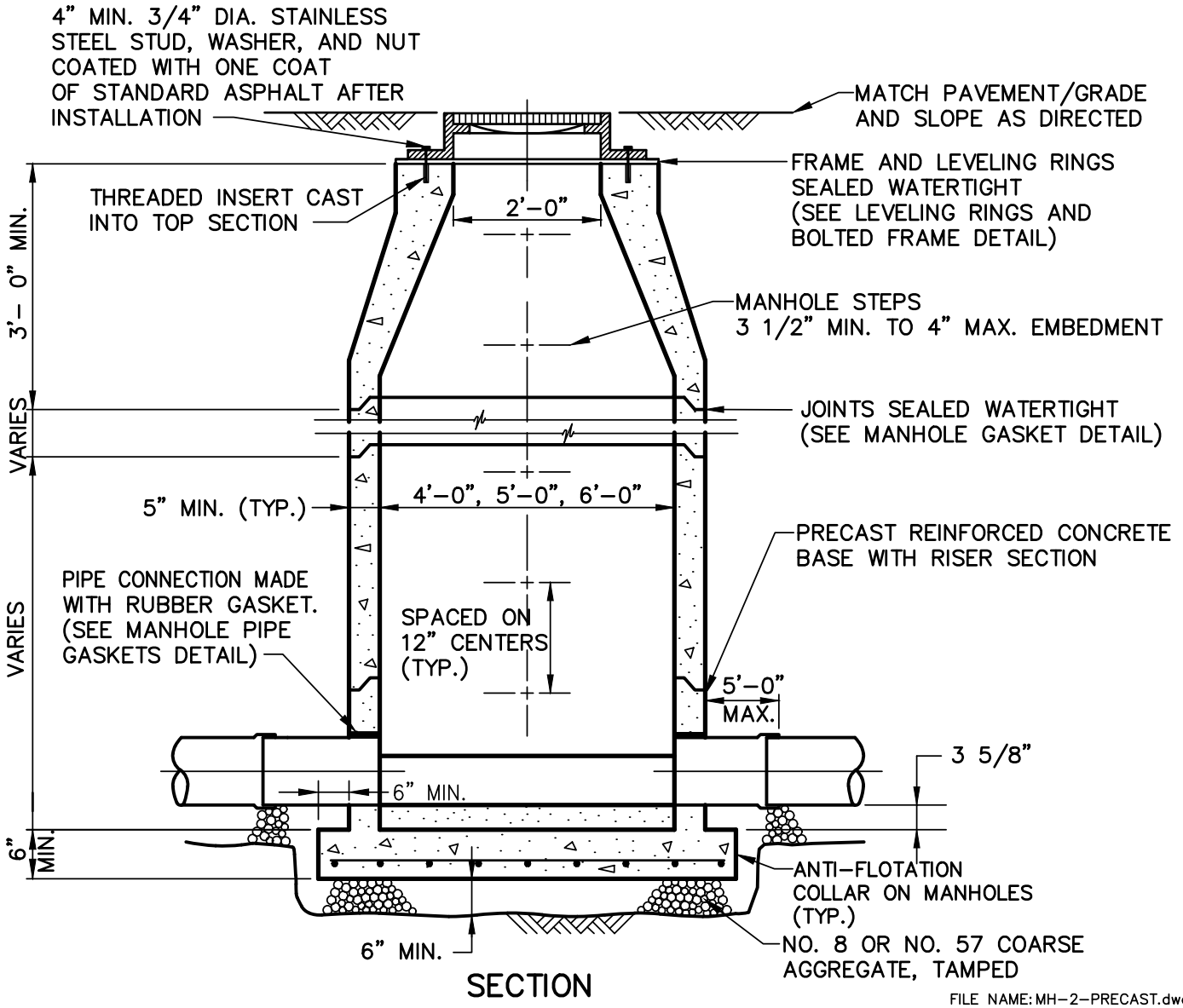
5. MINIMUM DEPTH TO TOP OF PIPE WILL BE 8 FEET.



PLAN



SECTION

FILE NAME: MH-2-PRECAST.dwg

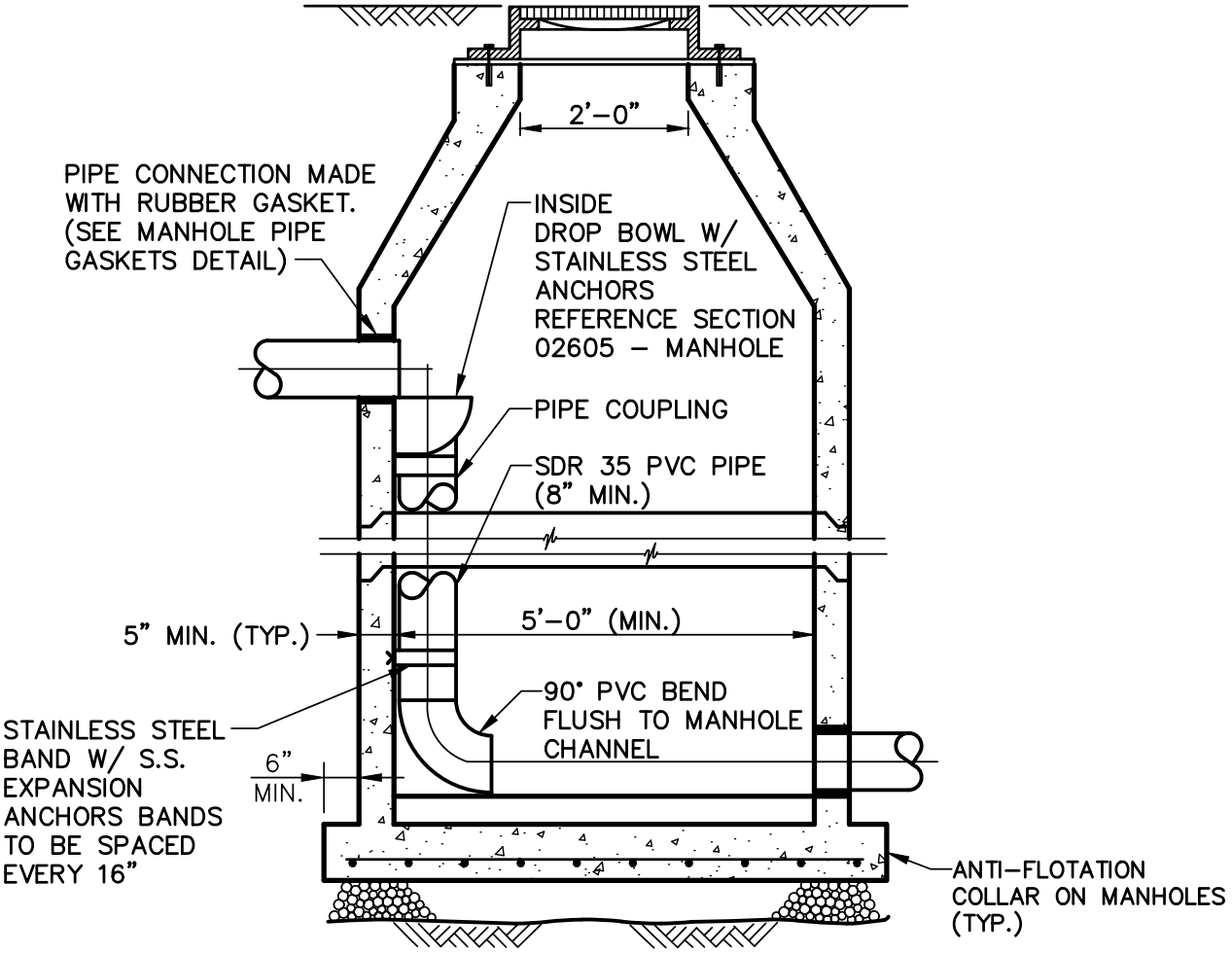
STANDARD DETAILS

PRECAST CONCRETE MANHOLE WITH PRECAST CONCRETE BASE

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-2



SECTION

FILE NAME: MH-3-INSIDEDROP.dwg

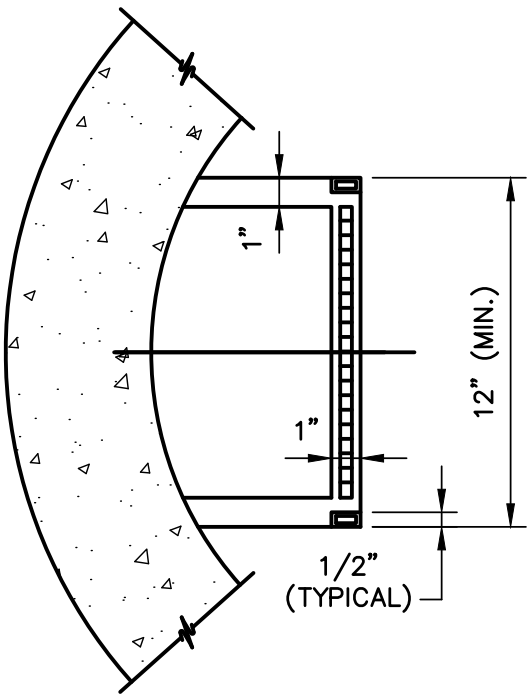
STANDARD DETAILS

INSIDE DROP MANHOLE

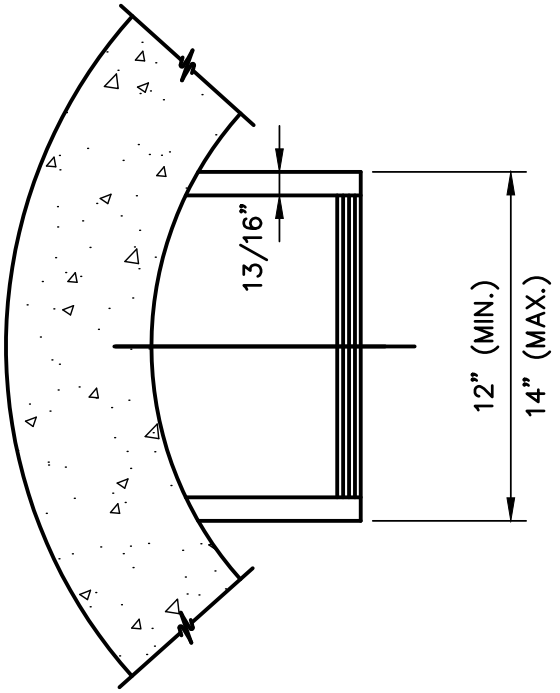
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-3



PLAN



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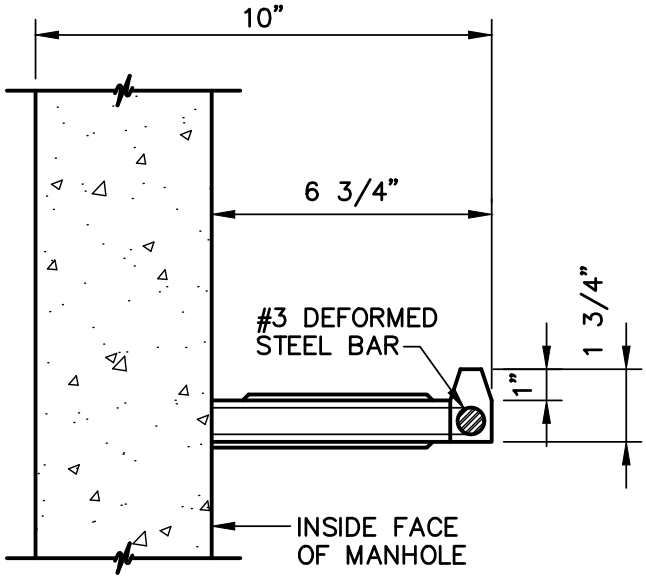
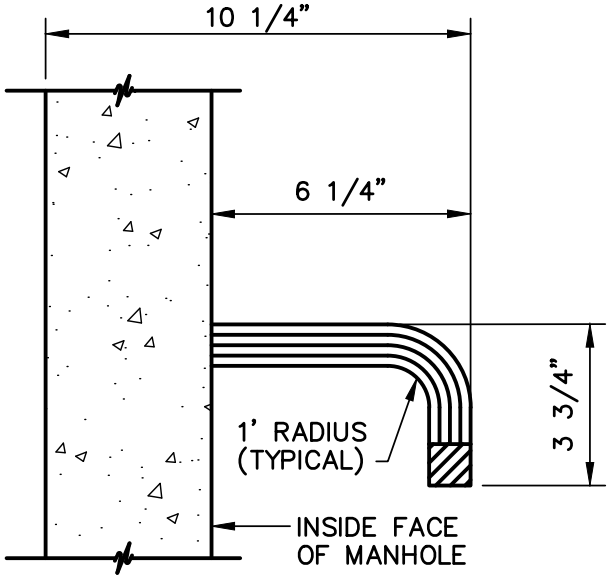


SECTIONAL ELEVATION
REINFORCED PLASTIC



SECTIONAL ELEVATION
ALUMINUM

FILE NAME: MH-4-STEPS.dwg

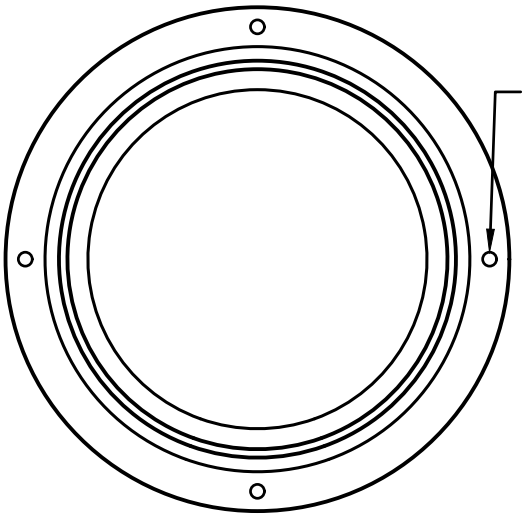
STANDARD DETAILS

MANHOLE STEPS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-4



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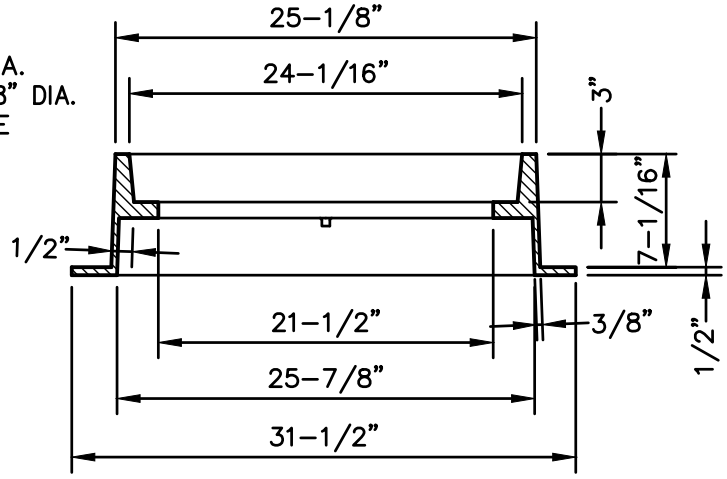
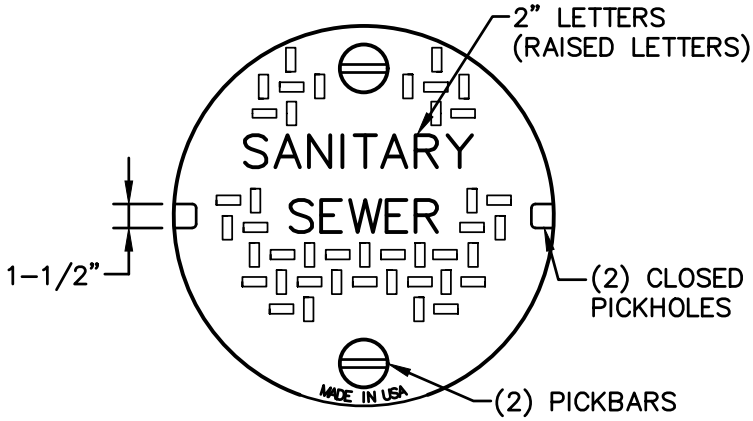


SECTION

MANHOLE FRAME DETAIL



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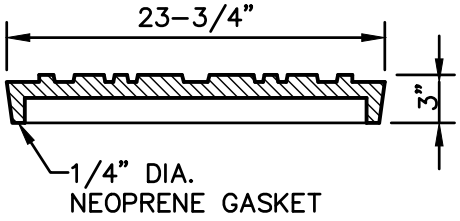
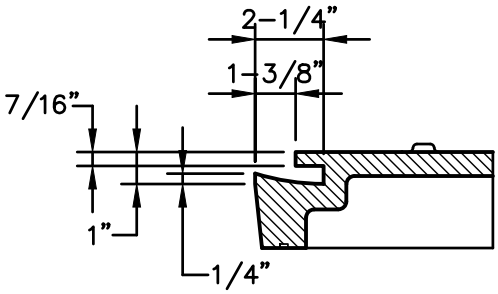
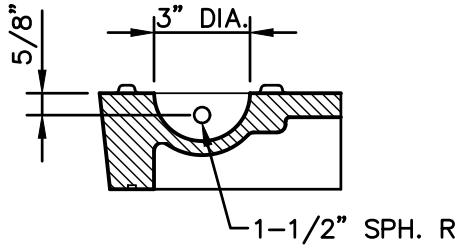


SECTION



PICKHOLE DETAIL



PICKBAR DETAIL

MANUFACTURER: EAST JORDON IRON WORKS – FRAME 1835Z1, COVER 1835A1GS

FILE NAME: MH-5-FRAME&COVER.dwg

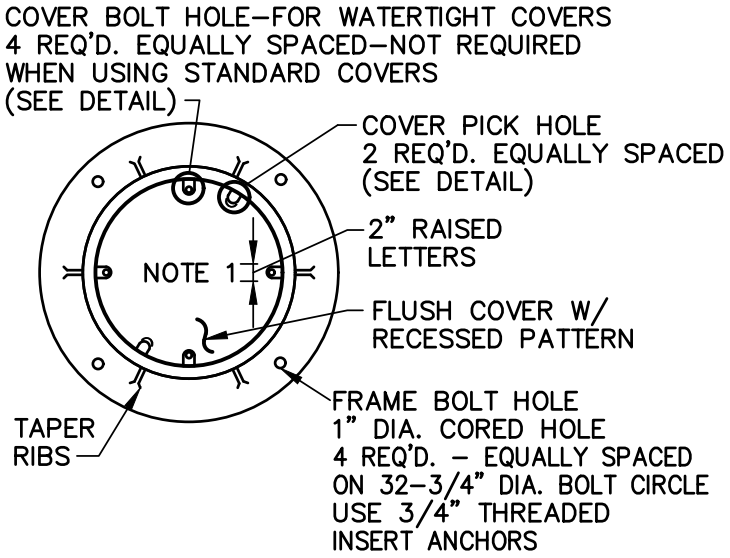
STANDARD DETAILS

HEAVY DUTY SELF SEALING MANHOLE FRAME AND COVER

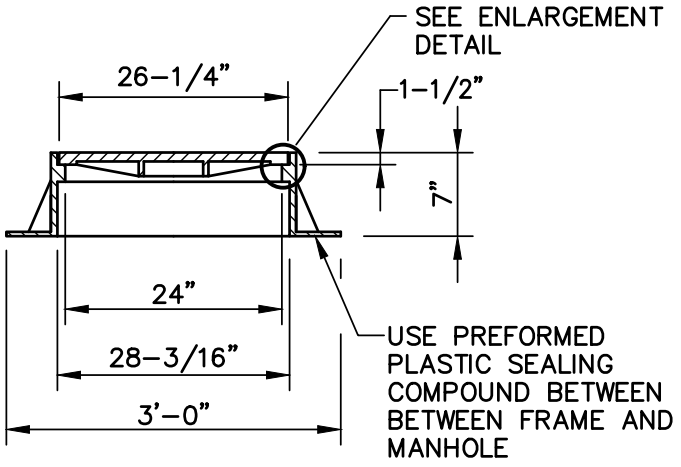
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

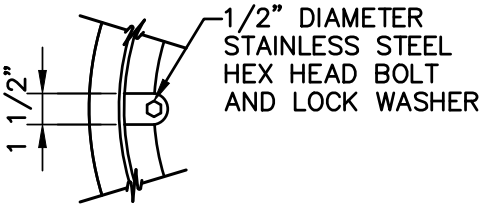
SCALE	DWG. NO.
NO SCALE	MH-5



PLAN



SECTIONAL ELEVATION



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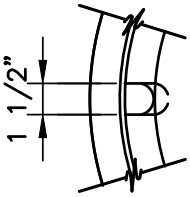
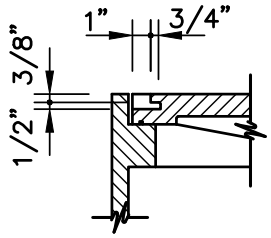
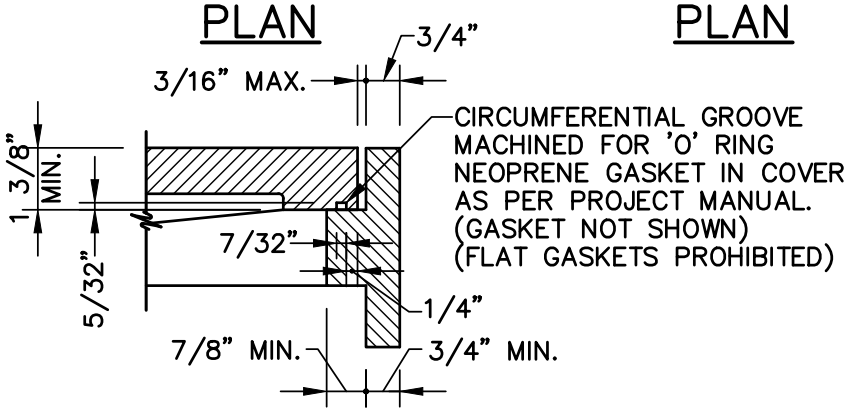


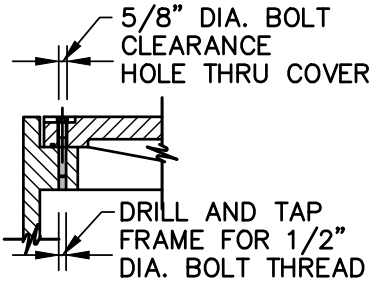
PLAN



SECTIONAL ELEVATION
COVER PICK HOLE



ENLARGEMENT DETAIL



SECTIONAL ELEVATION
COVER BOLT HOLE

NOTES:

1. LETTERING SHALL BE "SANITARY SEWER".
2. ALL MANHOLE FRAMES AND COVERS SHALL BE FOR HEAVY DUTY TRAFFIC, AASHTO HIGHWAY LOADING CLASS HS–20.
3. MANUFACTURER: EAST JORDAN IRON WORKS: FRAME – NO. 1045ZPT; COVER – NO. 1040APT (4 BOLT).
4. FRAME AND COVER TO HAVE BLACK ASPHALTIC COATINGS.

FILE NAME: MH–6–CASTIRON_WT.dwg

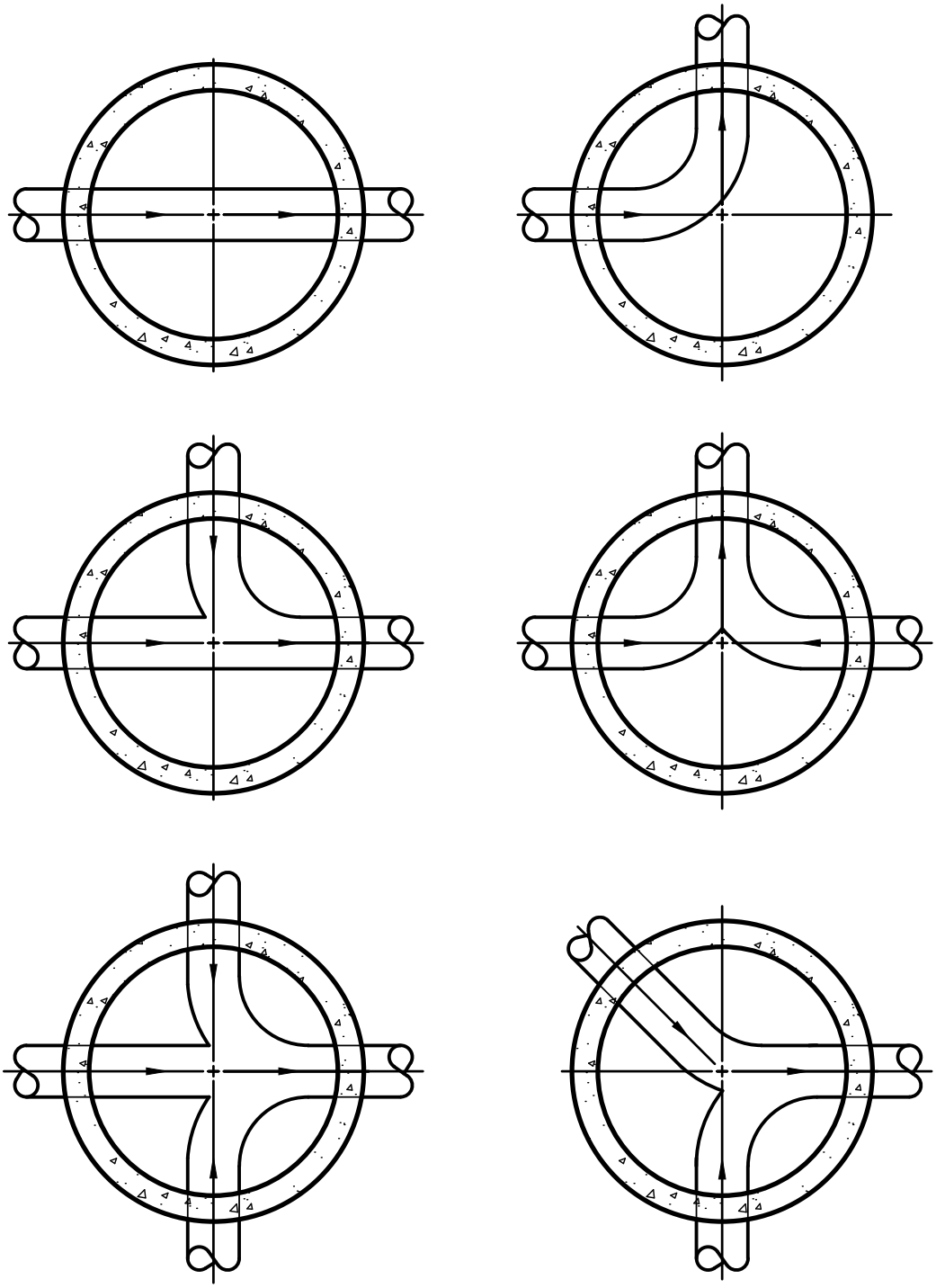
STANDARD DETAILS

HEAVY DUTY WATER TIGHT MANHOLE FRAME AND COVER

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH–6



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

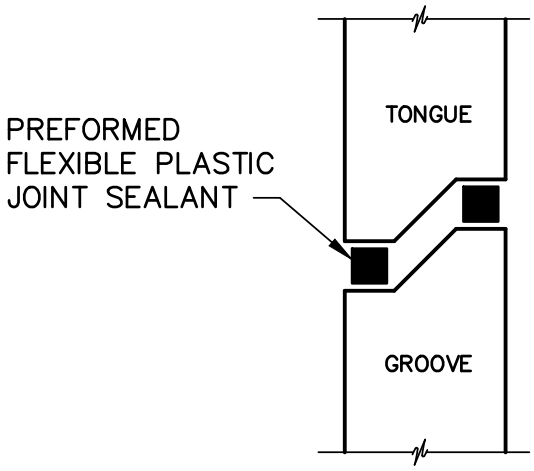
STANDARD DETAILS

TYPICAL PLAN OF MANHOLE CHANNELS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-7



SECTION

FILE NAME: MH-8-GASKET.dwg

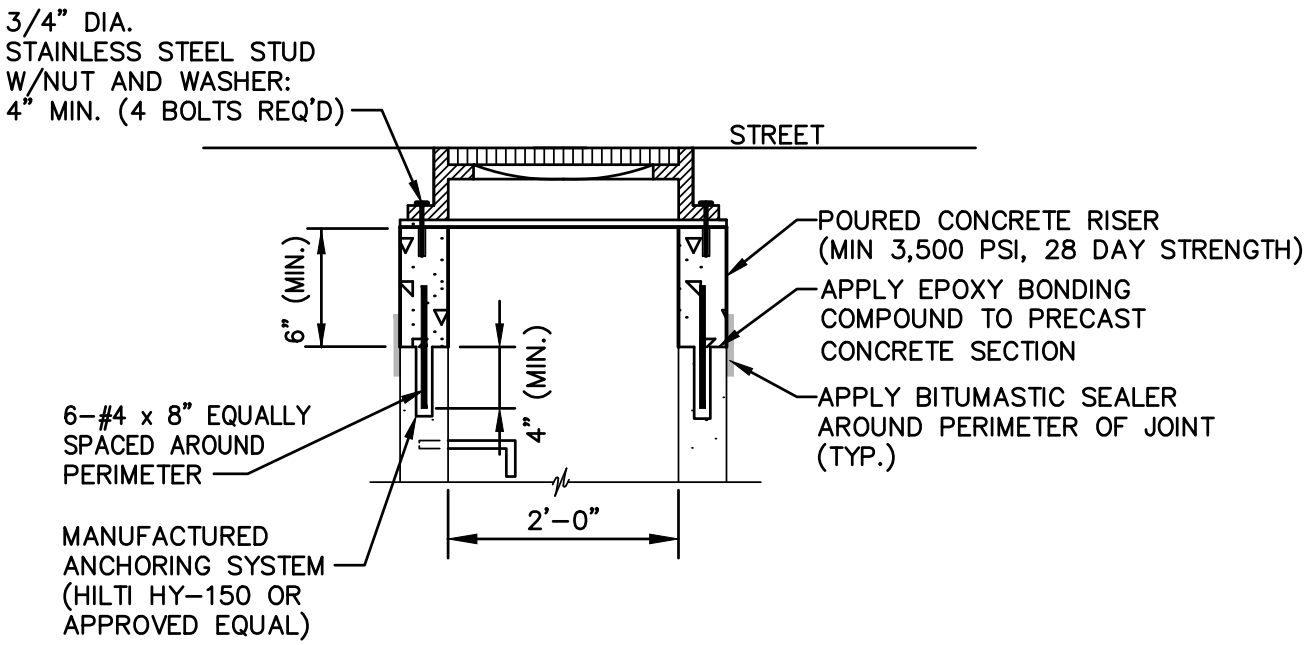
STANDARD DETAILS

MANHOLE GASKET

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

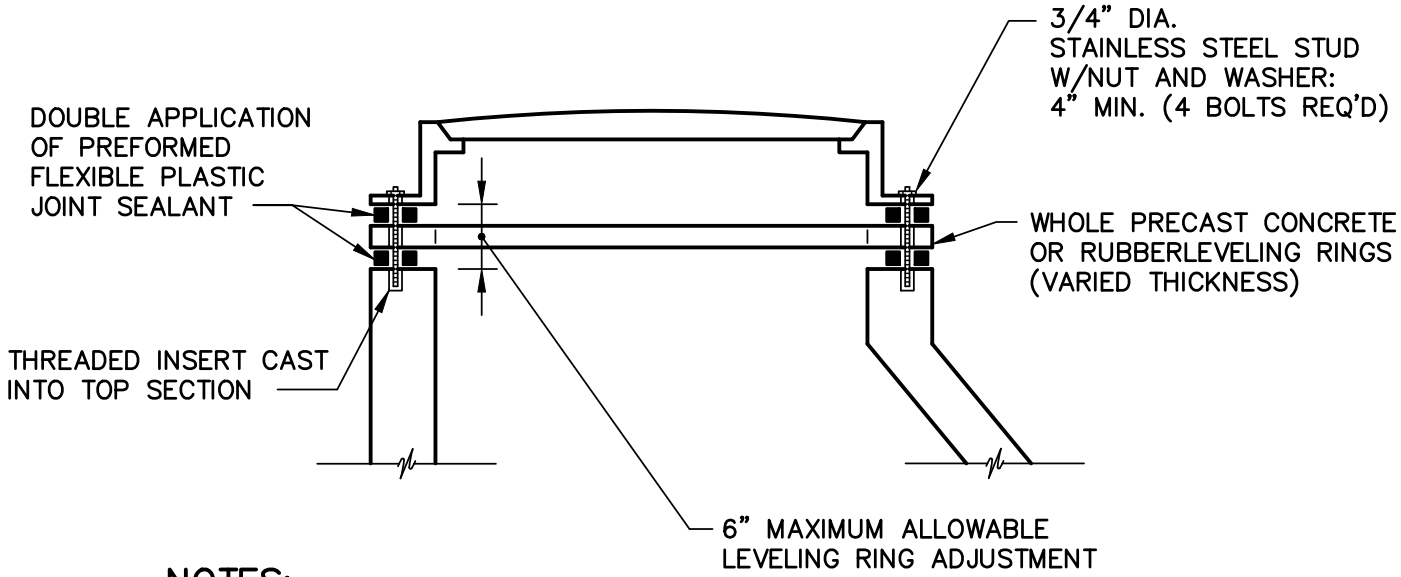
SCALE	DWG. NO.
NO SCALE	MH-8



NOTES:

1. TO BE USED ONLY IN PAVED AREAS. NOT TO BE USED IN ROW AREAS.

SECTION



NOTES:

1. TO BE USED ONLY IN ROW AREAS. NOT TO BE USED IN PAVED AREAS.

SECTION

FILE NAME: MH-9-BOLTEDFRAME.dwg

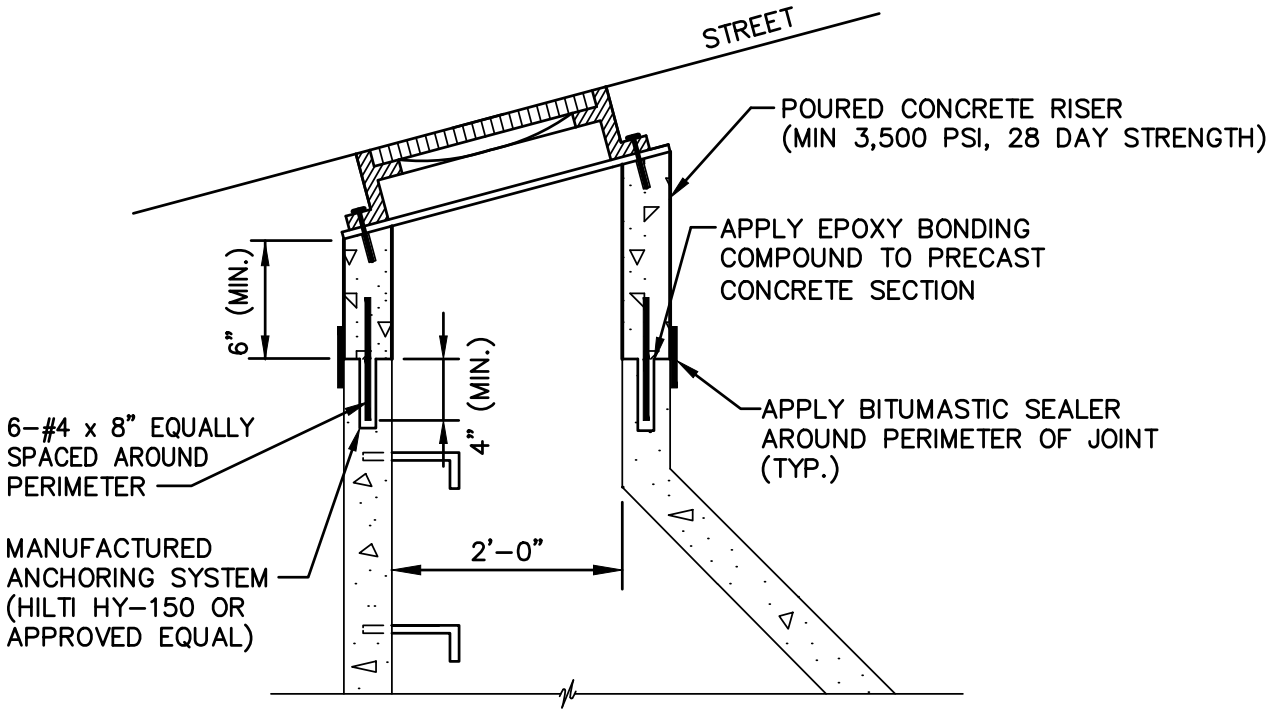
STANDARD DETAILS

LEVELING RINGS, CONCRETE RISER AND BOLTED FRAME DETAILS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-9



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"

FILE NAME: MH-10-CONCRISER-4%.dwg

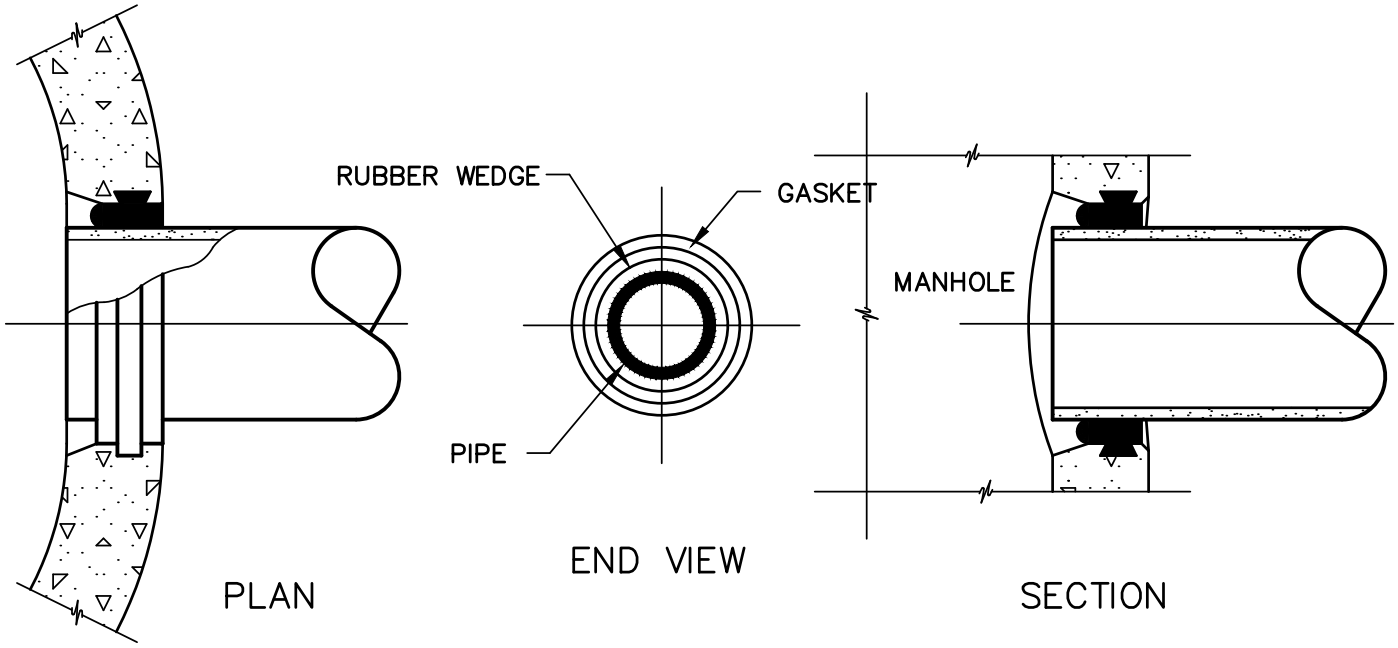
STANDARD DETAILS

POURED CONCRETE RISER FOR STREET GRADES OF 4% OR GREATER

NORTH LONDONDERRY TOWNSHIP AUTHORITY

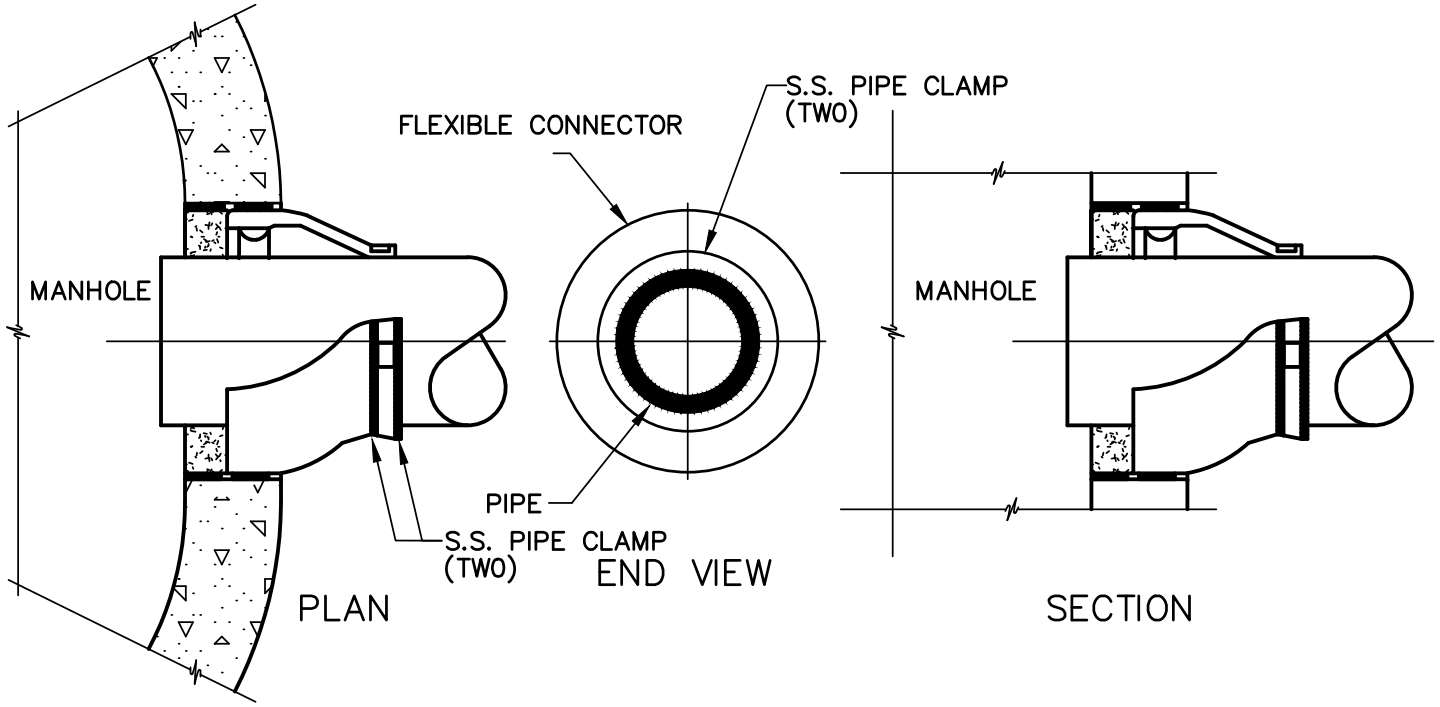
DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-10



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

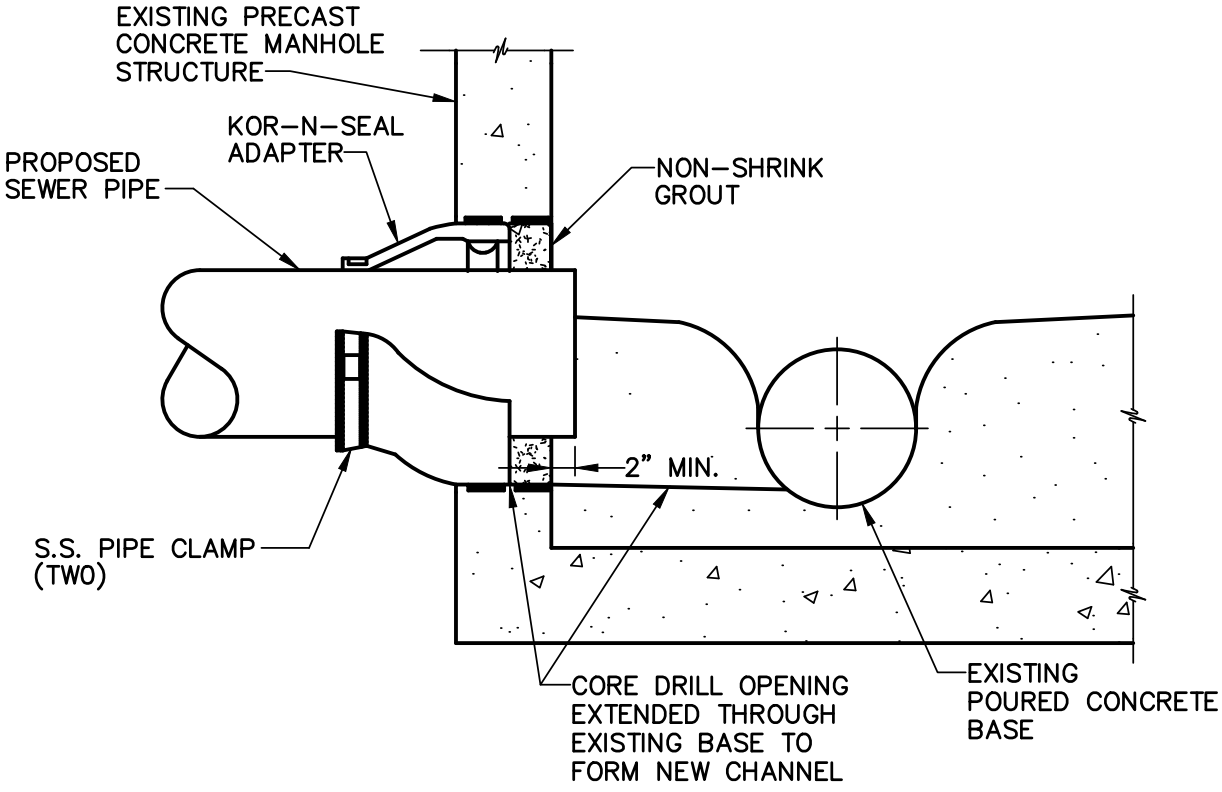
STANDARD DETAILS

MANHOLE PIPE GASKETS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-11



KOR-N-SEAL DETAIL

NOTE:

1. NEW PIPE CHANNEL RECONSTRUCTION IN ACCORDANCE WITH TOWNSHIP REQUIREMENTS.

FILE NAME: MH-12-KORNSEAL.dwg

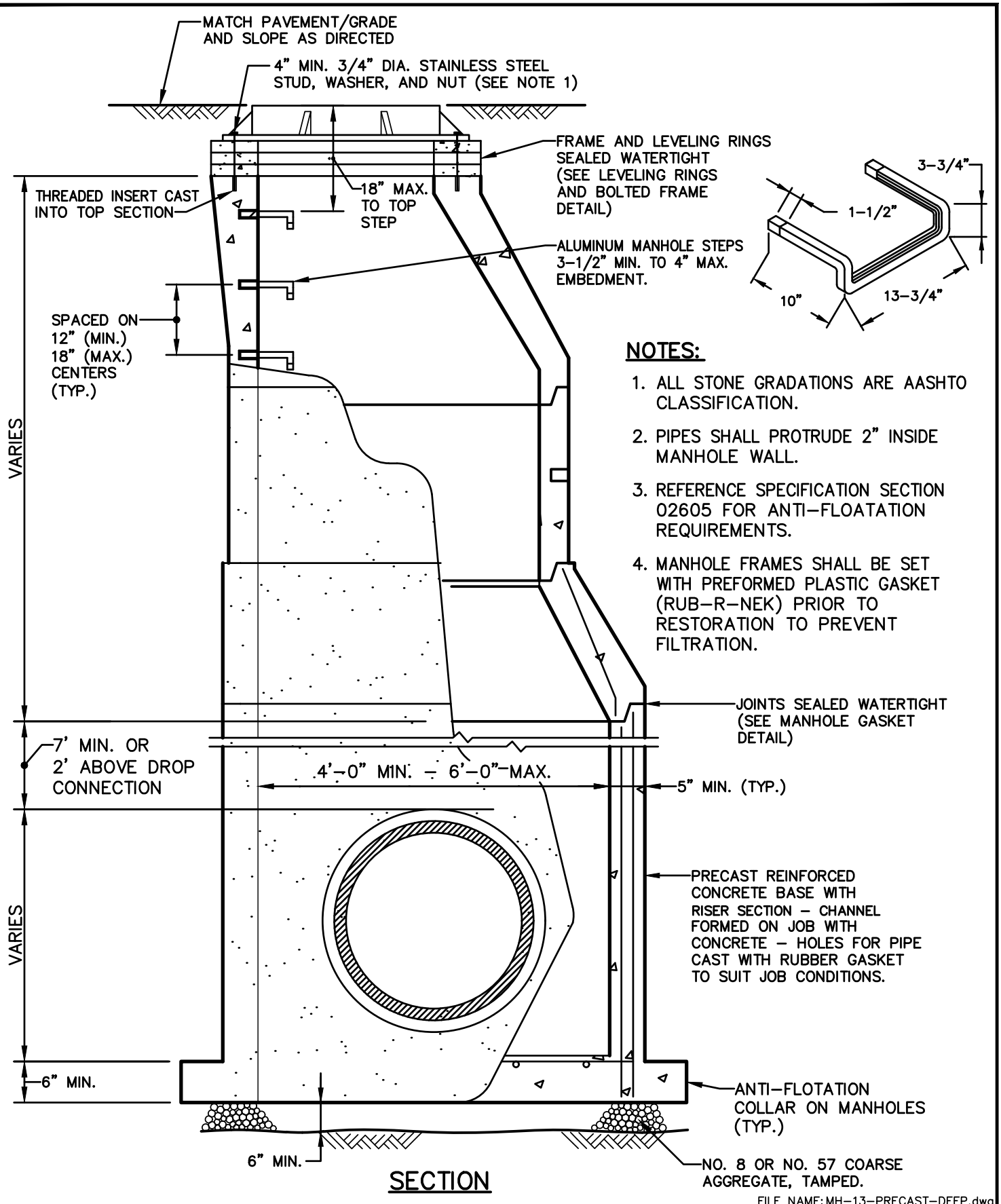
STANDARD DETAILS

MANHOLE PIPE ADAPTERS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-12



NOTES:

1. ALL STONE GRADATIONS ARE AASHTO CLASSIFICATION.
2. PIPES SHALL PROTRUDE 2" INSIDE MANHOLE WALL.
3. REFERENCE SPECIFICATION SECTION 02605 FOR ANTI-FLOATATION REQUIREMENTS.
4. MANHOLE FRAMES SHALL BE SET WITH PREFORMED PLASTIC GASKET (RUB-R-NEK) PRIOR TO RESTORATION TO PREVENT FILTRATION.

SECTION

FILE NAME: MH-13-PRECAST-DEEP.dwg

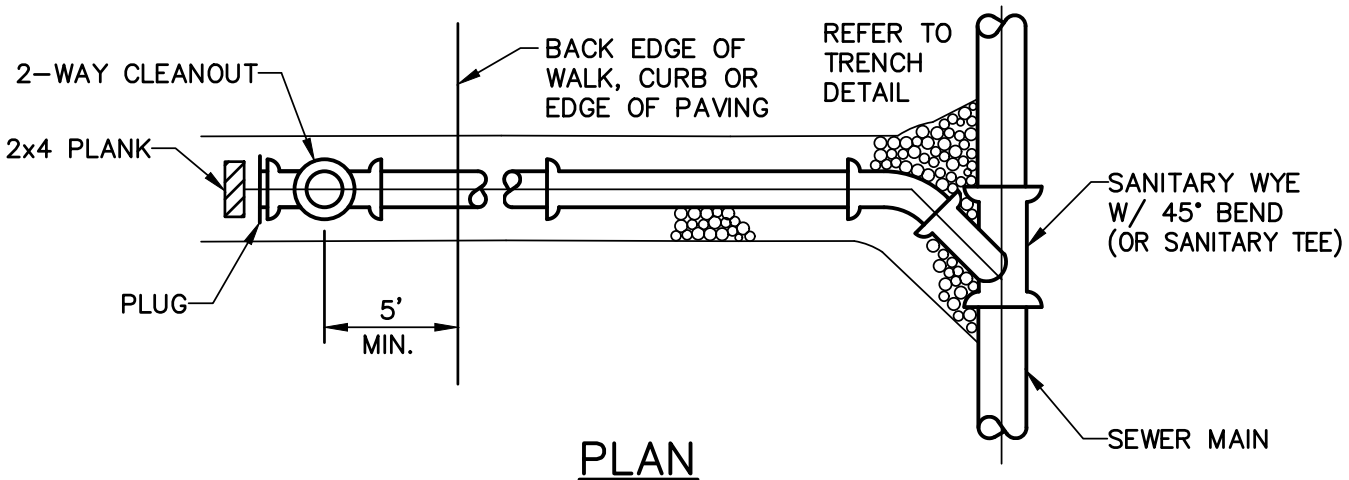
STANDARD DETAILS

PRECAST CONCRETE MANHOLE WITH PRECAST CONCRETE BASE

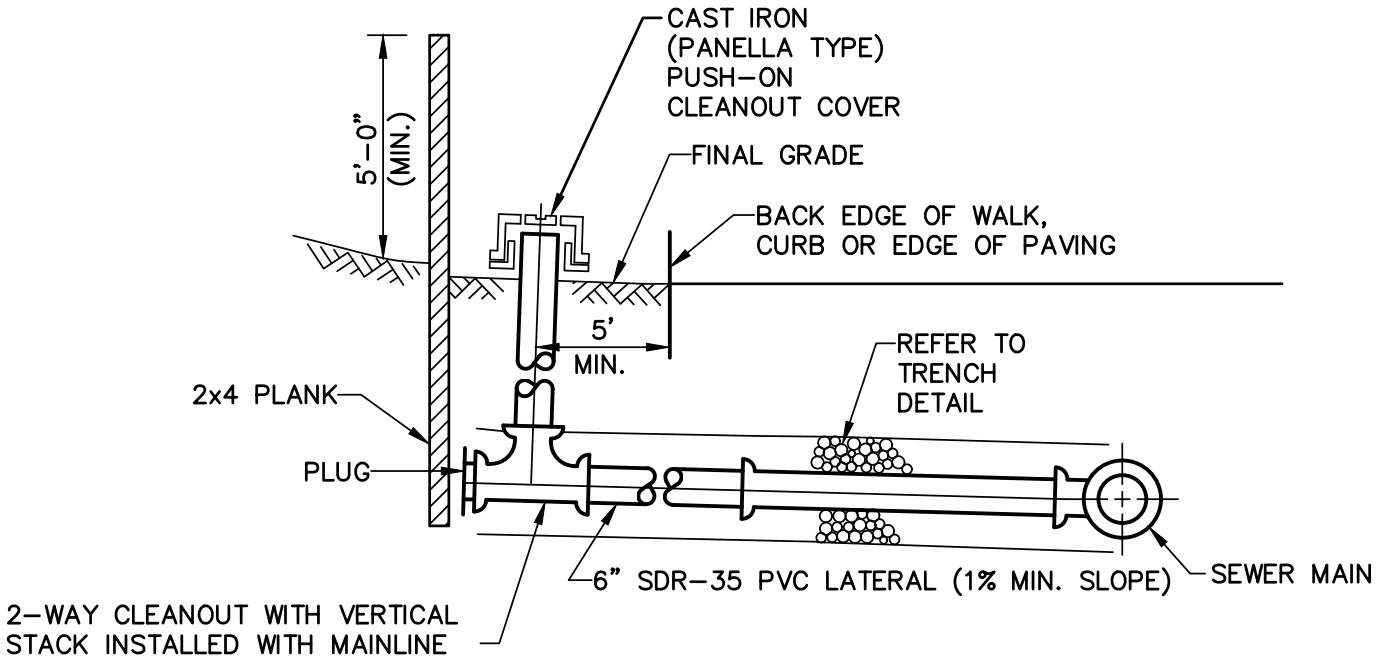
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	MH-13



PLAN



SECTION

NOTES:

1. CURB CLEANOUT NOT TO BE LOCATED IN SIDEWALK, DRIVEWAYS OR BENEATH OTHER CURBLINE UTILITIES.
2. CLEANOUT TO BE LOCATED BETWEEN CURB AND SIDEWALK

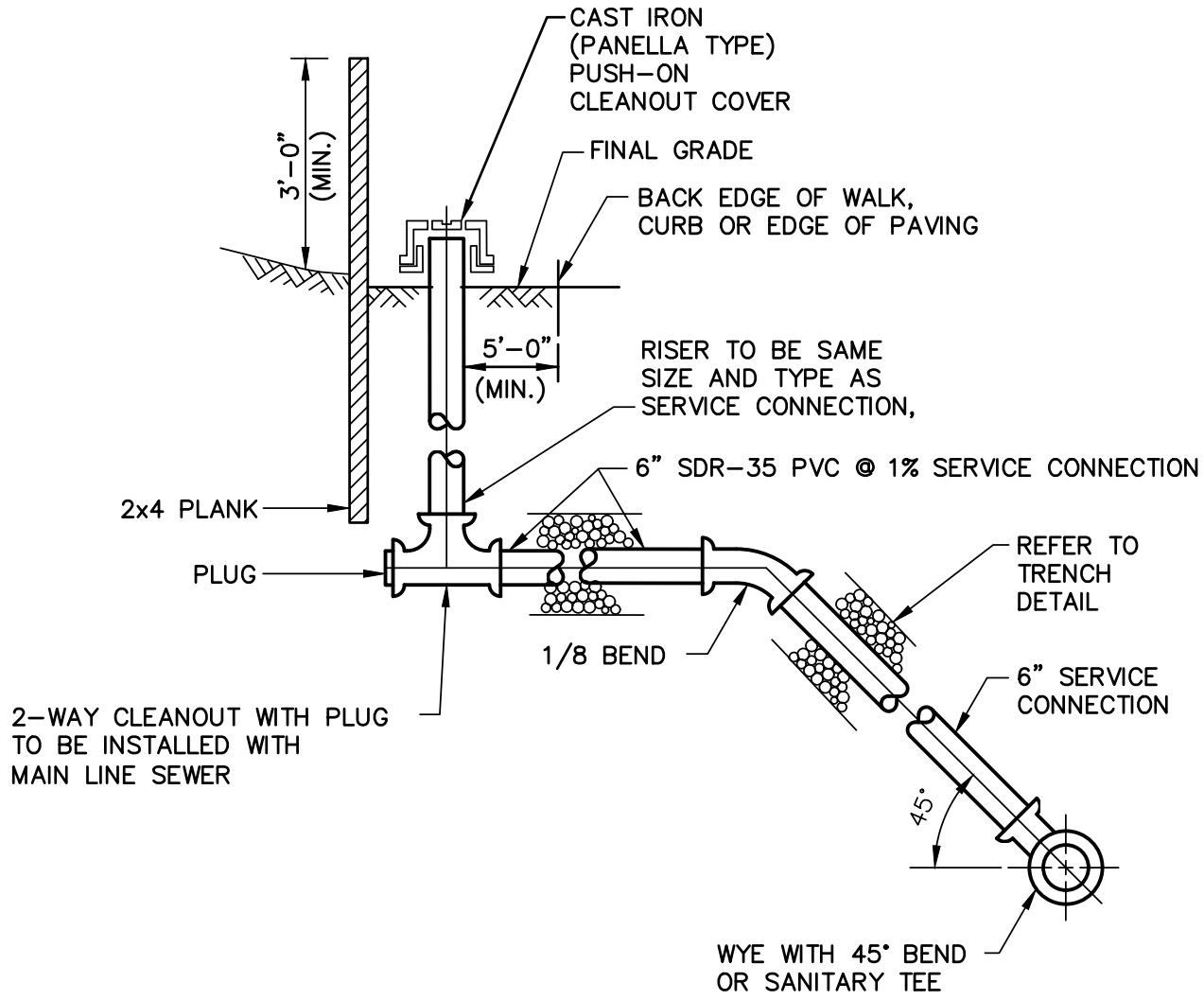
FILE NAME: LAT-1-SHALLOW.dwg

STANDARD DETAILS

SERVICE LATERAL - SHALLOW SEWER

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED
SCALE: NO SCALE	DWG. NO.: LAT-1



ELEVATION

NOTES:

1. CURB CLEANOUT NOT TO BE LOCATED IN SIDEWALK, DRIVEWAY OR BENEATH OTHER CURBLINE UTILITIES.
2. CLEANOUT TO BE LOCATED BETWEEN SIDEWALK AND CURB.

FILE NAME: LAT-2-DEEP.dwg

STANDARD DETAILS

SERVICE LATERAL - DEEP SEWER

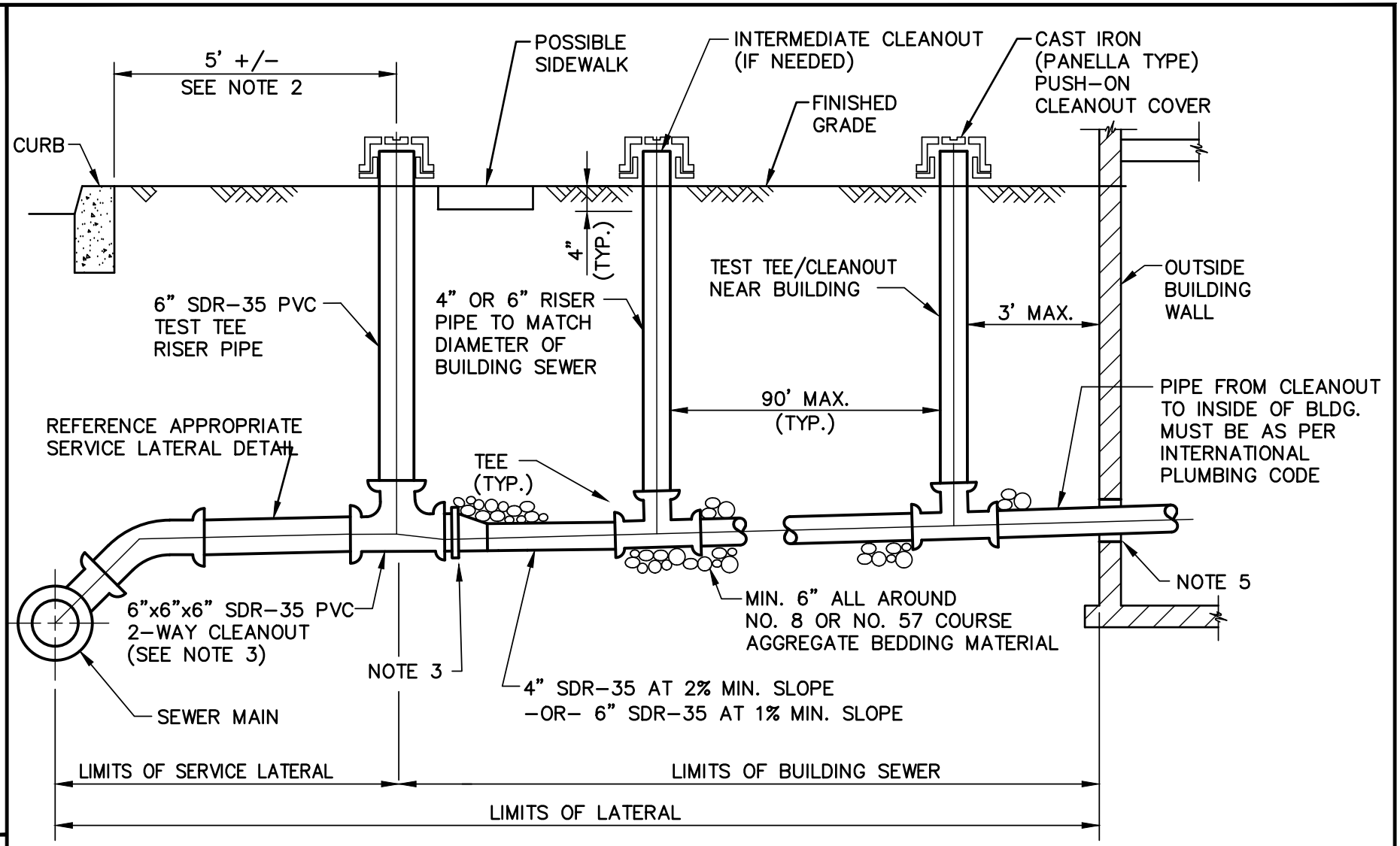
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED
SCALE: NO SCALE	DWG. NO.: LAT-2

NORTH LONDONDERRY TOWNSHIP AUTHORITY

STANDARD DETAILS

BUILDING SEWER



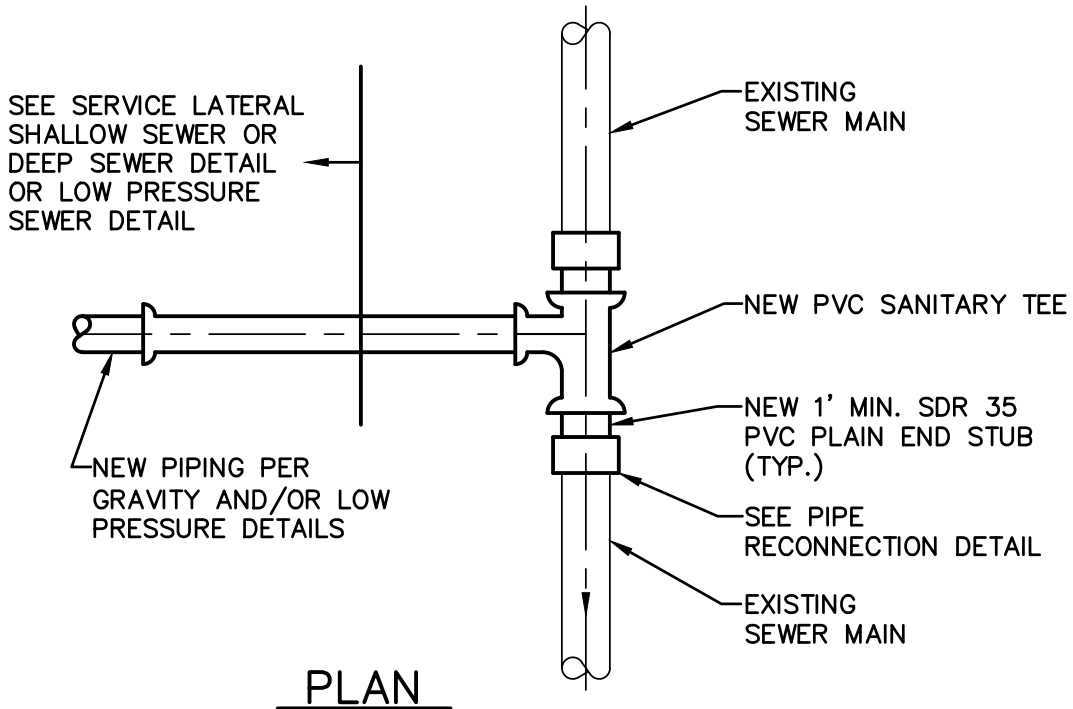
ELEVATION

NOTES:

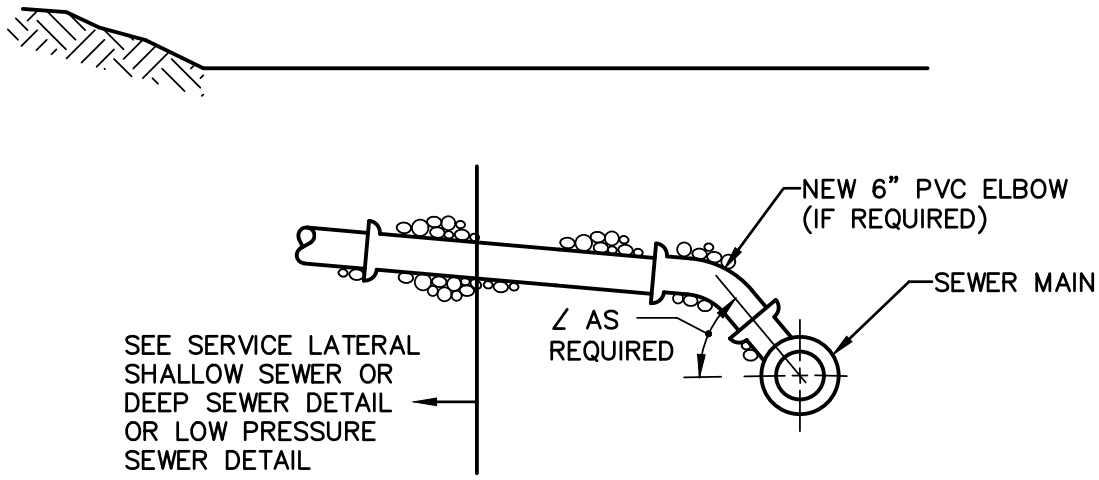
1. PIPE SIZES AND MATERIALS TO BE IN ACCORDANCE WITH AUTHORITY REQUIREMENTS.
2. LOCATE CURB CLEANOUT BETWEEN CURB AND SIDEWALK, BUT NOT UNDERNEATH ANY CURB SIDE UTILITIES. IF THERE IS NO CURB, LOCATE CLEANOUT AT EDGE OF RIGHT-OF-WAY.
3. FOR 4" BUILDING SEWER, USE ECCENTRIC 4"x6" ADAPTER FITTING FOR TRANSITION TO TEST TEE (4"x6" FLEXIBLE COUPLING NOT ALLOWED).
4. CLEANOUT/TEST TEE SPACING IS 90' MAXIMUM.
5. WALL SLEEVE (REFER TO PAGE 615 P2603.4 OF THE IRC.
6. ANY PIPE LESS THAN 3 FEET OF COVER SHALL BE DUCTILE IRON.
7. REFER TO PAGE 645 AND 646 P2905.4.2 OF THE IRC.

SCALE	DATE	REVISIONS
NO SCALE	2/18	
FILE LAT-3	DWG. CREATED	

FILE NAME: LAT-3-BLDGSEWER.dwg



PLAN



ELEVATION

NOTES:

1. EXISTING MAIN SEWER TO BE SAW CUT.

FILE NAME: LAT-4-CONNTOMAIN.dwg

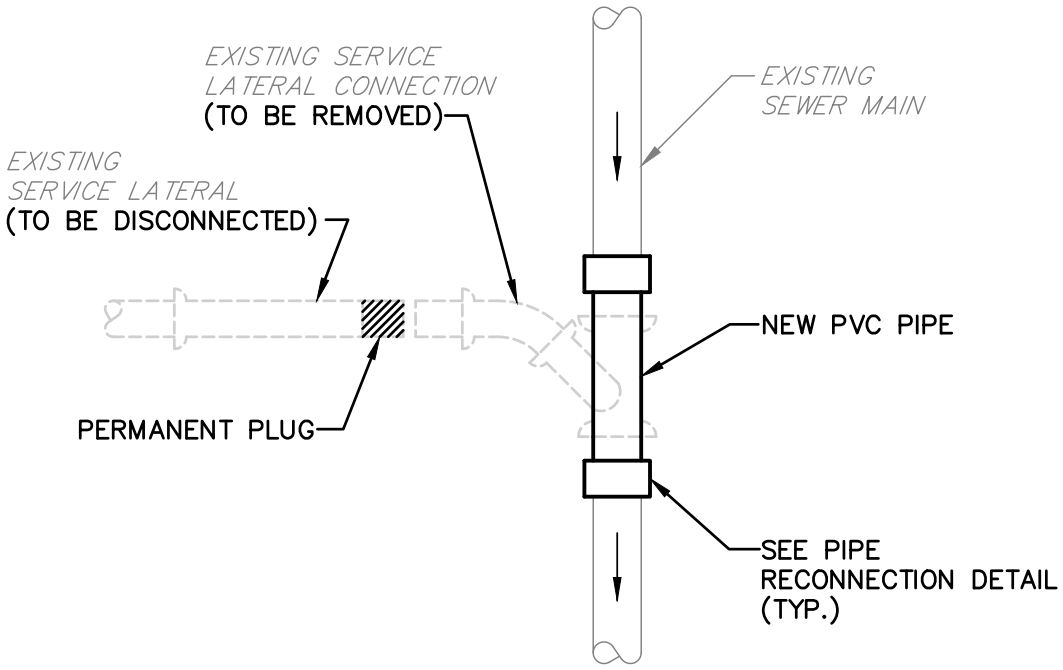
STANDARD DETAILS

SERVICE LATERAL CONNECTION TO EXISTING SEWER MAIN

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-4



PLAN

NOTES:

1. EXISTING MAIN SEWER TO BE SAW CUT.

FILE NAME: LAT-5-DISCONNECTION.dwg

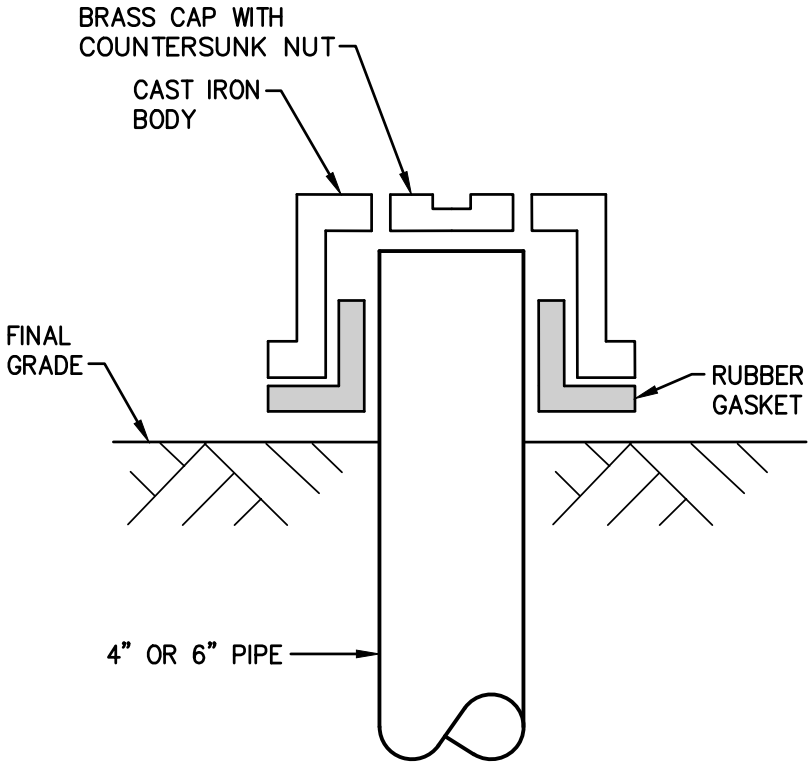
STANDARD DETAILS

SERVICE LATERAL DISCONNECTION FROM EXISTING SEWER MAIN

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-5



SECTION

FILE NAME: LAT-6-CLEANOUTCAP.dwg

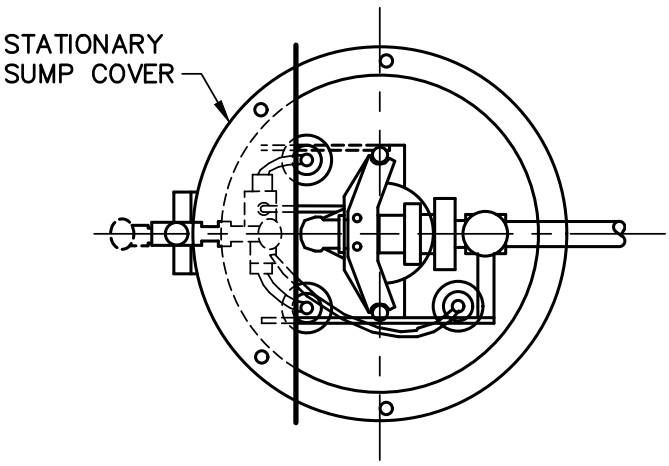
STANDARD DETAILS

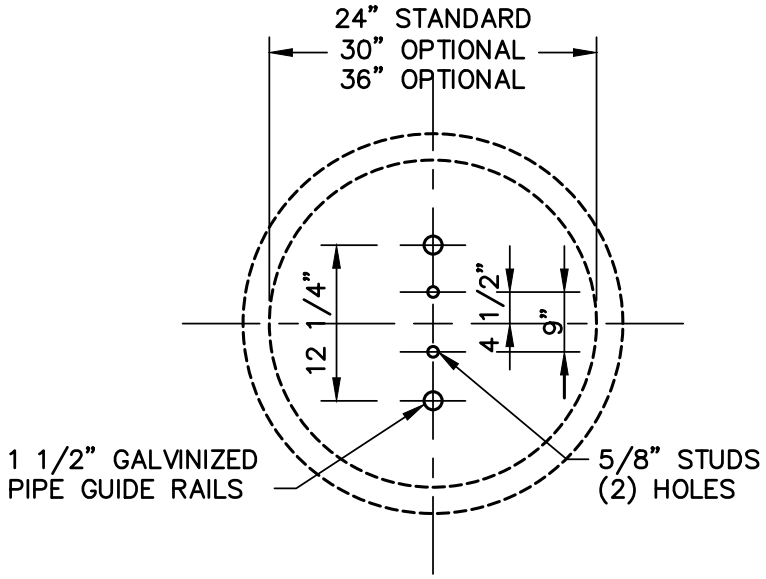
CAST IRON (PANELLA TYPE) PUSH-ON CLEANOUT COVER

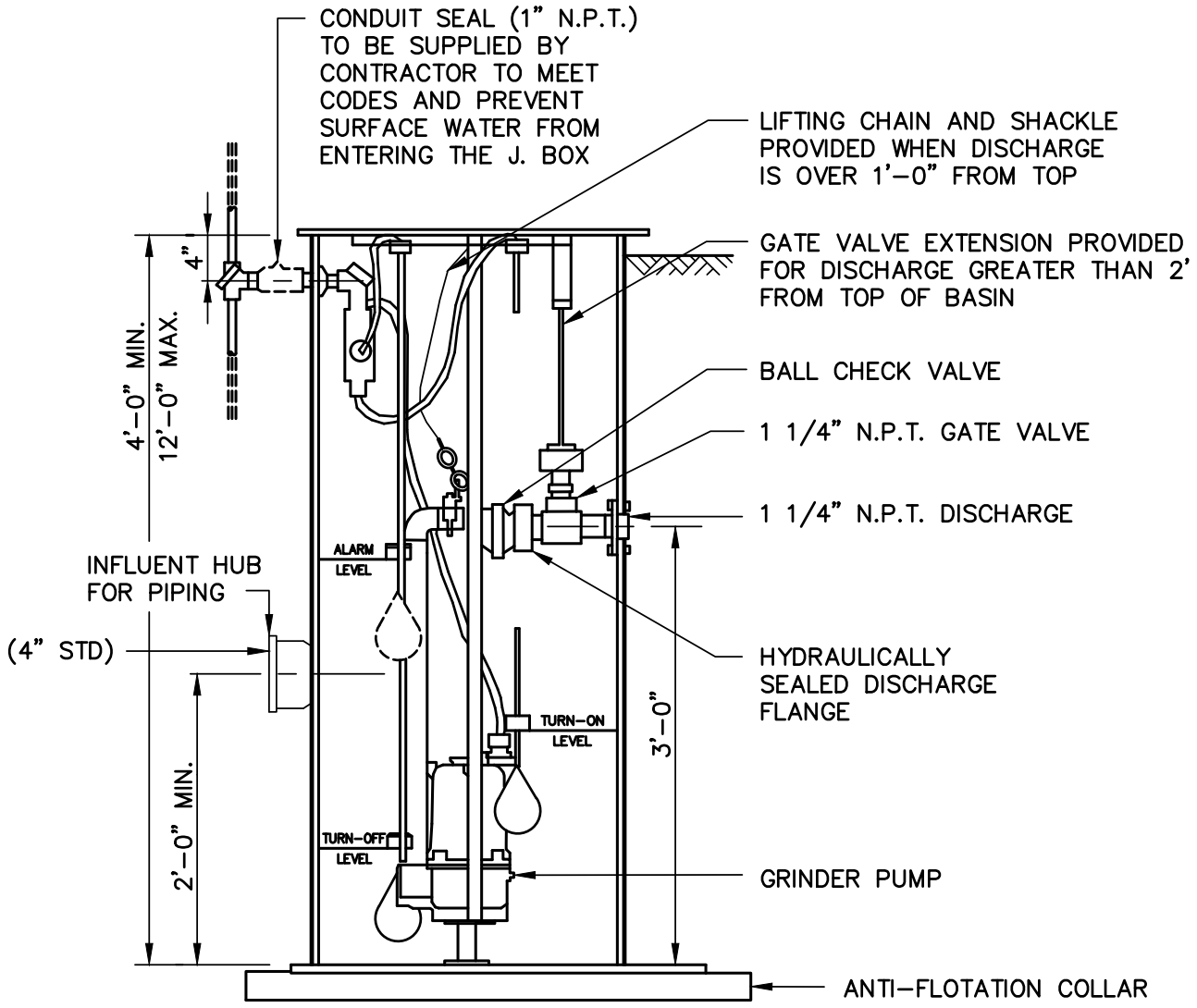
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-6







FILE NAME: LAT-7-GRINDERPUMP.dwg

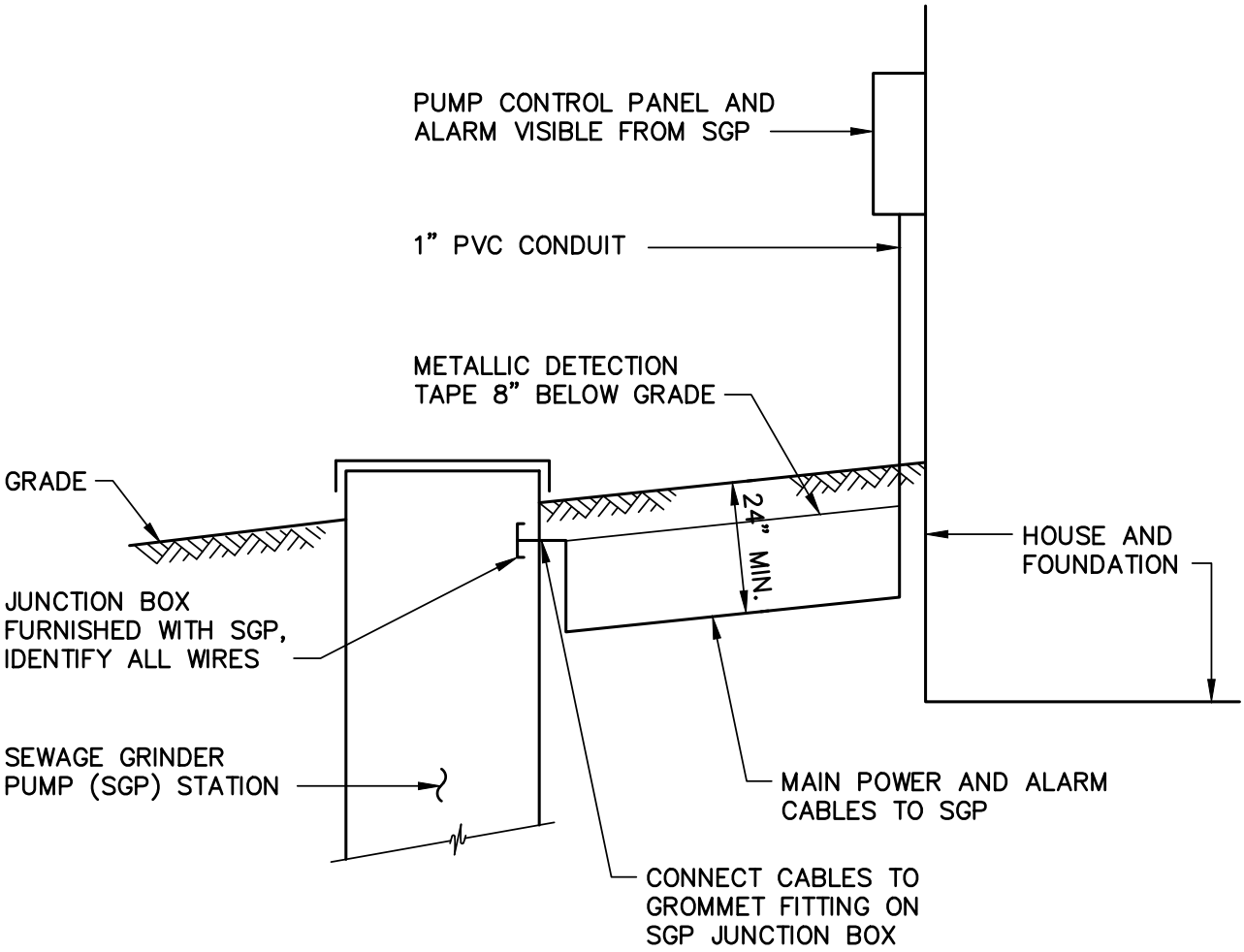
STANDARD DETAILS

SIMPLEX SEWAGE GRINDER PUMP STATION

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-7



FILE NAME: LAT-8-GRINDERELEC.dwg

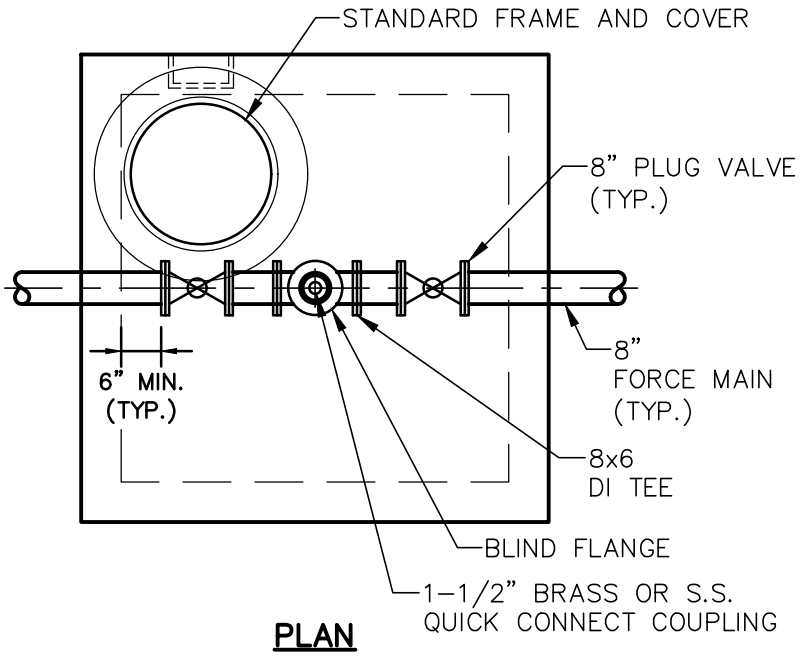
STANDARD DETAILS

TYPICAL ELECTRICAL LAYOUT

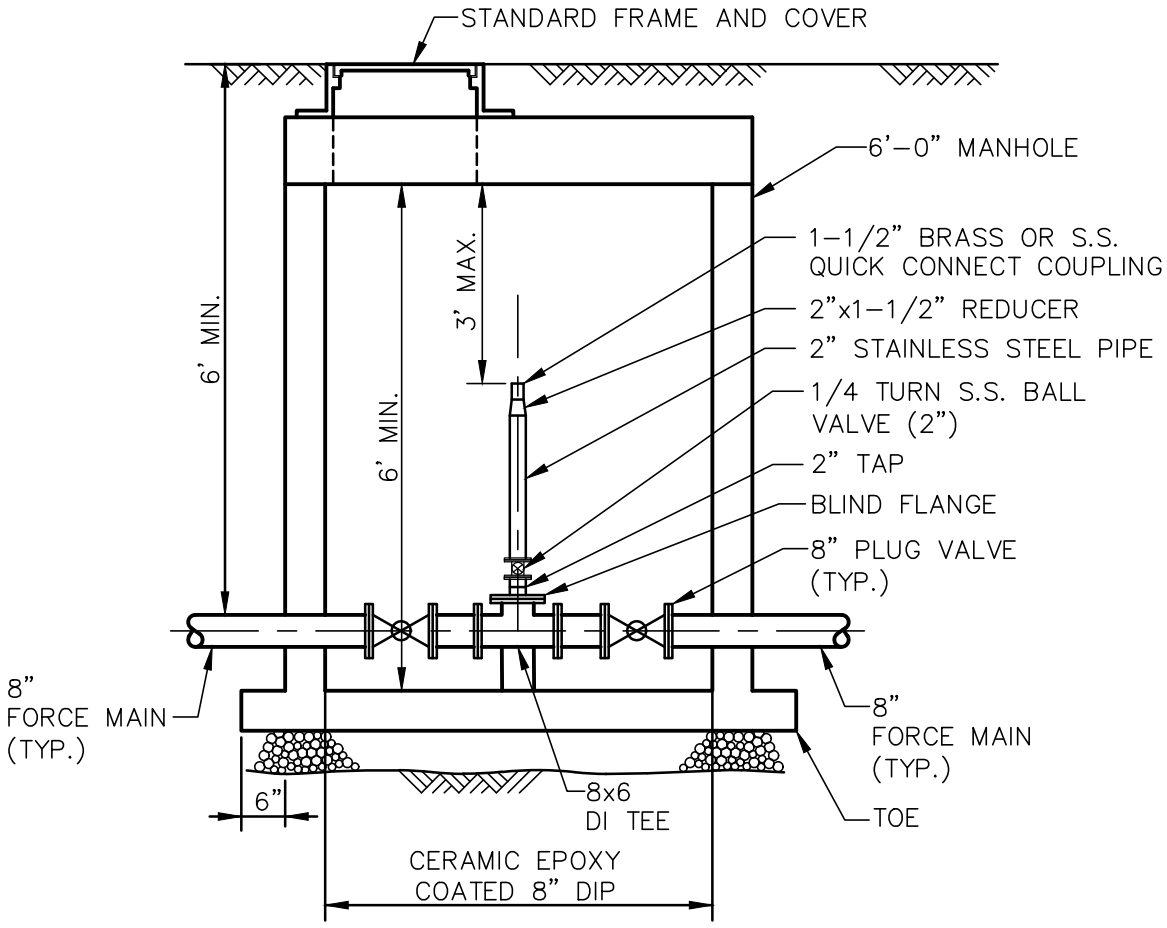
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LAT-8



PLAN



SECTION

FILE NAME: FM-1-FLUSH-CHAMBER.dwg

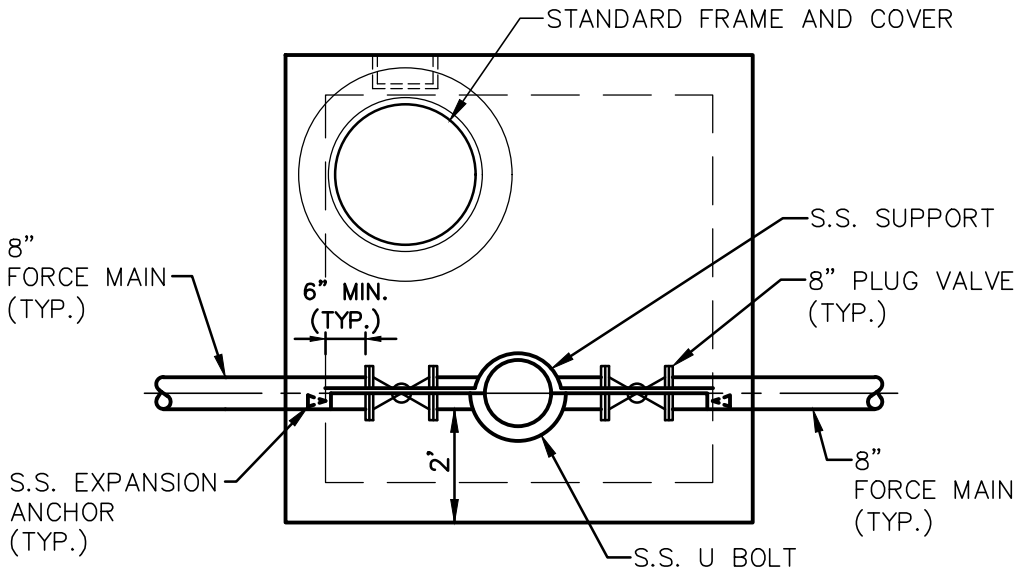
STANDARD DETAILS

FLUSH CHAMBER

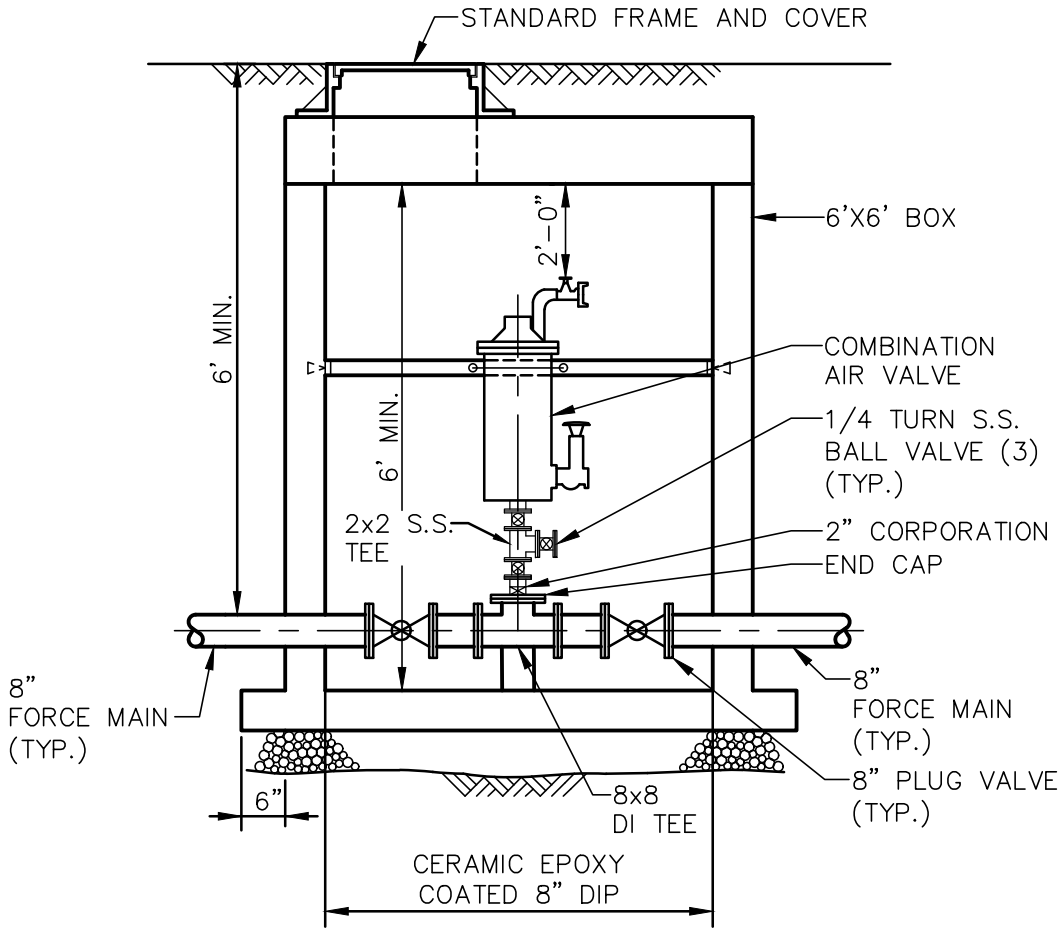
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	FM-1



PLAN



SECTION

FILE NAME: FM-2-AIR-RELEASE.dwg

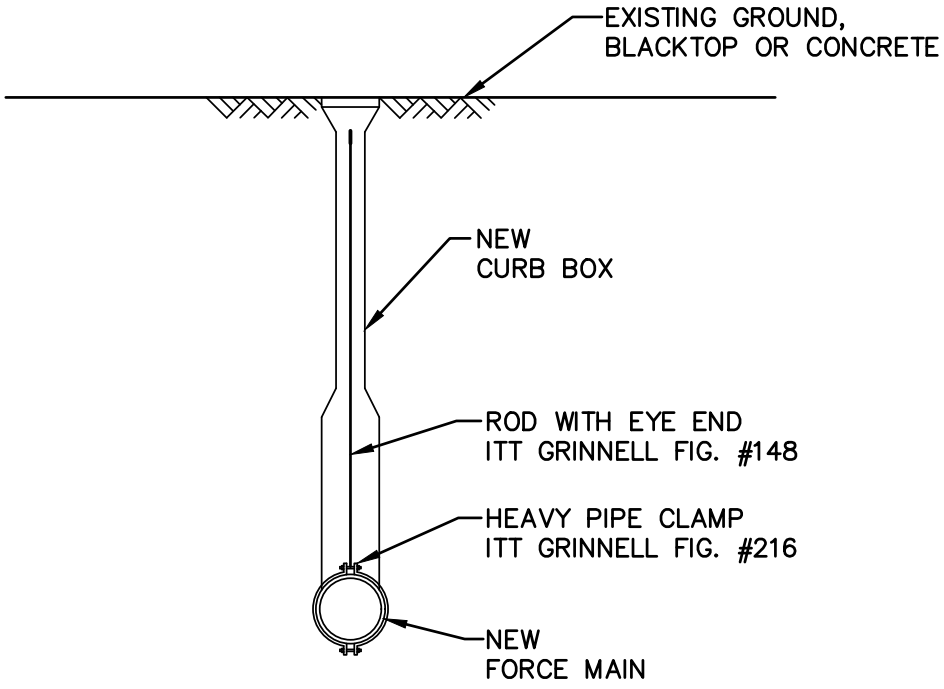
STANDARD DETAILS

AIR RELEASE VALVE CHAMBER

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	FM-2



FILE NAME: FM-3-FMLOCATOR.dwg

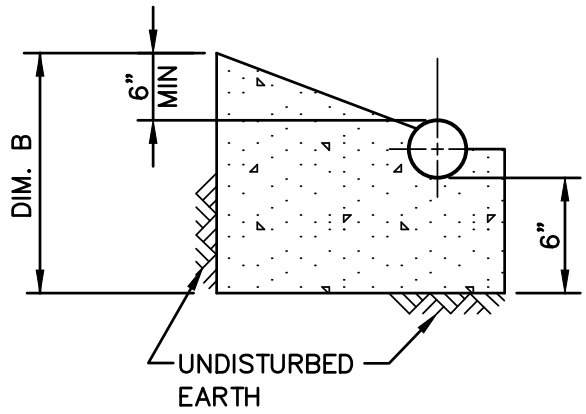
STANDARD DETAILS

FORCEMAIN LOCATOR ASSEMBLY

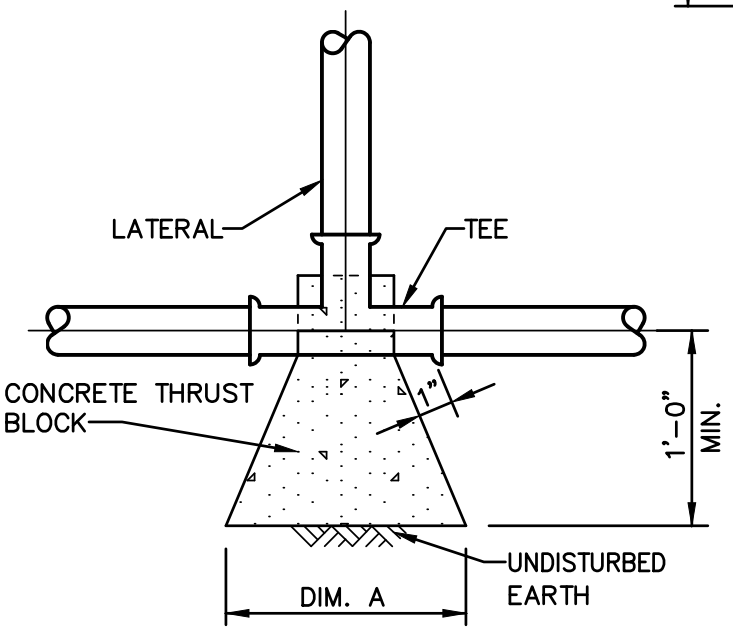
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

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

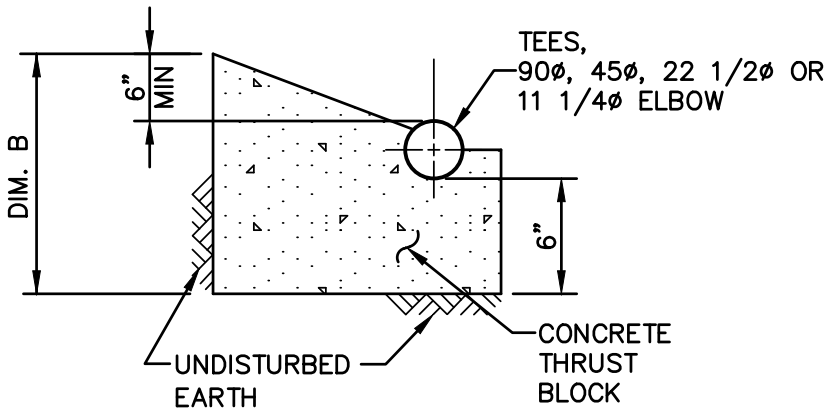
HORIZONTAL THRUST BLOCK DETAILS FORCE MAIN

NORTH LONDONDERRY TOWNSHIP AUTHORITY

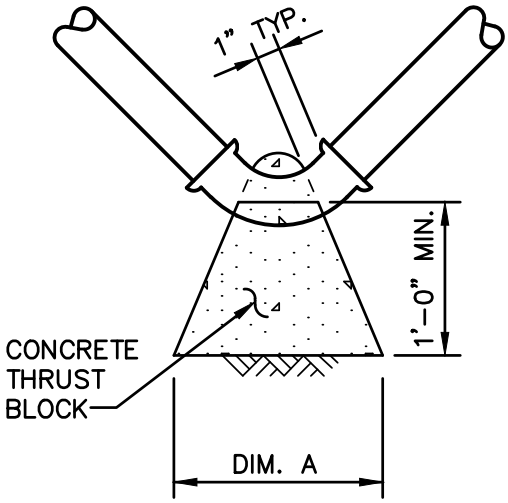
DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	FM-4

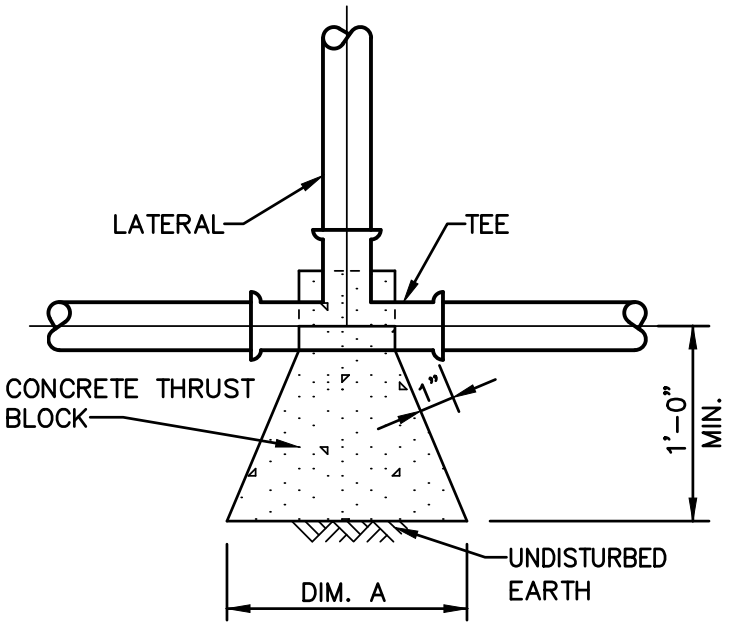
ELBOW DIMENSION SCHEDULE											
DIM.	3"–90°	3"–45°	3"–22 1/2°	3"–11 1/4°	2 1/2"–90°	2 1/2"–45°	2 1/2"–22 1/2°	2"–90°	2"–45°	1 1/2"–90°	1 1/2"–45°
A	20"	18"	16"	12"	18"	16"	14"	16"	14"	14"	12"
B	15"	15"	15"	14"	15"	15"	15"	14"	14"	14"	14"



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

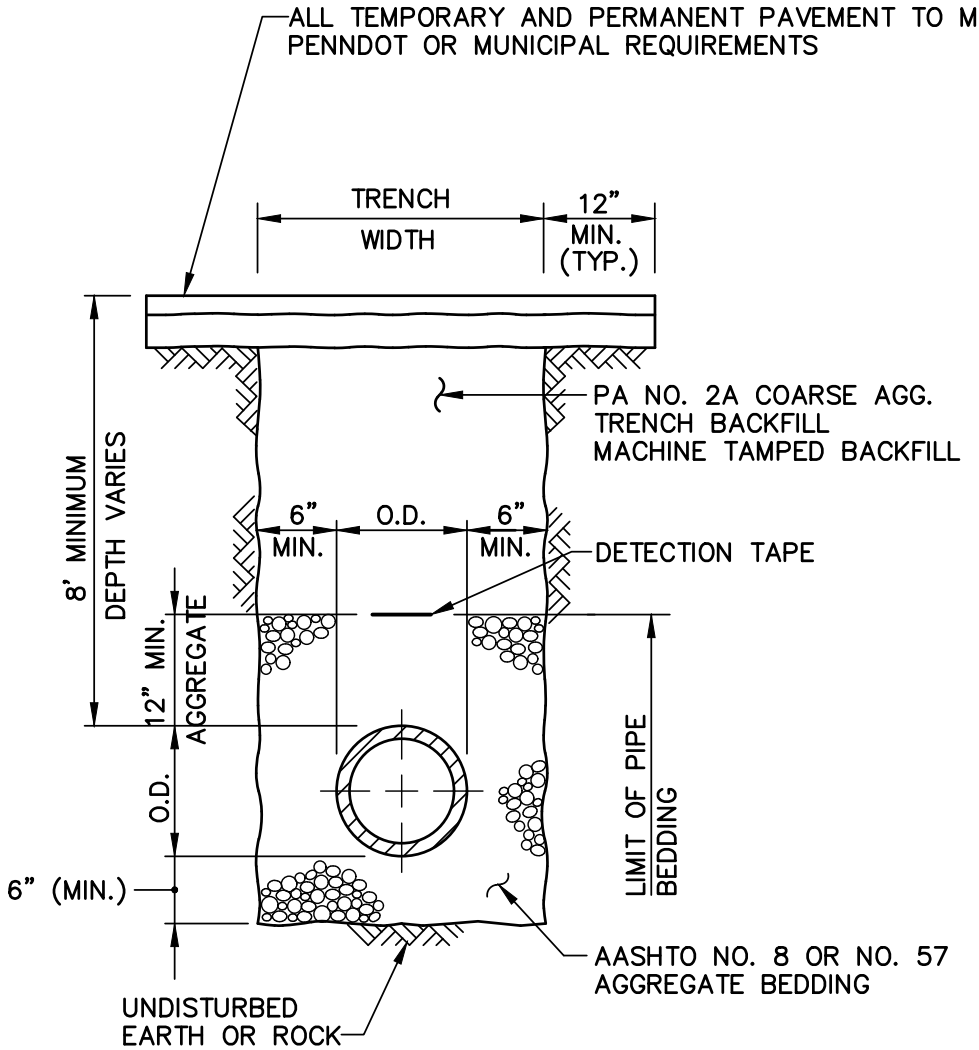
STANDARD DETAILS

CONCRETE THRUST BLOCK DETAILS FORCE MAIN

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	FM–5



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.

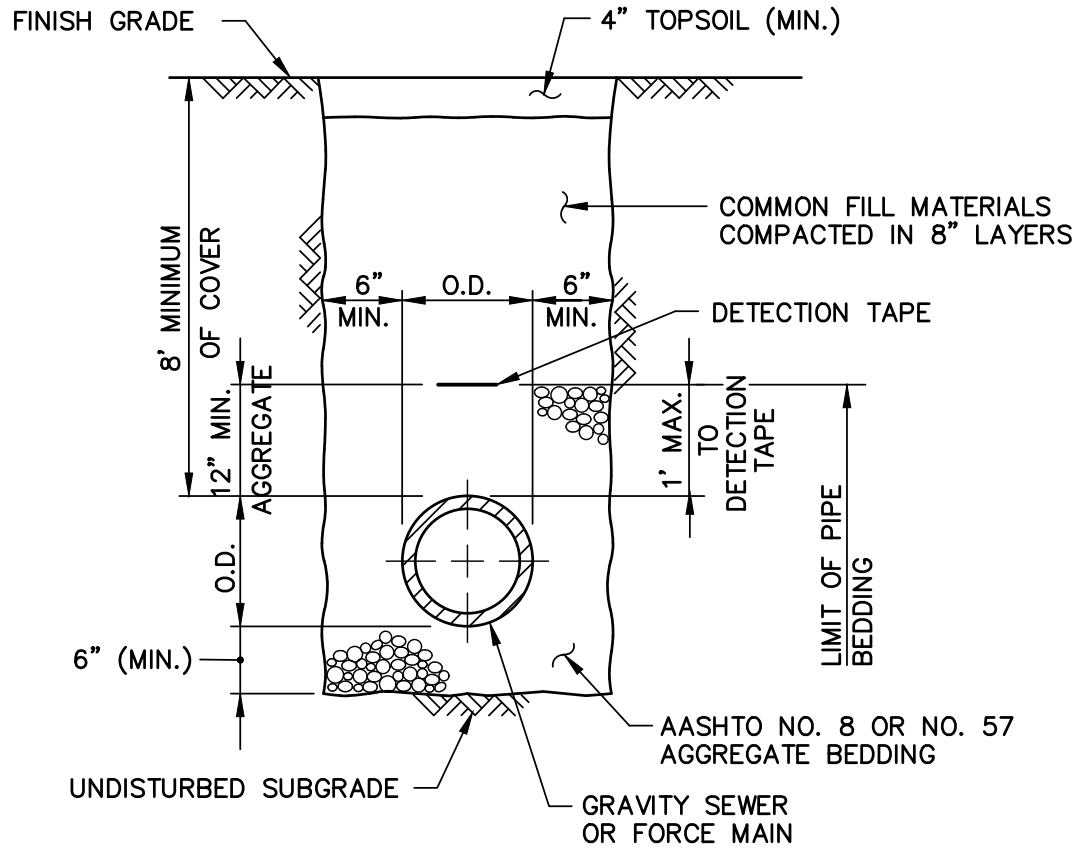
FILE NAME: TRENCH–1–PAVED.dwg

STANDARD DETAILS

TRENCH DETAIL IN PAVED AREAS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED
SCALE NO SCALE	DWG. NO. TRENCH–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.

FILE NAME: TRENCH–2–UNPAVED.dwg

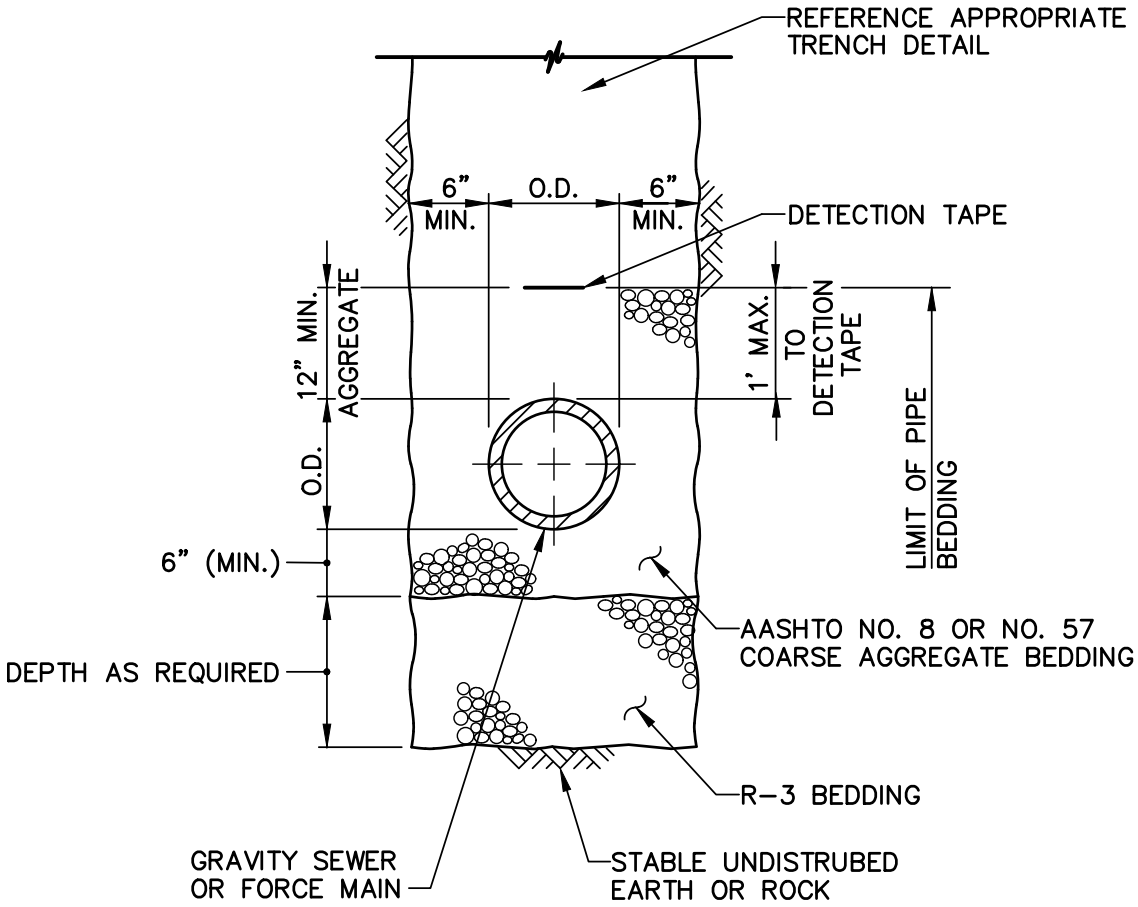
STANDARD DETAILS

TRENCH DETAIL IN UNPAVED AREAS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	TRENCH–2



FILE NAME: TRENCH-3-UME.dwg

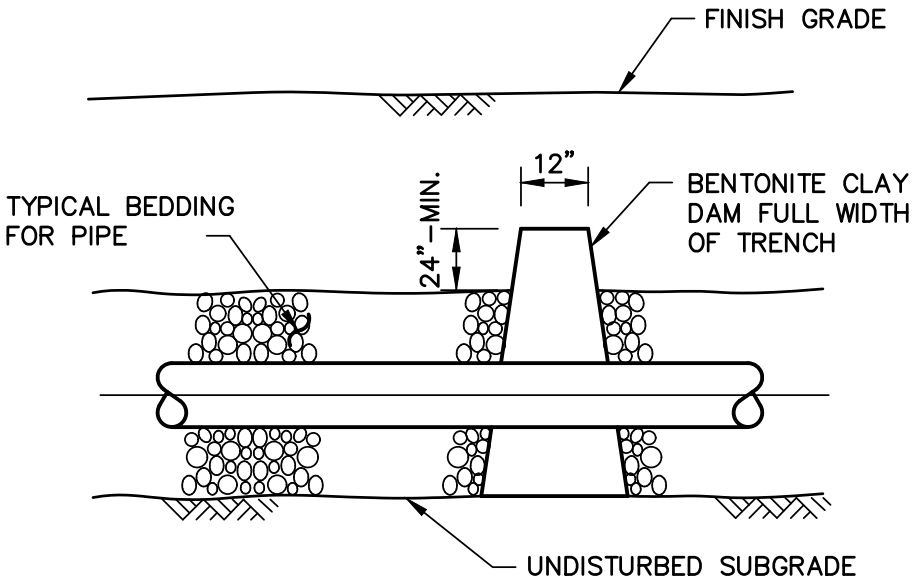
STANDARD DETAILS

UNSUITABLE MATERIAL EXCAVATION

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	TRENCH-3



NOTES:

1. HEIGHT OF CLAY DAM TO BE DETERMINED IN THE FIELD.

FILE NAME: TRENCH-4-CLAYDAM.dwg

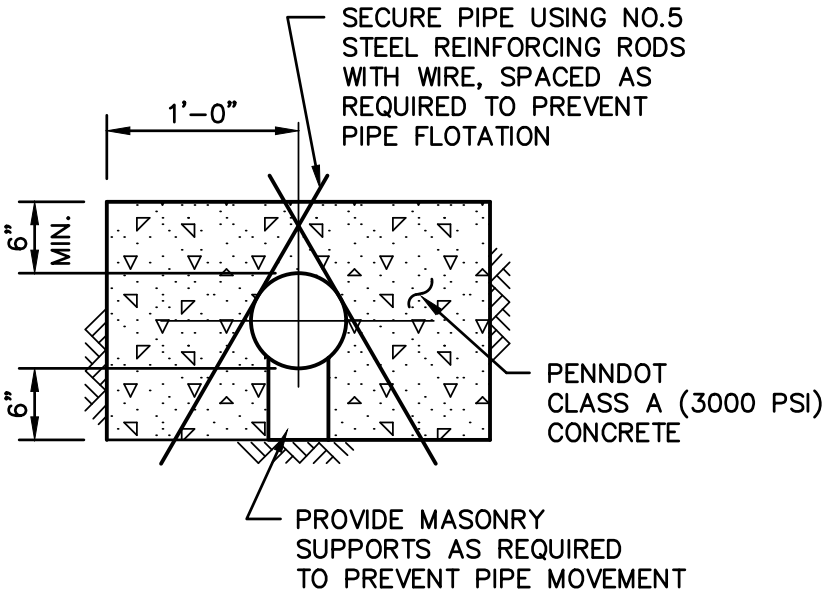
STANDARD DETAILS

BENTONITE CLAY DAM DETAIL

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	TRENCH-4



FILE NAME: TRENCH-5-ENCASEMENT.dwg

STANDARD DETAILS

CONCRETE ENCASEMENT DETAIL

NORTH LONDONDERRY TOWNSHIP AUTHORITY

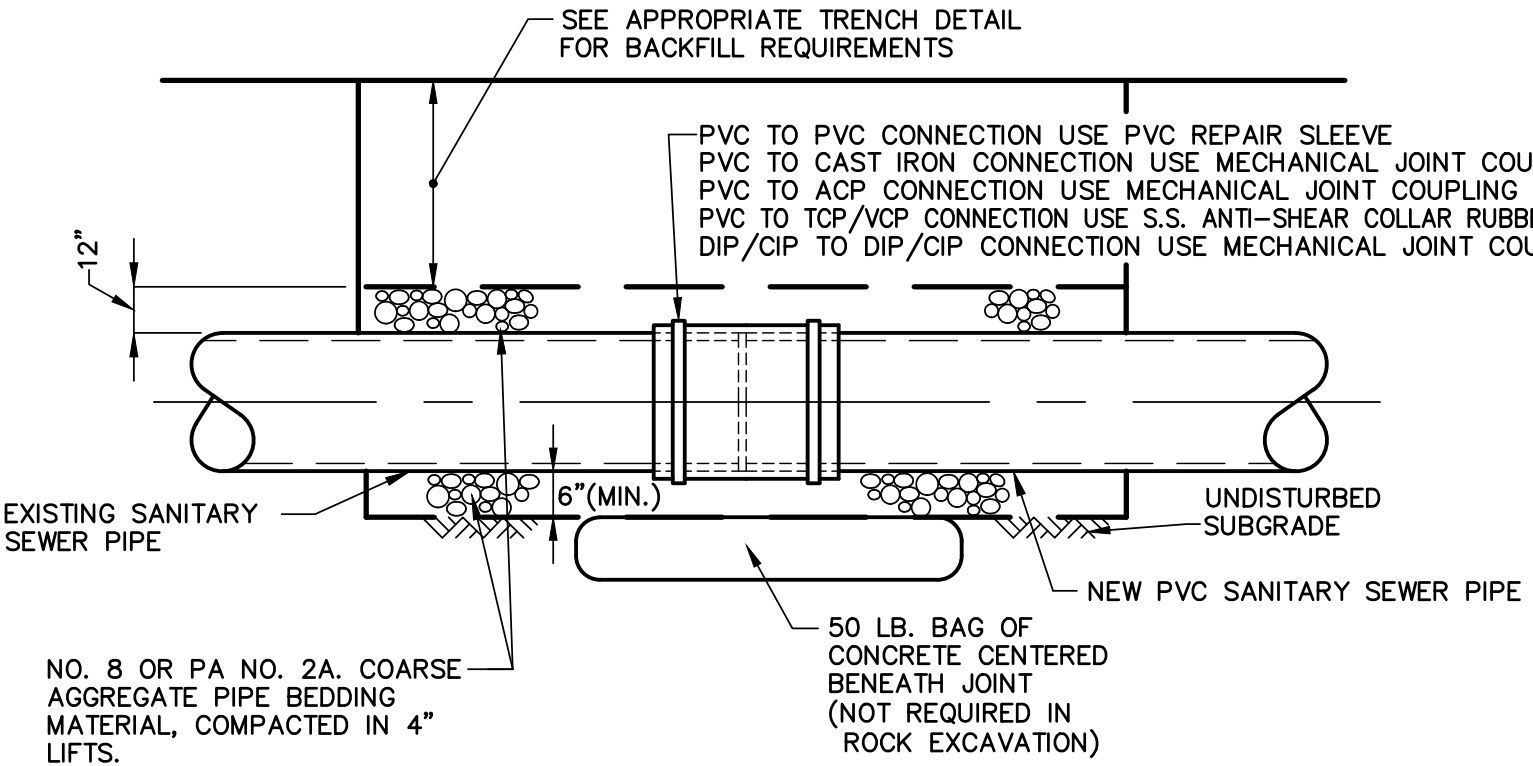
DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	TRENCH-5

NORTH LONDONDERRY TOWNSHIP AUTHORITY

STANDARD DETAILS

PIPE RECONNECTION DETAIL



NOTES:

1. RECONNECTIONS TO BE AIR TESTED IN ACCORDANCE WITH SPECIFICATIONS.
2. MECHANICAL JOINT COUPLINGS TO BE SMITH-BLAIR OR APPROVED EQUAL

SCALE	DWG. NO.
NO SCALE	SEW-1

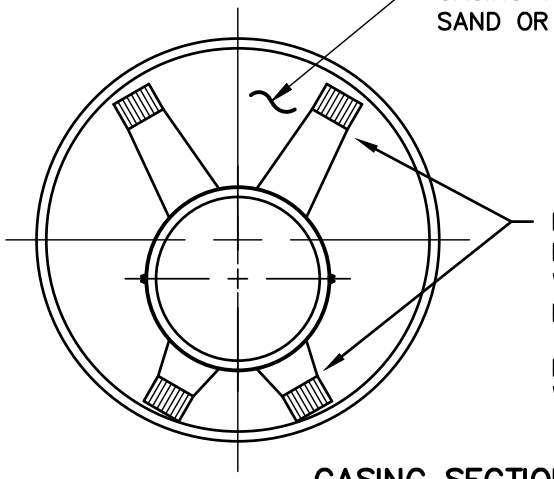
DATE	REVISIONS
2/18	DWG. CREATED

FILE NAME: SEW-1-PIPERECONN.dwg

STANDARD DETAILS

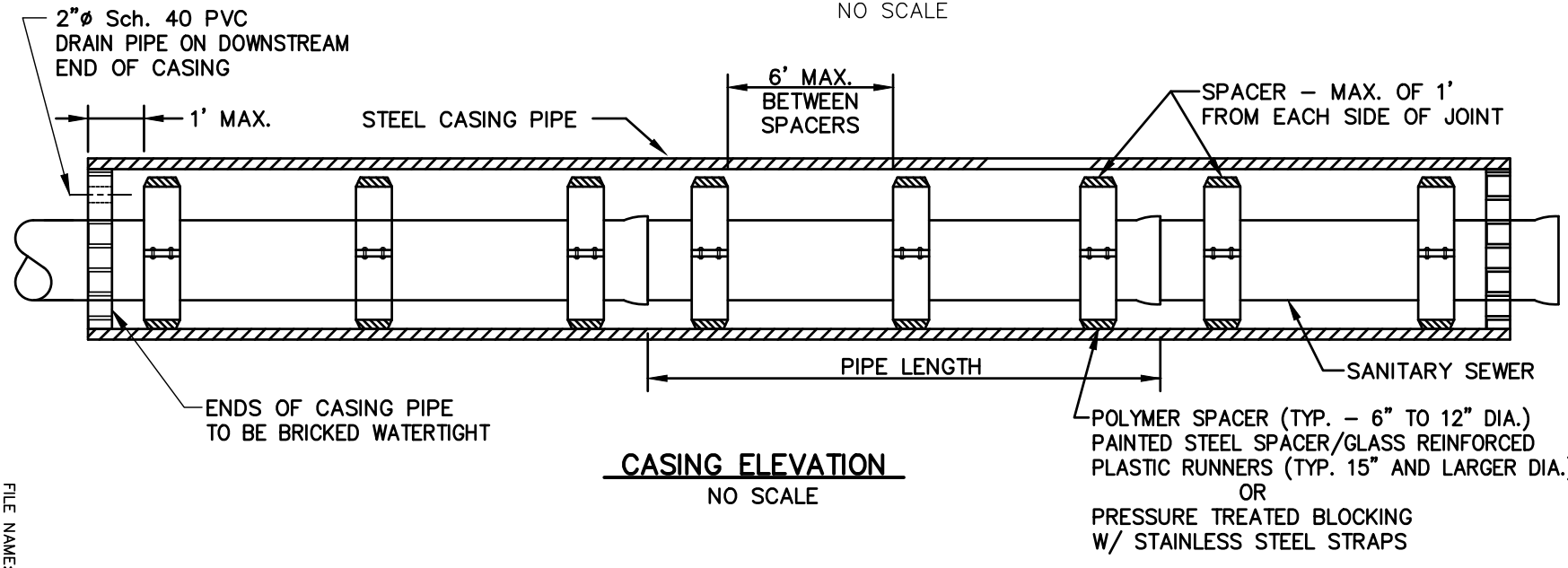
CASING DETAILS FOR PIPE BORINGS/TUNNELS

NORTH LONDONDERRY TOWNSHIP 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

SCALE	DWG. NO.
NO SCALE	SEW-2

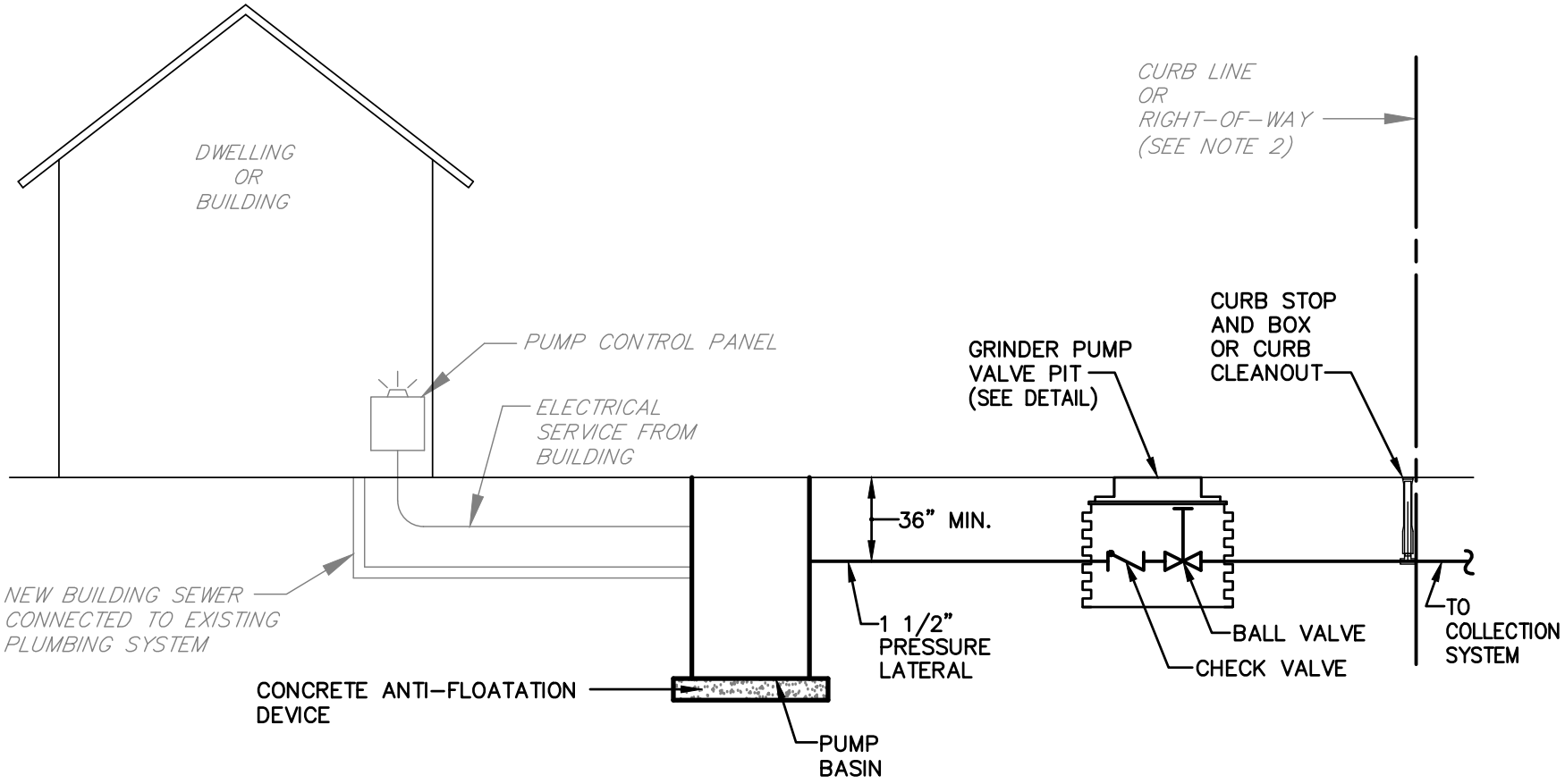
DATE	DWG. CREATED	REVISIONS
2/18		

FILE NAME: SEW-2-PIPECASING.dwg

TYPICAL GRINDER PUMP INSTALLATION DETAIL

STANDARD DETAILS

NORTH LONDONDERRY TOWNSHIP AUTHORITY



NOTES:

1. PROVIDE CHECK VALVE AND BALL VALVE IN VALVE PIT ONLY REQUIRED WHEN CONNECTING TO L.P.S. MAIN.

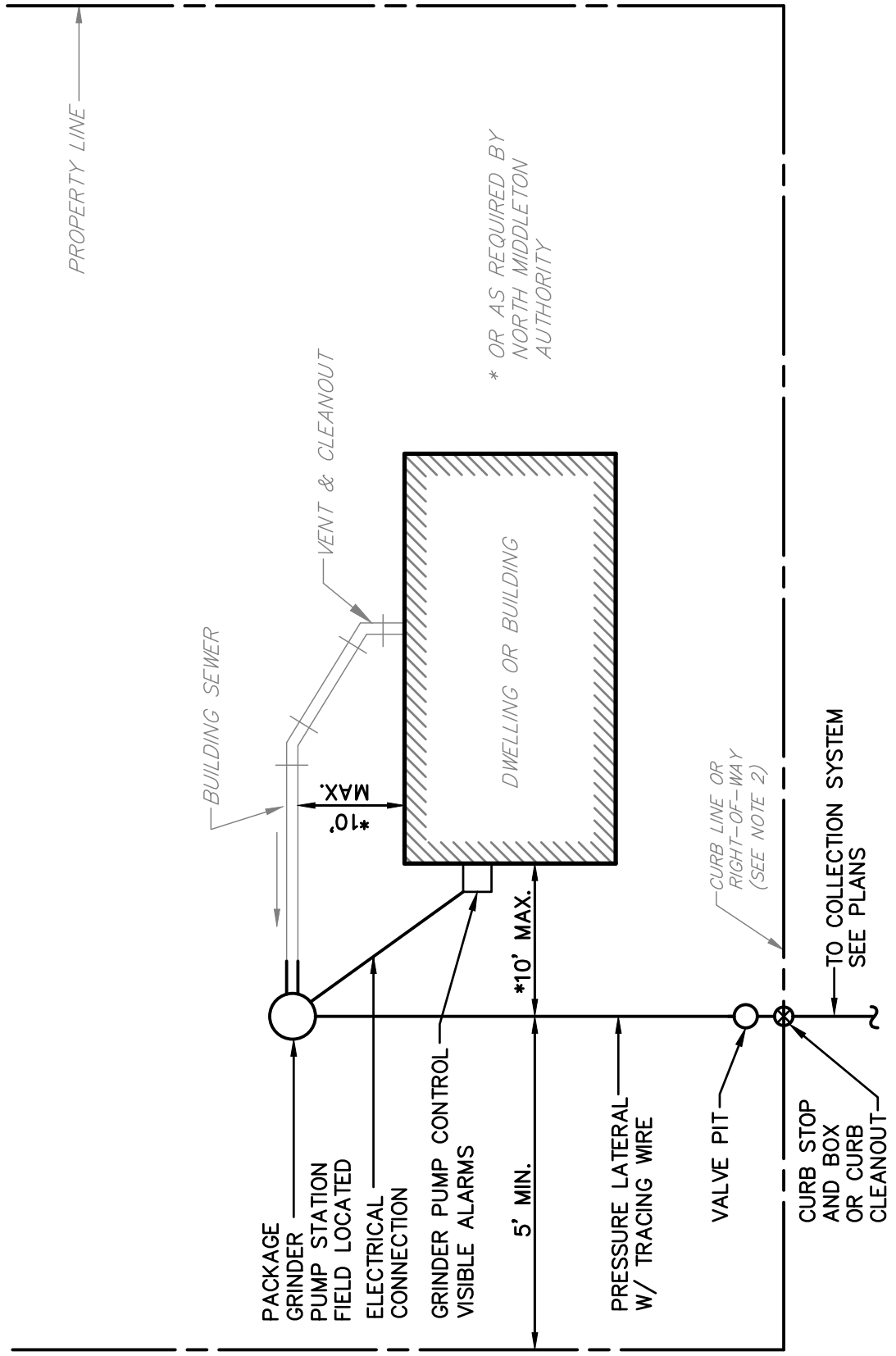
2. REFER TO LAT-1 DETAIL FOR LOCATION.

DATE	REVISIONS
2/18	DWG. CREATED

SCALE: NO SCALE

DWG. NO. LP-1

FILE NAME: LP-1-2-GRINDPMPINST.dwg



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

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-2

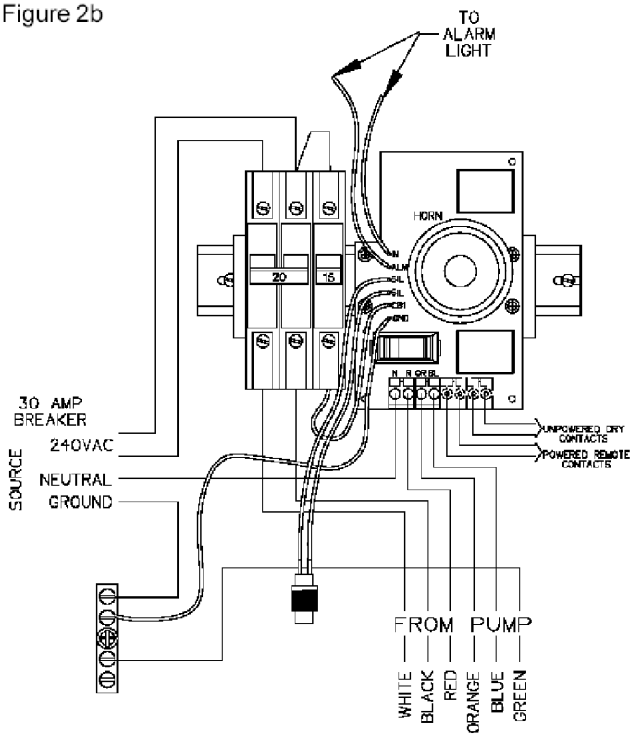
Environment One Grinder Pump Feature Identification:

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

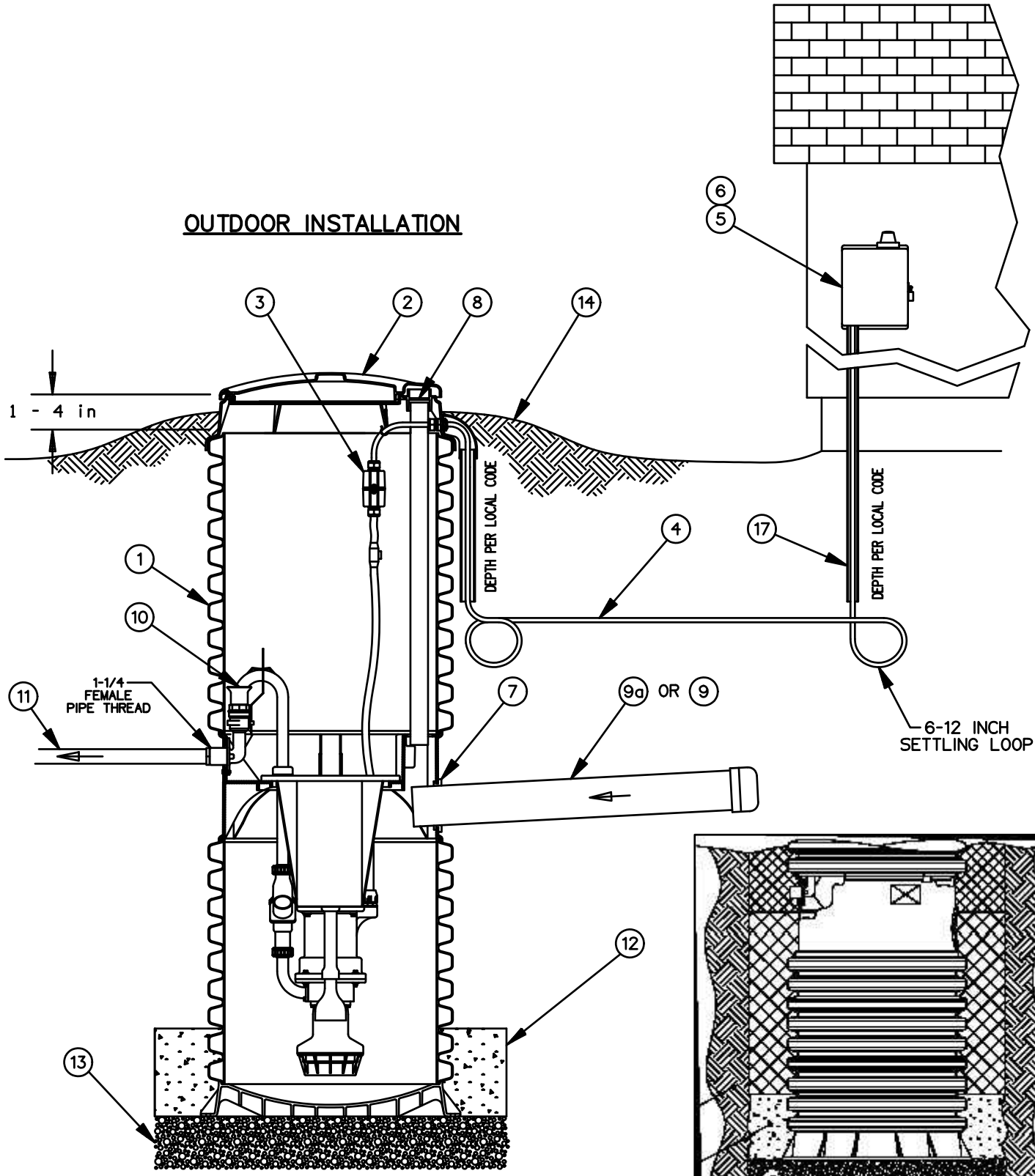
ENVIRONMENT ONE GRINDER PUMP FEATURE IDENTIFICATION – 240 VOLT WIRING

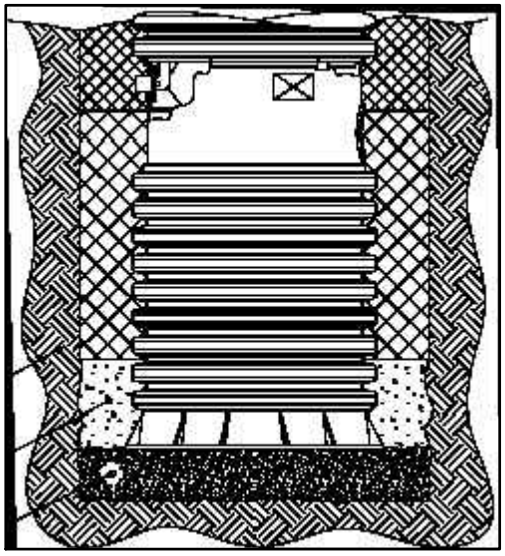
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP–3

OUTDOOR INSTALLATION





POURED IN-PLACE

FILE NAME: LP-3-4-EONEGRINDERPUMP.dwg

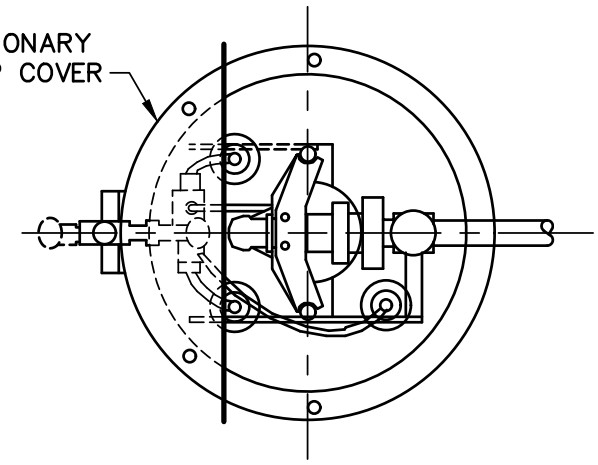
STANDARD DETAILS

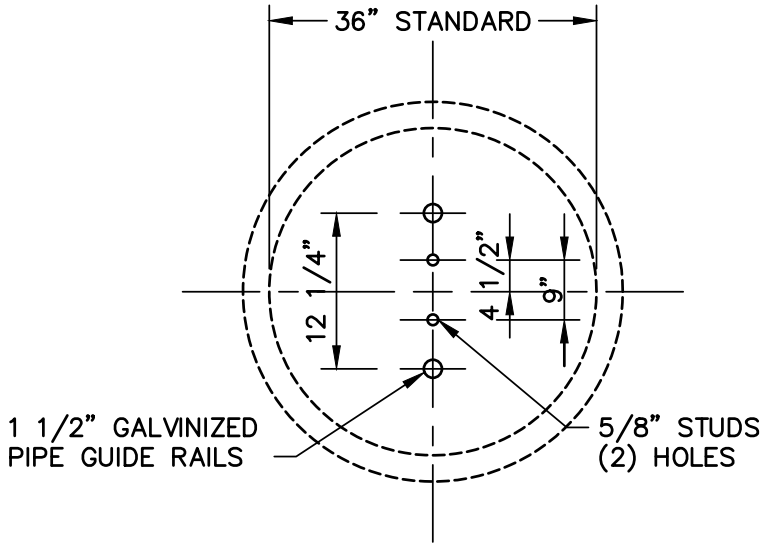
ENVIRONMENT ONE GRINDER PUMP OUTDOOR INSTALLATION - POURED IN-PLACE

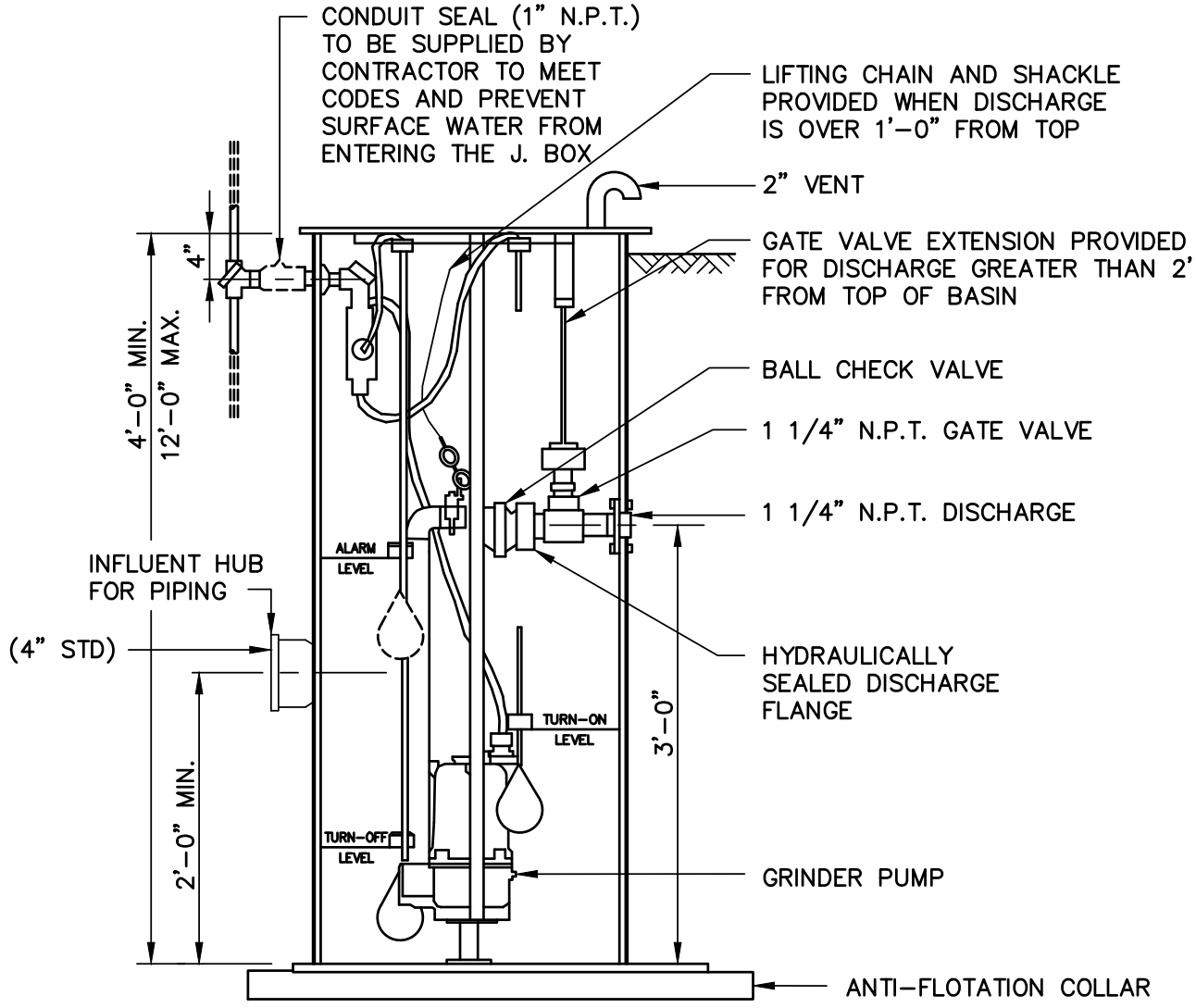
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-4







FILE NAME: LP-5-GRINDERPUMP.dwg

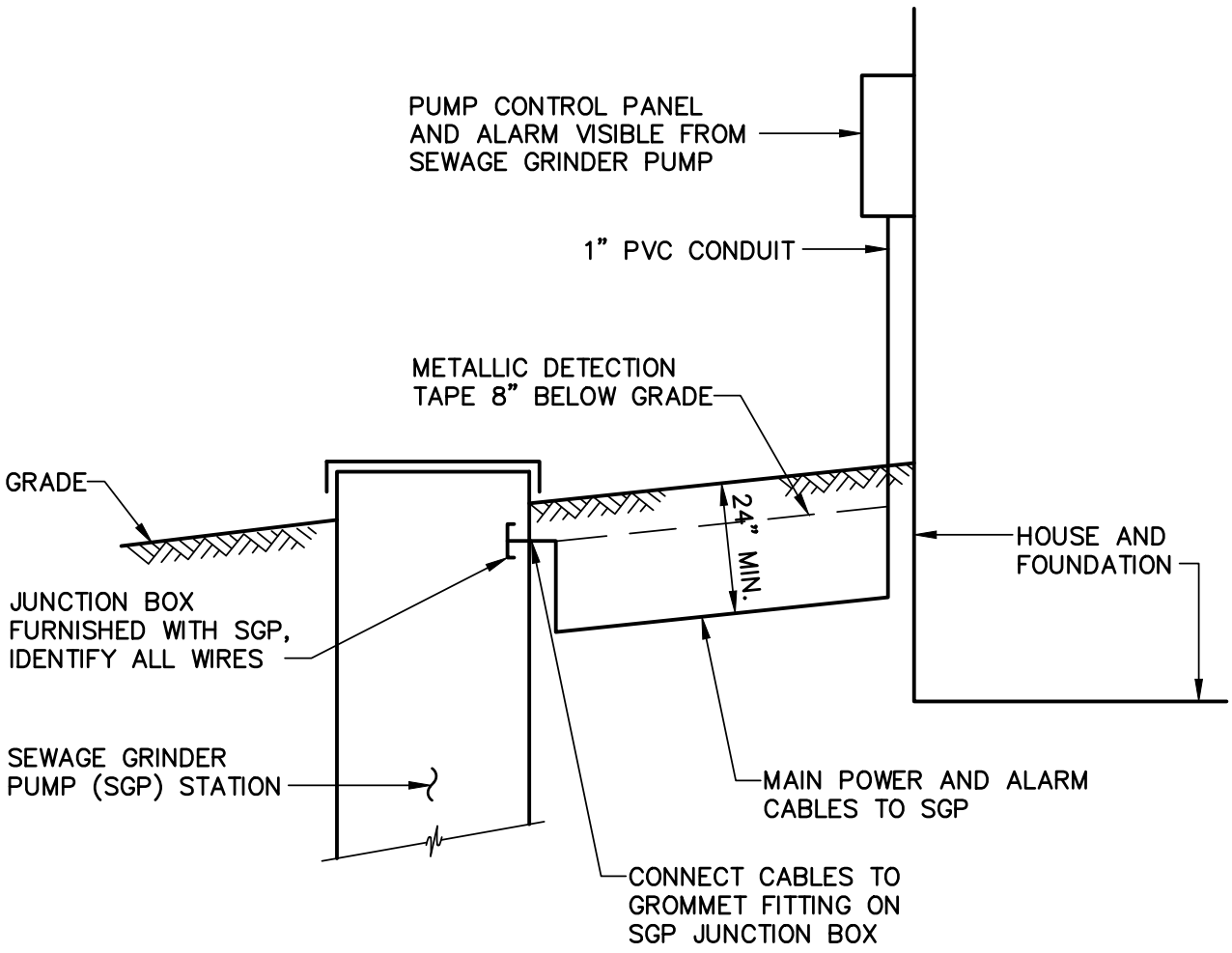
STANDARD DETAILS

SIMPLEX SEWAGE GRINDER PUMP STATION

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-5



FILE NAME: LP-TYPELEC.dwg

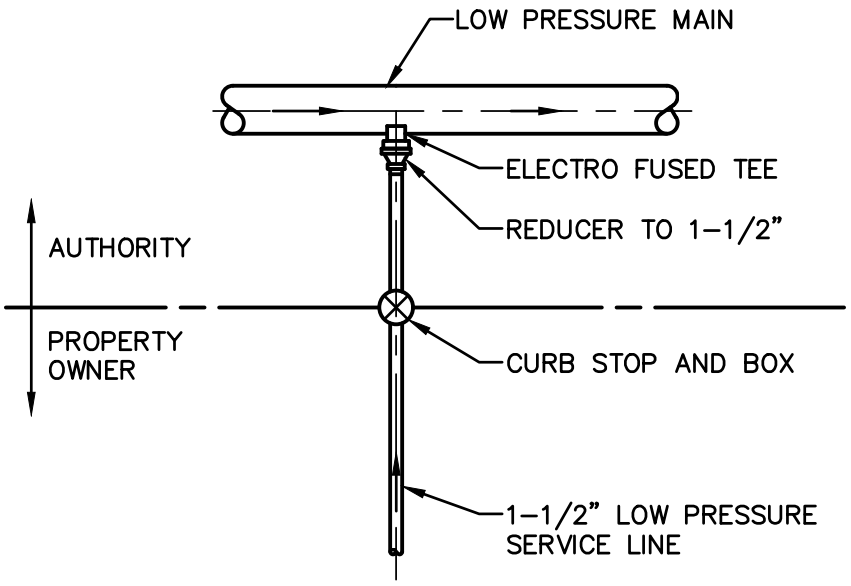
STANDARD DETAILS

TYPICAL ELECTRICAL LAYOUT

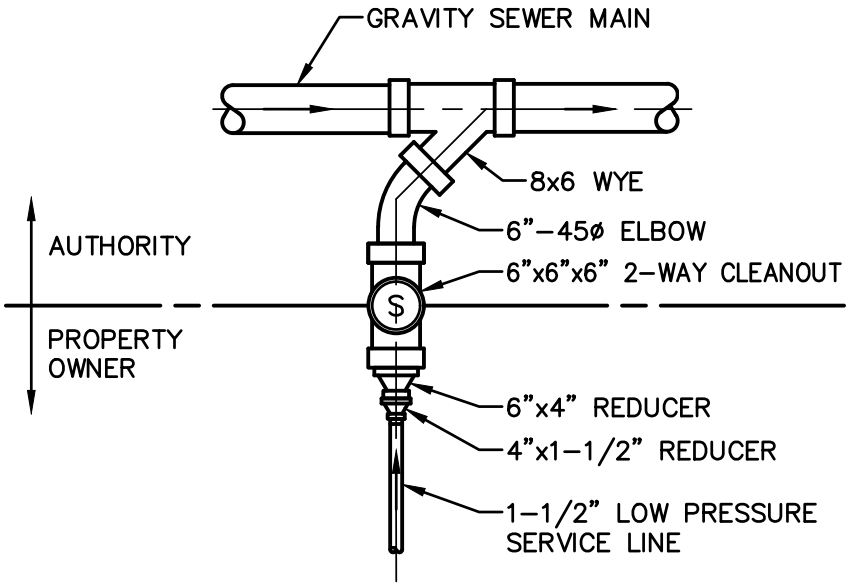
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-6



PLAN



PLAN

FILE NAME: LP-7-LOWPRSCONN.dwg

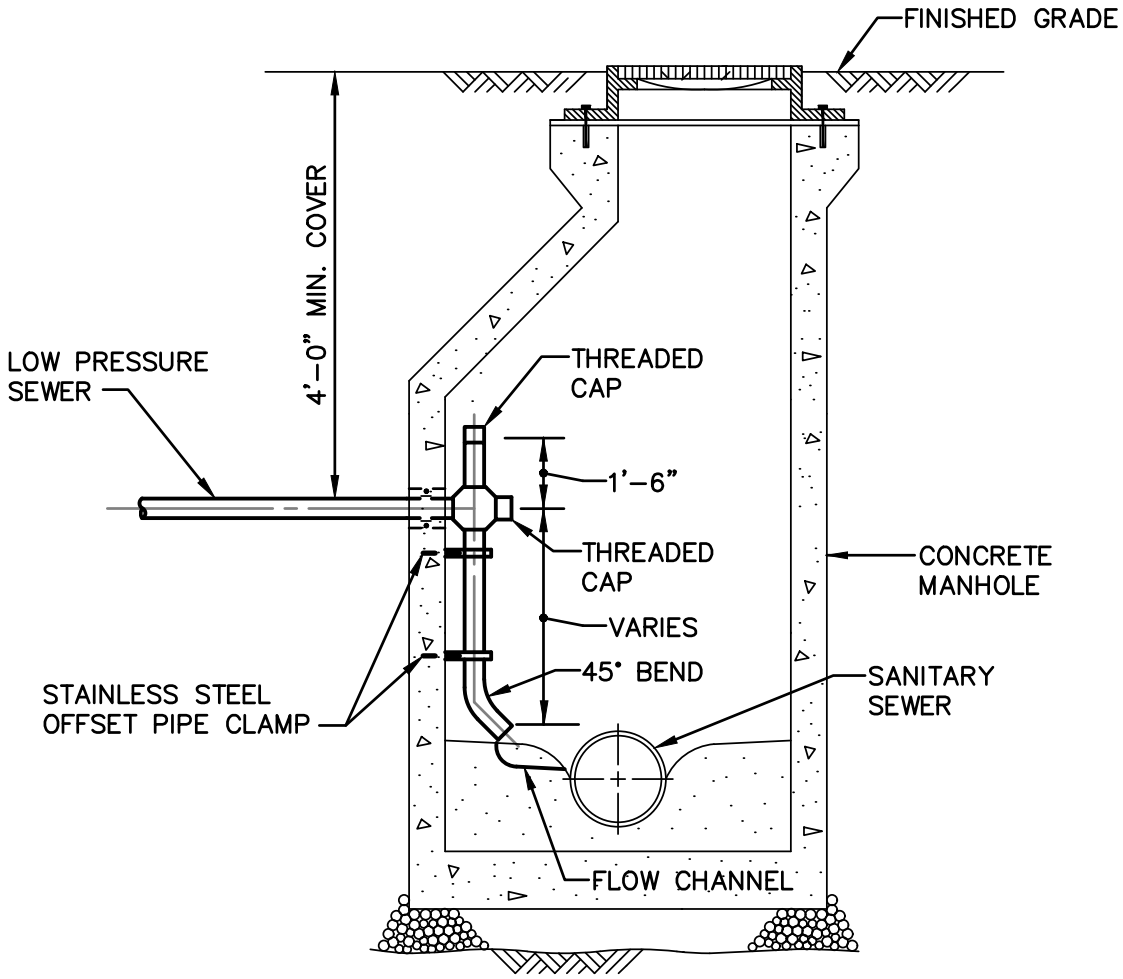
STANDARD DETAILS

LOW PRESSURE SERVICE LINE CONNECTION AT GRAVITY/PRESSURE MAIN

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

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

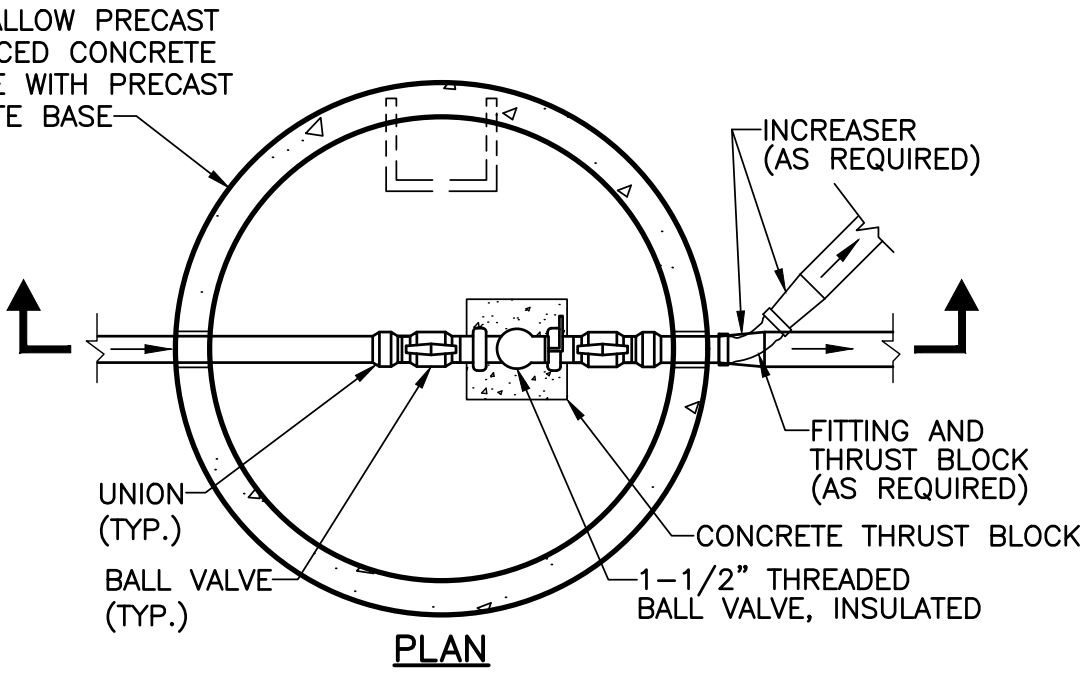
STANDARD DETAILS

LOW PRESSURE SEWER DISCHARGE MANHOLE

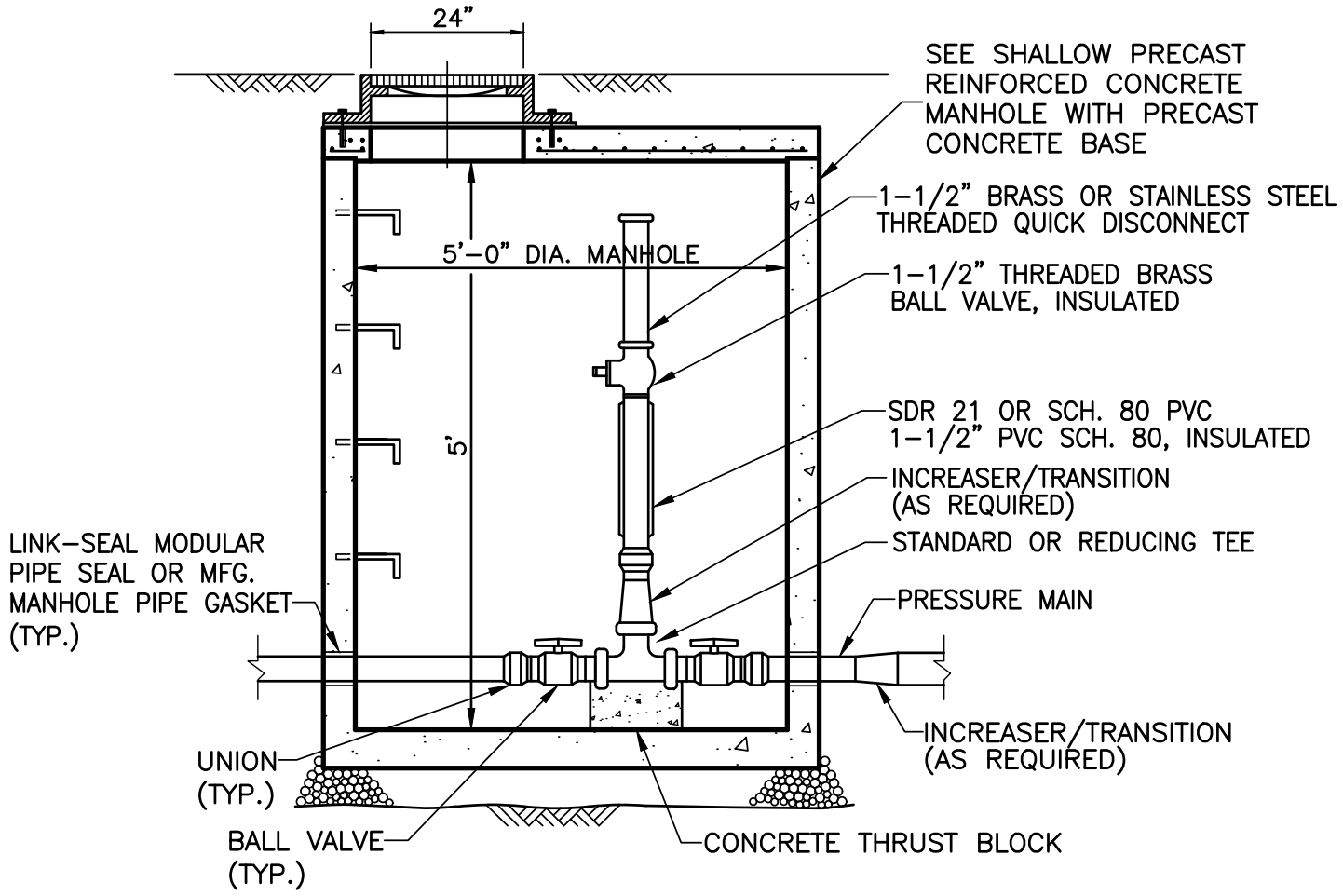
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-8



PLAN



SECTIONAL ELEVATION

FILE NAME: LP-7-IN-LINE-CO-VALVE.DWG

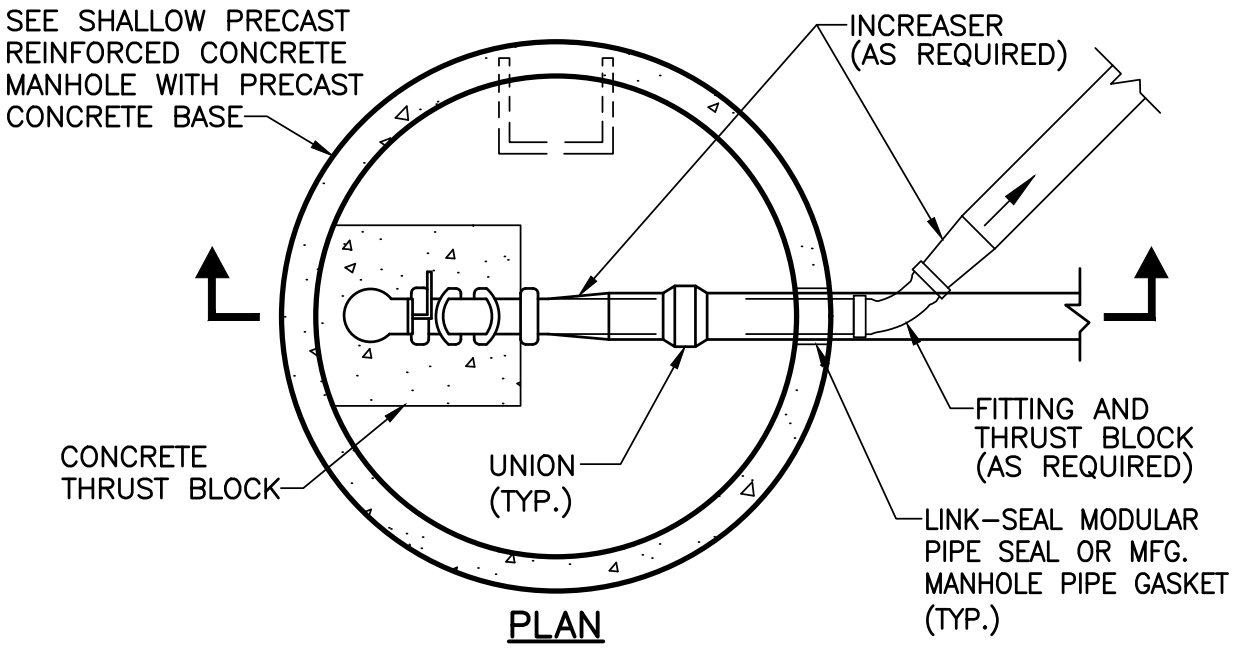
STANDARD DETAILS

IN-LINE CLEANOUT/VALVE PIT FOR LOW PRESSURE SEWER MAIN

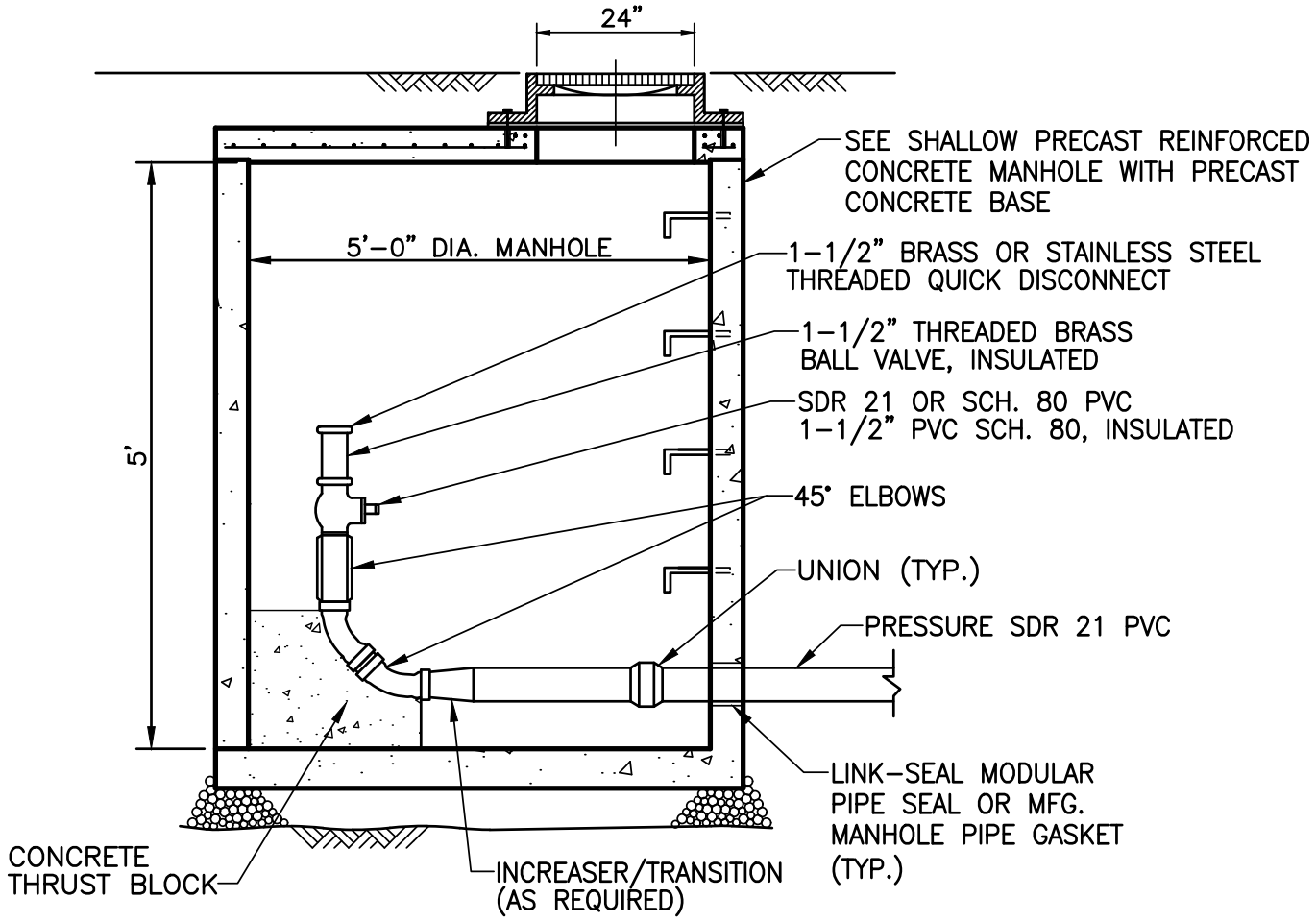
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-9



PLAN



SECTIONAL ELEVATION

FILE NAME: LP-8-IN-LINE-TERM-CO.dwg

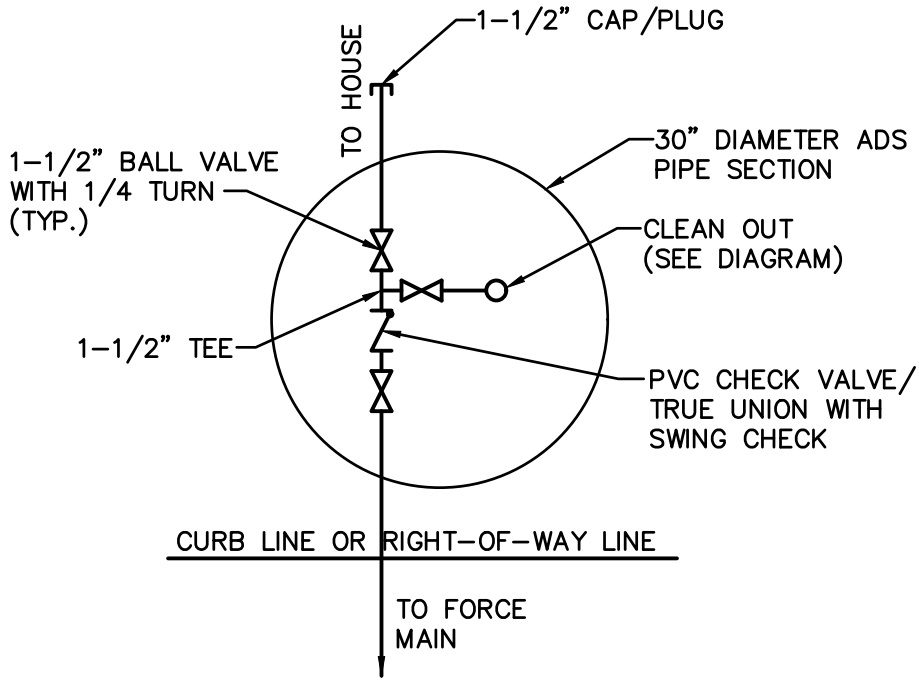
STANDARD DETAILS

IN-LINE TERMINAL CLEANOUT FOR LOW PRESSURE MAIN

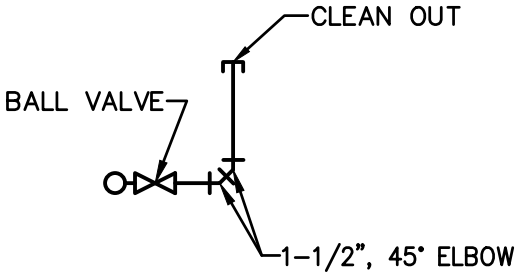
NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

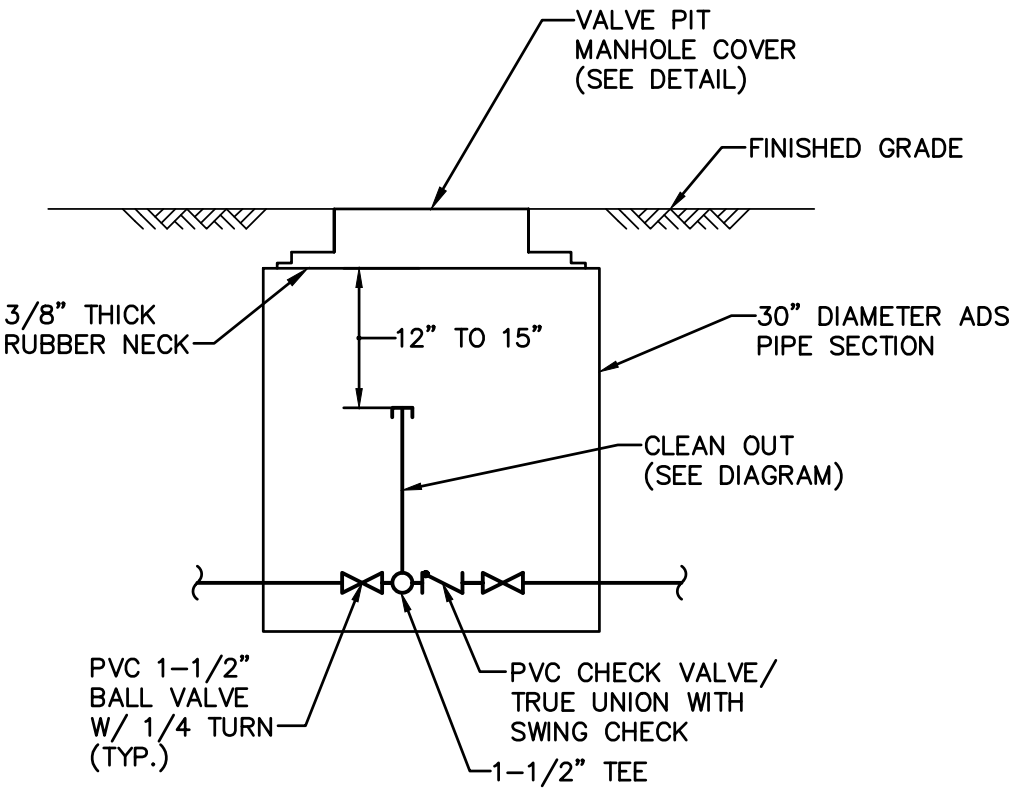
SCALE	DWG. NO.
NO SCALE	LP-10



PLAN VIEW



TEE DIAGRAM



SECTION VIEW

FILE NAME: LP-VALVEPITDET.dwg

STANDARD DETAILS

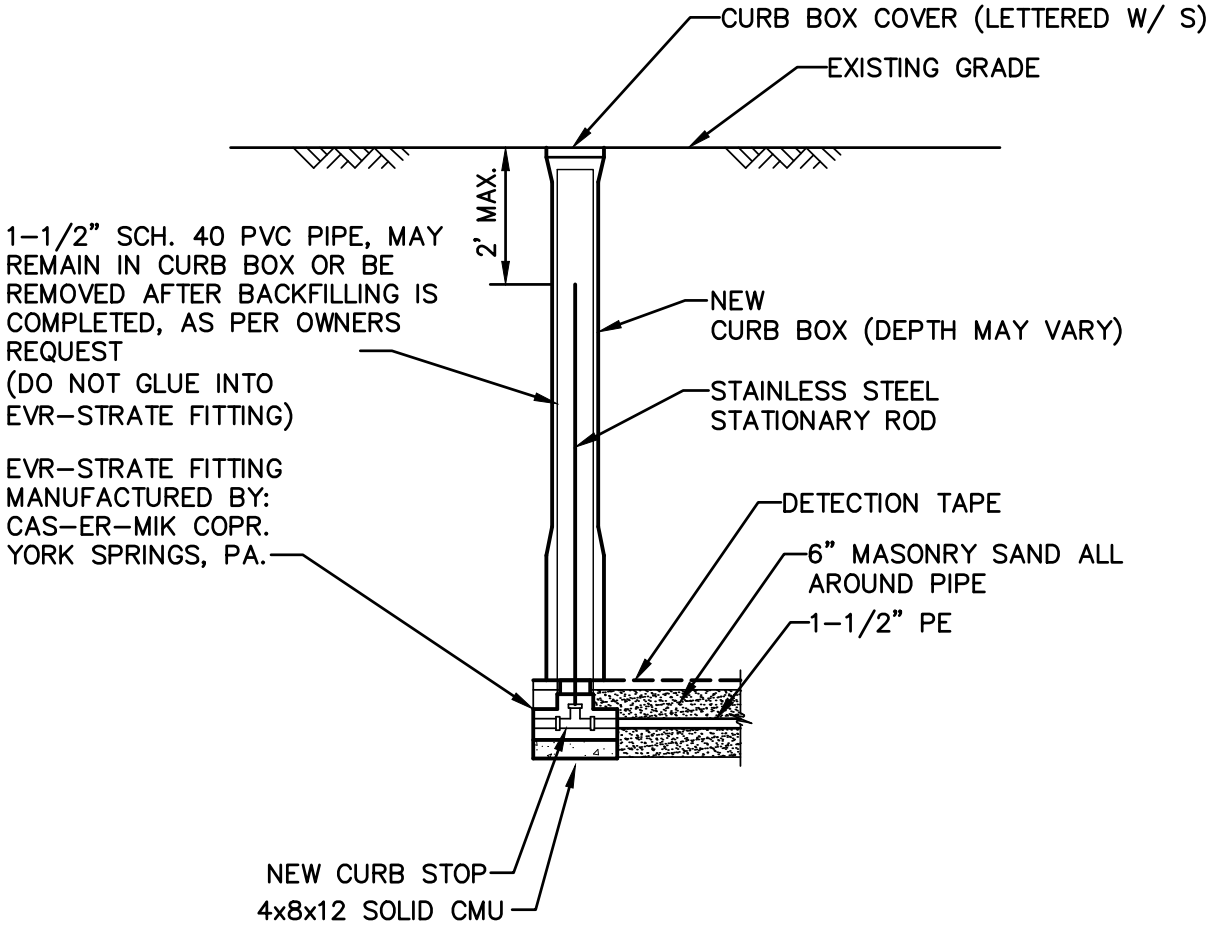
IN LINE VALVE PIT DETAIL BUILDING SEWER

NOTE: FOR NON-TRAFFIC AREAS ONLY

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP-11



FILE NAME: LP–17–CURBSTOP.dwg

STANDARD DETAILS

CURB STOP AND BOX DETAIL

NORTH LONDONDERRY TOWNSHIP AUTHORITY

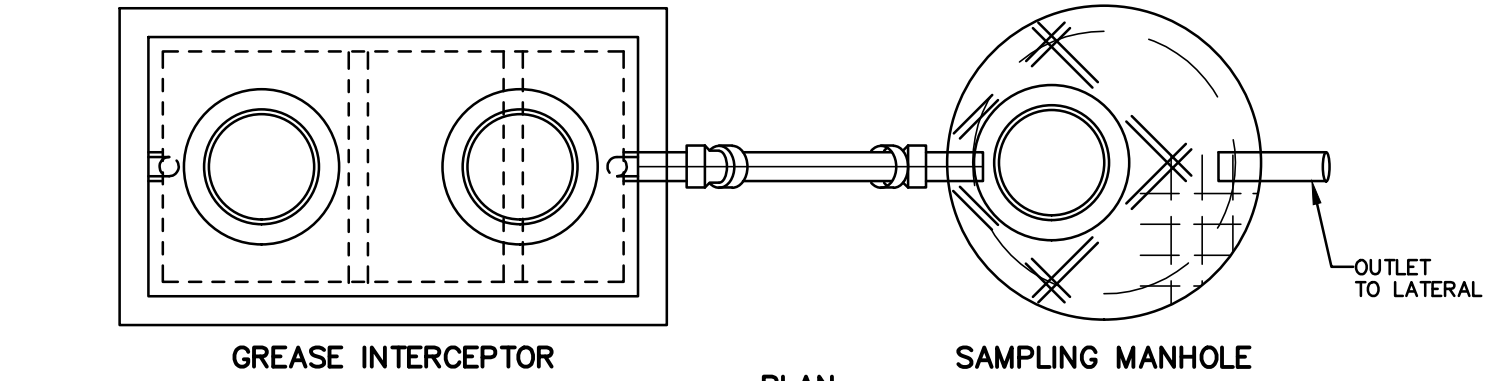
DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	LP–12

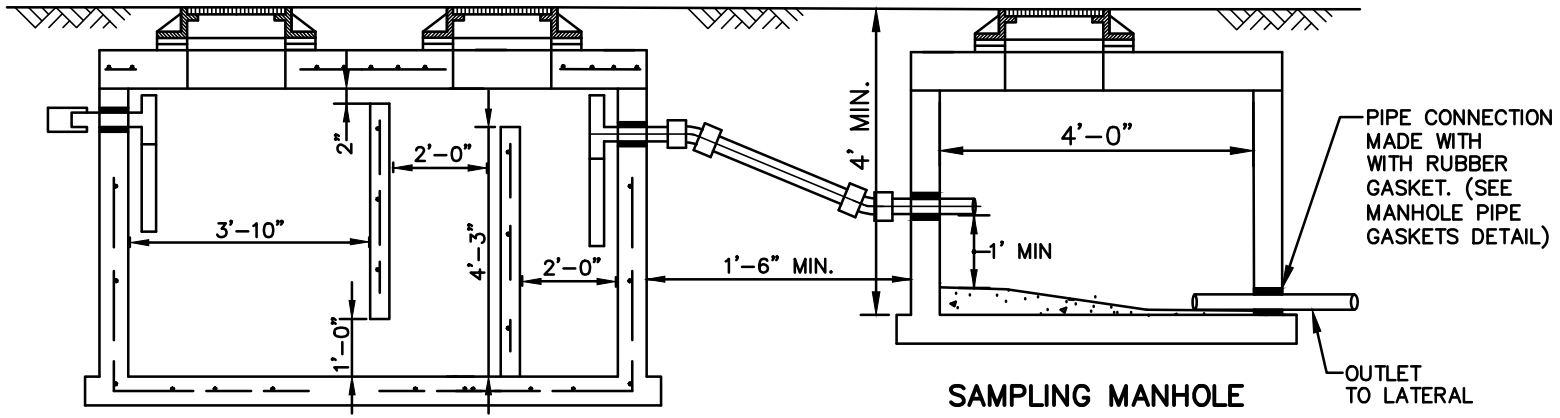
STANDARD DETAILS

TYPICAL GREASE INTERCEPTOR TO SAMPLING MANHOLE CONNECTION

NORTH LONDONDERRY TOWNSHIP AUTHORITY



PLAN



SECTION

NOTES:

1. MINIMUM SIZE OF OF GREASE TRAP PERMITTED IS 1,000 GALLONS.
2. GREASE INTERCEPTOR SIZE AND DESIGN SHALL BE THE RESPONSIBILITY OF THE DESIGN PROFESSIONAL OF RECORD.
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.

DWG. NO.	SCALE
GR-1	NO SCALE

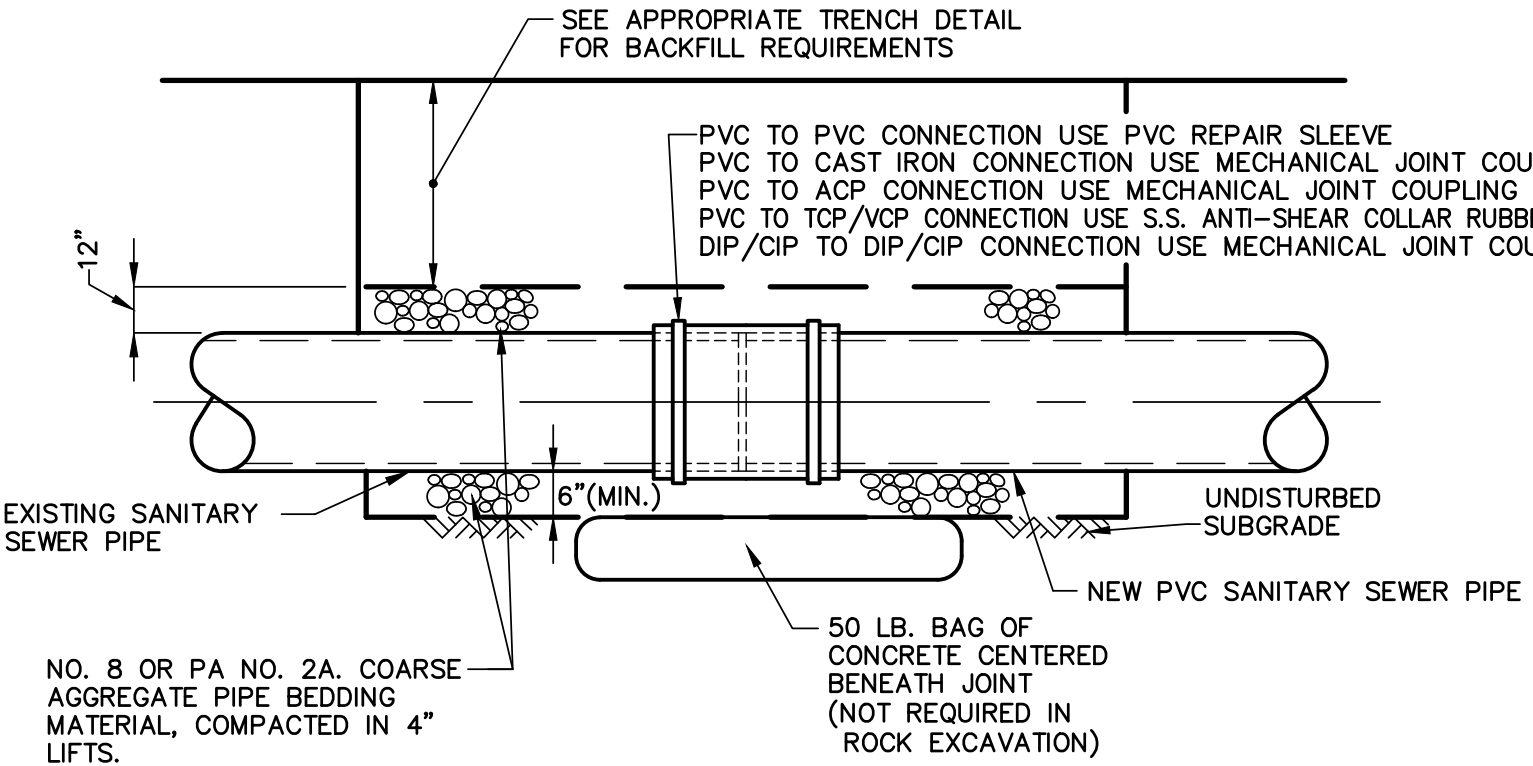
REVISIONS	DWG. CREATED	DATE
		2/18

FILE NAME: GR-1-GreaseTrap-Vault.dwg

NORTH LONDONDERRY TOWNSHIP AUTHORITY

STANDARD DETAILS

PIPE RECONNECTION DETAIL



NOTES:

1. RECONNECTIONS TO BE AIR TESTED IN ACCORDANCE WITH SPECIFICATIONS.
2. MECHANICAL JOINT COUPLINGS TO BE SMITH-BLAIR OR APPROVED EQUAL

SCALE	DWG. NO.
NO SCALE	SEW-1

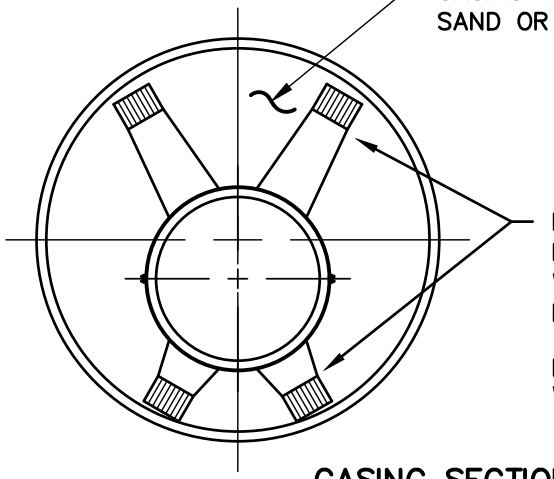
DATE	REVISIONS
2/18	DWG. CREATED

FILE NAME: SEW-1-PIPERECONN.dwg

STANDARD DETAILS

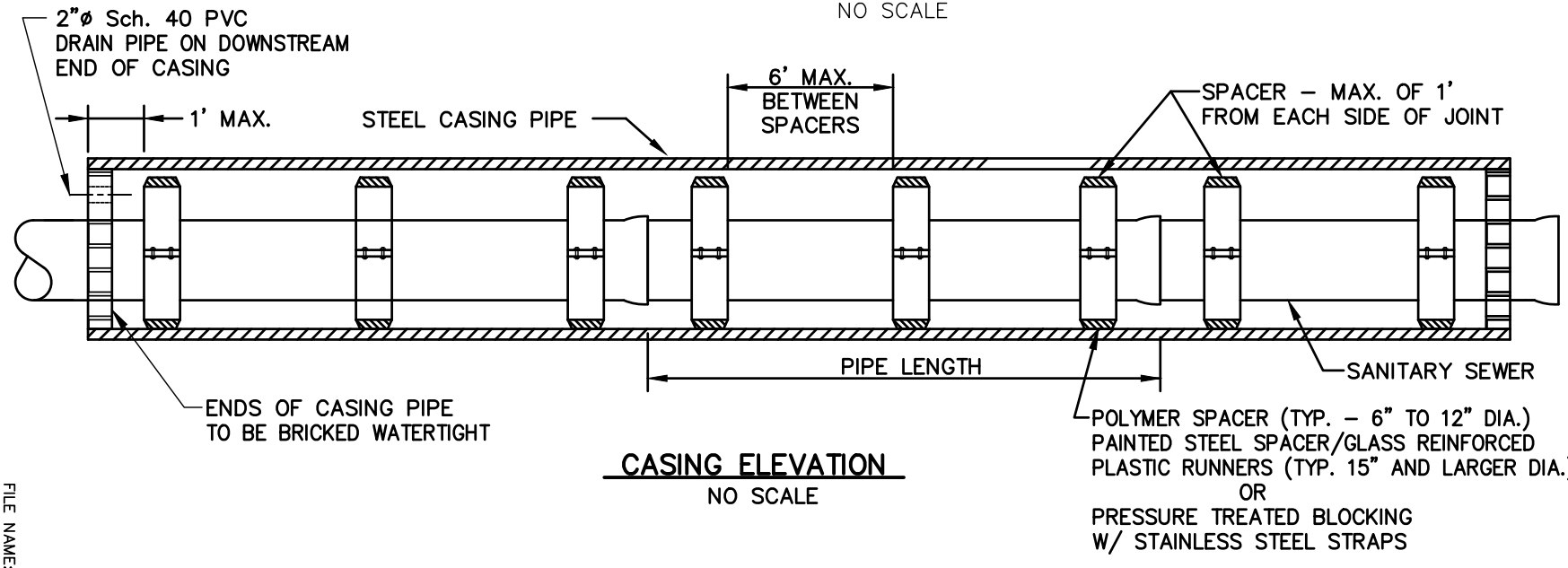
CASING DETAILS FOR PIPE BORINGS/TUNNELS

NORTH LONDONDERRY TOWNSHIP 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

SCALE	DWG. NO.
NO SCALE	SEW-2

DATE	DWG. CREATED	REVISIONS
2/18		

FILE NAME: SEW-2-PIPECASING.dwg

NORTH LONDONDERRY TOWNSHIP AUTHORITY
SANITARY SEWER
STANDARD DETAIL DRAWINGS

MANHOLES DETAILS: (MH)

1. Precast Concrete Manhole with Precast Concrete Base – Type1
2. Precast Concrete Manhole with Precast Concrete Base – Type2
3. Inside Drop Manhole
4. Manhole Steps
5. Heavy Duty Self-Sealing Frame and Cover
6. Heavy Duty Water Tight Frame and Cover
7. Typical Plan of Manhole Channels
8. Manhole Gasket
9. Leveling Rings, Concrete Riser and Bolted Frame Details
10. Poured Concrete Riser for Street Grades of 4% or Greater
11. Manhole Pipe Gaskets
12. Manhole Coring Gasket Detail (Kor-N-Seal)
13. Precast Concrete Manhole with Precast Concrete Base – Deep

BUILDING SEWERS/SERVICE LATERALS: (LAT)

1. Service Lateral – Shallow Sewer
2. Service Lateral – Deep Sewer
3. Building Sewer
4. Service Lateral Connection to Existing Sewer Main
5. Service Lateral Disconnection from Existing Sewer Main
6. Cleanout Cover
7. Simplex Sewage Grinder Pump Station
8. Typical Electrical Layout (for Grinder)

FORCEMAIN DETAILS: (FM)

1. Flush Chamber
2. Air Release Valve Chamber
3. Forcemain Locator Assembly
4. Horizontal Thrust Block Details
5. Concrete Thrust Block Details

TRENCH DETAILS: (TRENCH)

1. Trench Backfill Detail in Paved Areas
2. Trench Backfill Detail in Unpaved Areas
3. Unsuitable Material Excavation Detail
4. Bentonite Clay Dam Detail
5. Concrete Encasement Detail

SEWER PIPING DETAILS: (SEW)

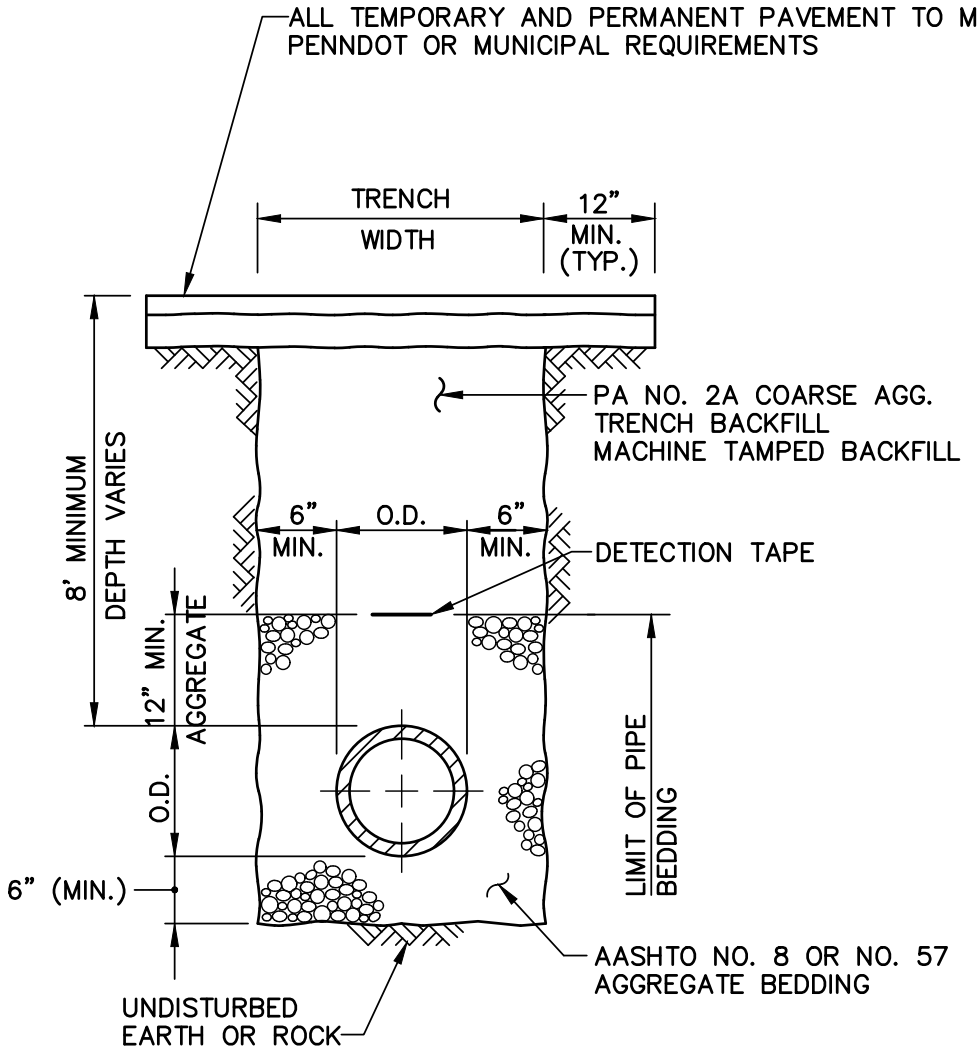
1. Pipe Reconnection Detail
2. Casing Details for Pipe Boring/Tunnels

LOW PRESSURE SANITARY SEWER DETAILS: (LP)

1. Typical Grinder Pump Installation Detail - Elevation
2. Typical Grinder Pump Installation Detail – Plan
3. E-One Control Panel Detail
4. E-One Grinder Pump Station
5. Simples Grinder Pump Station
6. Typical Electrical Layout
7. Low Pressure Service Line Connection at Gravity Main and/or Low Pressure Main
8. Low Pressure Sewer Discharge to Manhole
9. In-Line Cleanout /Valve Pit for Low Pressure Sewer Main
10. In-Line Terminal Cleanout for Low Pressure Sewer Main
11. In-Line Valve Pit for Low Pressure Building Service Line
12. Curb Stop and Box Detail

GREASE INTERCEPTOR DETAILS: (GR)

1. Typical Grease Interceptor to Sampling Vault Connection - Plan and Section



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.

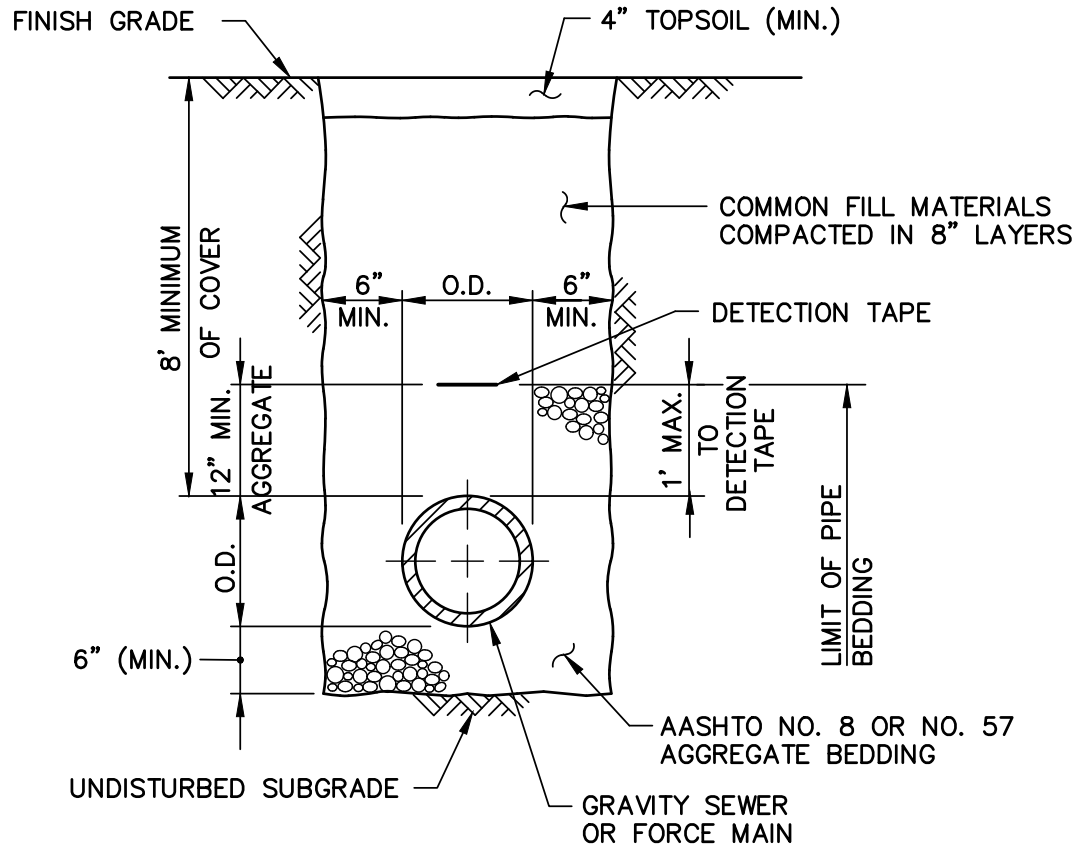
FILE NAME: TRENCH–1–PAVED.dwg

STANDARD DETAILS

TRENCH DETAIL IN PAVED AREAS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED
SCALE NO SCALE	DWG. NO. TRENCH–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.

FILE NAME: TRENCH–2–UNPAVED.dwg

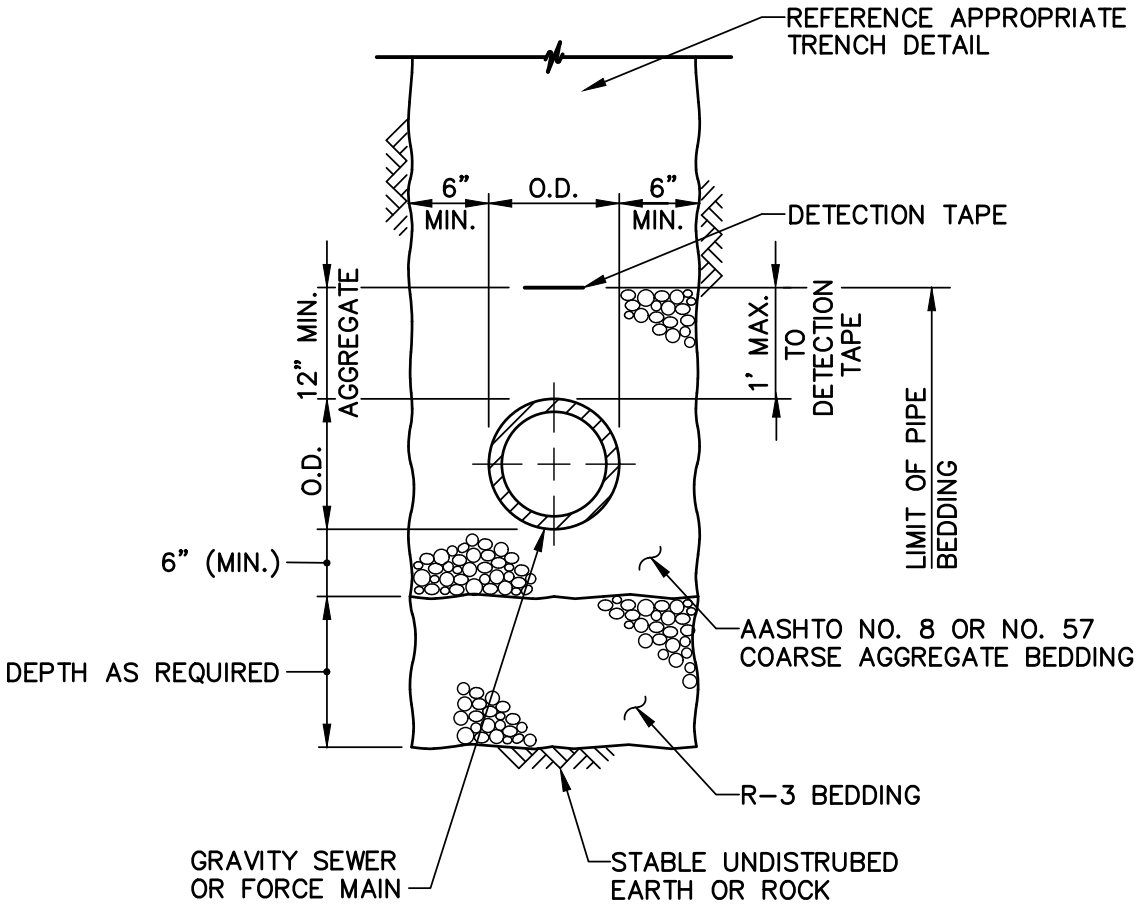
STANDARD DETAILS

TRENCH DETAIL IN UNPAVED AREAS

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	TRENCH–2



FILE NAME: TRENCH-3-UME.dwg

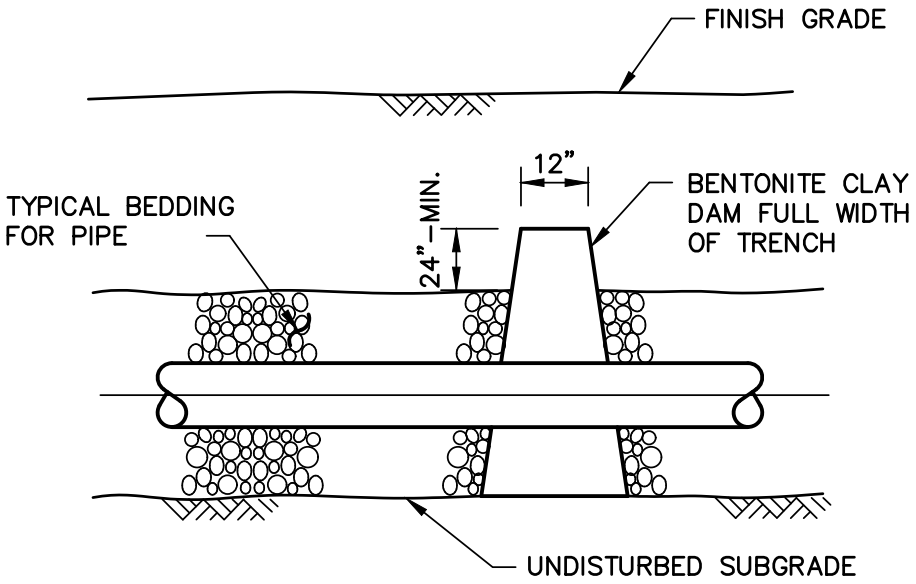
STANDARD DETAILS

UNSUITABLE MATERIAL EXCAVATION

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	TRENCH-3



NOTES:

1. HEIGHT OF CLAY DAM TO BE DETERMINED IN THE FIELD.

FILE NAME: TRENCH-4-CLAYDAM.dwg

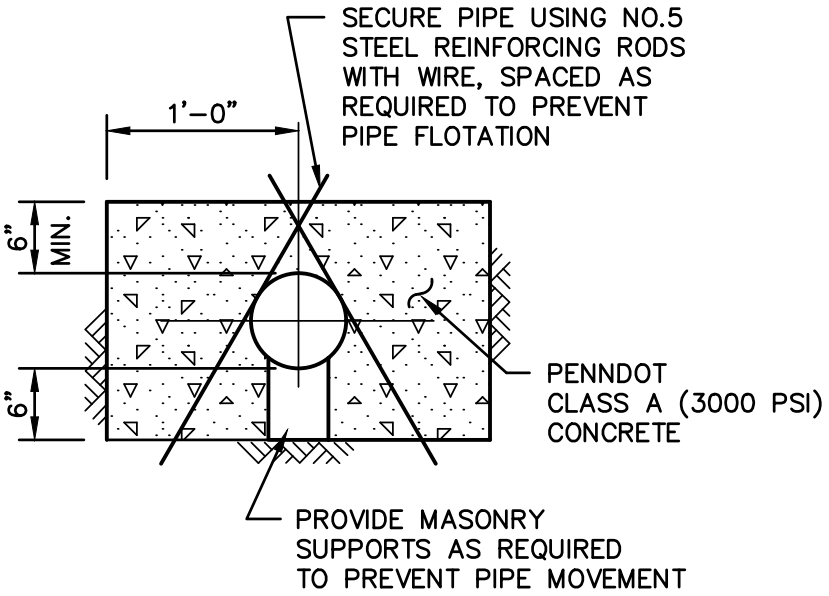
STANDARD DETAILS

BENTONITE CLAY DAM DETAIL

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	TRENCH-4



FILE NAME: TRENCH-5-ENCASEMENT.dwg

STANDARD DETAILS

CONCRETE ENCASEMENT DETAIL

NORTH LONDONDERRY TOWNSHIP AUTHORITY

DATE	REVISIONS
2/18	DWG. CREATED

SCALE	DWG. NO.
NO SCALE	TRENCH-5