BOOK NO. _____

STANDARD CONSTRUCTION AND MATERIAL SPECIFICATIONS

FOR

WASTEWATER COLLECTION SYSTEM EXTENSIONS

FEBRUARY 2011

LOWER PAXTON TOWNSHIP AUTHORITY
LOWER PAXTON TOWNSHIP
DAUPHIN COUNTY, PENNSYLVANIA

0699.3400

CET ENGINEERING SERVICES
1240 NORTH MOUNTAIN ROAD
HARRISBURG, PA 17112
(717) 541-0622

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PREFACE

This document is provided by Lower Paxton Township Authority for use by developers and their contractors for design and construction of sanitary sewers and appurtenances within the Authority's service area. The standards in this document must be followed in design development and construction. Use of this document for any other purpose other than preparation of plans for submittal to Lower Paxton Township Authority or for construction of sanitary sewers in the Authority's service area is forbidden.

LOWER PAXTON TOWNSHIP AUTHORITY

STANDARD CONSTRUCTION AND MATERIALS SPECIFICATIONS FOR WASTEWATER COLLECTION SYSTEM EXTENSIONS

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Section 1

General Instructions

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. Agreement: The written agreement between the AUTHORITY and DEVELOPER covering the work to be performed.

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

C. ACI: American Concrete Institute.

D. AISC: American Institute of Steel Construction.

E. "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.

F. ANSI: American National Standards Institute.

G. ASTM: American Society of Testing Materials.

H. AUTHORITY: LOWER PAXTON TOWNSHIP AUTHORITY including any agent, officer or employee duly authorized to act for the said party in connection with the work of the DEVELOPER. Also referred to as OWNER.

I. Building Sewer: The lateral pipe from a point near the public right-of-way line to a point near the building foundation

J. Completion Certificate: The certificate of the ENGINEER or AUTHORITY indicating the completion and acceptance of the work of the DEVELOPER.

K. Contract: The written agreement executed by and between the DEVELOPER and the DEVELOPER'S CONTRACTOR covering the performance of the work and the furnishing of labor, materials and service in the construction of sewer extensions to the AUTHORITY'S wastewater collection system.

L. Construction Observation: The observation of the work performed by the DEVELOPER to ascertain its conformity with the AUTHORITY'S Standard Construction and Material Specifications.

M. DEVELOPER: The person, firm or corporation ultimately responsible for construction of the sewers with whom the AUTHORITY has entered into the Agreement, as well as agents acting on behalf of the DEVELOPER, including the DEVELOPER'S CONTRACTOR.

N. DEVELOPER'S CONTRACTOR: The person, firm or corporation constructing the sewers on behalf of the DEVELOPER, if other than DEVELOPER.

O. DEVELOPER'S Drawings: The drawings which show the character and scope of the work to be performed and which have been prepared by the DEVELOPER and approved by the ENGINEER and are referred to in the Agreement.

P. ENGINEER: The independent consulting engineer that the AUTHORITY has contracted to review/assess the DEVELOPER'S design, installation, and completion of any sewer construction. 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.

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

R. Laws and Regulations: Laws, rules, regulations, ordinances, codes and/or orders of the AUTHORITY, Lower Paxton Township, Dauphin County, Commonwealth of Pennsylvania, and United States of America.

S. Project: The total construction of the sanitary sewer extension covered under the agreement.

T. Project Representative: The authorized representative of the AUTHORITY or ENGINEER assigned to the site or any part thereof for observation of construction.

U. Service Connection: The point of connection between the service lateral and the building sewer.

V. Service Lateral: The lateral pipe from the sewer main to a point near the public right-of-way line.

W. Shop Drawings: All drawings, diagrams, illustrations, schedules, and other data which are specifically prepared by or for the DEVELOPER to illustrate some portion of the work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams, and other information prepared by a supplier and submitted by the DEVELOPER to illustrate material or equipment for some portion of the work.

X. Specifications: Those portions of these Standard Construction and Material Specifications consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the work and certain administrative details applicable thereto and all supplements thereto.

Y. Subcontractor: A person, firm or corporation having a direct contact with the DEVELOPER'S 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 these Specifications, Detail Drawings, and DEVELOPER's Drawings. This term does not include individual workmen furnishing labor only, nor one who merely furnished material not worked to a special design.

Z. Supplier: A manufacturer, fabricator, supplier, distributor, or vendor of materials or equipment.

AA. Underground Facilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or their control systems or water.

BB. Warranty Period: An 18 month time period beginning with the AUTHORITY'S final acceptance and issuance of completion certificate.

CC. Work: The entire completed construction of the sewer extension or the various identifiable parts thereof required to be furnished under these Specifications. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by these Specifications.

1.02 DRAWINGS AND SPECIFICATIONS

A. The DEVELOPER'S Drawings and these Specifications are complementary, 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 DEVELOPER'S CONTRACTOR. Whether they are so used is at the discretion of the DEVELOPER. All sanitary sewer extensions provided by the DEVELOPER, however, must conform to the requirements of these Standard Construction and Material Specifications.

C. All DEVELOPER'S Drawings pertaining to the Project are to be submitted by the DEVELOPER to the AUTHORITY for review. After review of the DEVELOPER'S 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 DEVELOPER'S Drawings shall not relieve the DEVELOPER from responsibility for errors or discrepancies in such Drawings. All DEVELOPER'S Drawings shall be prepared and submitted in conformance with the requirements set forth in Section 01300 and with the agreement.

D. Deviations from the DEVELOPER'S Drawings or these Specifications required by the exigencies of construction will be determined by the ENGINEER only, and authorized in writing.

E. At all times the DEVELOPER shall keep on the Project, available to the AUTHORITY and ENGINEER and their representatives, one (1) copy of the DEVELOPER'S Drawings and these Specifications.

1.03 PRELIMINARY PROJECT SITE INSPECTION

A. Unless the requirement is waived by the ENGINEER prior to the start of actual construction operations, the DEVELOPER, 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 DEVELOPER'S Drawings before him/her, all pertinent conditions relative to the Project, 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 night, weekend, or legal holiday work, requiring the presence of the ENGINEER or AUTHORITY or a representative of either, will be permitted, except in cases of emergency, and then only with the written consent of the ENGINEER or AUTHORITY and to such an extent as they may judge necessary.

B. Any request for AUTHORITY or ENGINEER project representatives for construction observation must be scheduled at the Administration office 24 hours in advance by calling 717-657-5617 between 8:00 a.m and 5 p.m. The availability of a project representative is not guaranteed.

1. Normal working hours are considered to be between 7:00 am and 3:00 pm.

1.05 MATERIALS

A. Before construction starts, the DEVELOPER shall furnish the ENGINEER with a complete statement of the origin, composition, and manufacture of all materials to be used in the construction of the Project, as called for in these Specifications. 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 these Specifications 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 DEVELOPER prior to obtaining materials from the respective sources of supply.

C. Materials shall be stored so as to insure preservation of their specified quality and fitness for the work.

D. 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 DEVELOPER shall immediately remove all such rejected material from the property.

1.06 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 under the AUTHORITY'S signature, the 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 shall prepare the applications and pay any fees and charges associated with any required Highway Occupancy and/or Water Quality Management Permit(s).

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 DEVELOPER.

D. Where work is to be done by the DEVELOPER, in placing any pipe or other construction under railroad tracks, within the right-of-way of any railroad company, the DEVELOPER 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 or any other costs associated with the railroad crossing shall be borne by the DEVELOPER.

1.07 CARE OF PUBLIC AND PRIVATE PROPERTY.

A. The DEVELOPER shall comply with all provisions of the Pennsylvania Underground Utilities Act. The DEVELOPER shall protect all land monuments and property markers that will be affected by the construction until they have been correctly referenced. DEVELOPER shall satisfactorily reset monuments and markers that are disturbed by the DEVELOPER during the construction of the Project or otherwise.

1.08 SAFETY REQUIREMENTS

A. The DEVELOPER is responsible for all site safety.

B. If the use of explosives is necessary for the prosecution of the work, the DEVELOPER shall store and use in strict conformity to all State and local laws and regulations. **No explosives shall be used without first securing appropriate State and/or local blasting permits.**

C. Observance of, and compliance with, said regulations shall be solely and without qualification, the responsibility of the DEVELOPER, without any responsibility whatsoever on the part of the AUTHORITY or ENGINEER. The duty of enforcing such laws and regulations lies with the governing body, not with the AUTHORITY or ENGINEER.

1.09 REGULATIONS AND REQUIREMENTS OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

A. The DEVELOPER is advised that he will be required to design and conduct his work in compliance with the rules, regulations and requirements of the Pennsylvania Department of Environmental Protection and all other applicable laws and regulations (Paragraph 1.010).

1.010 OBSERVANCE OF LAWS AND REGULATIONS

A. The DEVELOPER 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 between the DEVELOPER and the DEVELOPER'S CONTRACTOR; such observance and compliance shall be solely and without reliance on superintendence or direction by the AUTHORITY or ENGINEER.

1.011 ENGINEER'S DUTIES

A. The work shall at all times be subject to the observation of the ENGINEER, AUTHORITY or their authorized employees, who shall have free access to the work, and be furnished by the DEVELOPER with every reasonable facility for examination of the work, to the extent of uncovering, testing or removing finished portions thereof. The DEVELOPER shall provide all labor and equipment necessary for such observations. The ENGINEER may require the DEVELOPER to uncover for observation, or to remove any work done or placed in violation or disregard of instructions issued to the DEVELOPER by the ENGINEER, AUTHORITY or their representatives.

B. The ENGINEER and his 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 provide observation of construction to provide greater assurance that materials and work conform fully to the requirements of these Specifications. The ENGINEER shall perform such other duties as may be 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 DEVELOPER nor interfere with the management of the work by the DEVELOPER.

C. All observations and tests shall be performed without unnecessarily delaying the work. All material and workmanship, if not otherwise designated by these Specifications shall be subject to observation and test by the AUTHORITY and/or ENGINEER or their duly authorized representatives. The AUTHORITY and 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 DEVELOPER shall promptly segregate and remove rejected material from the premises. If these Specifications, the ENGINEER'S instructions, laws, ordinances, or any public authority require the work to be specially tested or approved, the DEVELOPER shall give the ENGINEER timely notice of its readiness for inspection.

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

E. The ENGINEER shall have full authority to decide all questions that may arise 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 these Specifications.

F. Any verbal opinion or suggestion that the ENGINEER may give the DEVELOPER shall in no way be construed as binding the AUTHORITY in any way.

1.012 DEFECTIVE WORK

A. When any material not conforming to the requirements of these 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 or AUTHORITY. Failure or neglect on the part of the ENGINEER or AUTHORITY 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 DEVELOPER shall remove any work or material condemned, and shall rebuild and replace the same.

C. The DEVELOPER shall promptly move from the premises all materials condemned by the ENGINEER or AUTHORITY as failing to conform to these Specifications, whether incorporated into the work or not, and the DEVELOPER shall promptly replace its own work.

1.013 NOTICE

A. The service of any notice, by the AUTHORITY or ENGINEER to the DEVELOPER, shall be considered accomplished upon completion of 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 DEVELOPER 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 business at the site of the work, or its last known place of business; or

1.014 ENGINEERING STAKES

A. Setting and maintaining suitable stakes, grade boards, temporary structures, templates, and other materials for establishing and maintaining points, marks, and lines shall be the responsibility of the DEVELOPER.

B. The DEVELOPER is entirely responsible for maintaining all grades and elevations in the construction of the project in accordance with the approved plans.

1.015 ITEMS REQUIRED PRIOR TO BEGINNING CONSTRUCTION

A. Sewer Extension Agreement and related documents, including Construction Escrow.

B. County Conservation District approved Erosion Control Plan.

C. Blasting permit (if needed).

D. PennDOT Highway Occupancy Permit (if needed).

E. Ten (10) day notice letter indicating DEVELOPER intends to start work.

F. Pre-construction meeting.

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

H. Evidence that the final subdivision plan has been filed by the Municipality at the county courthouse, Recorder of Deeds office, if applicable.

I. Performance and Payment Bonds or other financial security to assure completion of the sewer construction.

J. Receipt of a letter from the DEVELOPER stating the name of the DEVELOPER'S CONTRACTOR who will be installing the sanitary sewers, when applicable.

K. Receipt from the AUTHORITY of a copy of the Water Quality Management (WQM) Permit issued by the DEP, when applicable; or the DEP Planning Module approval letter if a WQM permit 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.

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

P. Plats and legal descriptions of sewer easements to be dedicated to the AUTHORITY. The easements must be recorded at the Court House.

END OF SECTION 1

Division 1

General Requirements

SECTION 01010 – SUMMARY OF WORK

PART 1 – GENERAL

1.01 SITE LOCATION

A. Project locations are in and adjacent to Lower Paxton Township, Dauphin County, Pennsylvania.

1.02 WORK COVERED BY THESE SPECIFICATIONS

A. The Work generally comprises construction of extensions to the existing wastewater collection system by developers in accordance with these Specifications, Detail Drawings bound herein, the latest Building Sewer Specifications, and the approved DEVELOPER'S Drawings.

B. The Detail Drawings represent the standards of construction of the AUTHORITY and are bound in the back of these Specifications. On the Detail Drawings, the words "Project Manual" are defined as these Specifications.

1.03 PRELIMINARY REQUIREMENTS

A. The AUTHORITY may assign its own employees as field Project Representative(s) to observe the work. In such cases, the authority given to the Engineer's Project Representative shall be assumed by the AUTHORITY 's personnel.

B. Where sewers are to be installed within the right-of-way 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 Lower Paxton Township, 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. Work within the right-of-way of State Highways shall 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. 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/observation 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.

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 has been removed from the new sewer facilities and the new sewer facilities have passed all specified acceptance tests.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 01010

SECTION 01300 – SUBMITTALS

PART 1 – GENERAL

1.01 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 Drawings 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 DEVELOPER'S CONTRACTOR prepared drawings, certified test records or reports and such other certificates required by these Specifications.

1.02 GENERAL OUTLINE OF STEPS AND SUBMITTALS FOR DEVELOPER SEWER EXTENSIONS

A. For all land development plans, regardless of size, the DEVELOPER shall be required to submit 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. The AUTHORITY will respond to request in writing. If a planning module is required, this will be indicated in the 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 and advise the AUTHORITY.

b. The AUTHORITY will either approve or disapprove the DEVELOPER'S request.

3. For land development plans with existing planning module approval, submit approval letter with remaining capacity.

4. DEVELOPER must obtain a copy of the AUTHORITY'S "Standard Construction and Material Specifications for Wastewater Collection System Extensions."

5. 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 DEVELOPER'S Drawings. Such a meeting can prevent multiple requests of redesign of a sewer extension.

C. Design Phase

1. The DEVELOPER shall submit 3 sets of DEVELOPER'S Drawings for each submission to the AUTHORITY for review and comment.

   a. When the DEVELOPER'S drawings are delivered to the AUTHORITY, a check for $1,000 shall be submitted to cover the initial costs to the AUTHORITY for Drawing review.

   b. Enter into a Professional Services Contract (PSC) with the AUTHORITY. A copy of the PSC will be forwarded to the DEVELOPER upon receipt of the DEVELOPER'S Drawings and $1,000 to be placed in escrow.

   c. As the design review progresses and the AUTHORITY incurs costs greater than the $1,000 deposit, the AUTHORITY may, depending on the escrow deficiency, request additional escrow deposits from the DEVELOPER.

2. The DEVELOPER shall 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 two (2) sets of plats and legal descriptions for any easements to be dedicated to the AUTHORITY, prior to approval of DEVELOPER'S 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 shall prepare the permit in the name of the AUTHORITY. The DEVELOPER shall then deliver the application to the AUTHORITY for signature and subsequent delivery to PennDOT. Likewise, if a Part II Water Quality Management (WQM) Permit is required, the DEVELOPER shall prepare the permit in the name of the AUTHORITY. The DEVELOPER shall then deliver the application to the AUTHORITY for signature and subsequent delivery to DEP.

5. Upon approval of the DEVELOPER'S Drawings, the AUTHORITY will provide a listing of requirements prior to issuance of a Notice to Proceed.

6. The DEVELOPER shall submit five (5) sets of DEVELOPER'S 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, DEVELOPER'S CONTRACTOR, AUTHORITY,

AUTHORITY'S Construction Observer/Field Project Representative, and AUTHORITY'S ENGINEER.

D. Agreement Phase

1. Upon approval of the DEVELOPER'S Drawings, a SEWER EXTENSION AGREEMENT (SEA) shall be entered into between the DEVELOPER and owner of the property being developed and the AUTHORITY. SEWER EXTENSION AGREEMENTS apply to both private and public sewer extensions.

   a. Construction Cost Estimate for Financial Security When Constructing a Public Sewer Extension (Not Required for Private Extensions)

      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 select the desired form of financial security. The most common forms are Performance Bonds, Letters of Credit and Escrow Accounts. 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 SEWER EXTENSION AGREEMENT and attach the DEVELOPER'S financial security.

      1) If additional escrow is required, the SEWER EXTENSION AGREEMENT will also indicate that additional money shall be deposited with the AUTHORITY for costs to be incurred by the AUTHORITY.

      2) The AUTHORITY'S ENGINEER will determine the amount of escrow needed.

      3) The ENGINEER will then forward the Sewer Extensions Agreements to the DEVELOPER for execution.

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

   a. DEVELOPER shall submit four (4) copies of the DEVELOPER'S CONTRACTOR'S Insurance Certificate.

      1) The AUTHORITY shall be named as an additional insured.

2) The LOWER PAXTON TOWNSHIP shall be named as an additional insured.

3) The AUTHORITY'S ENGINEER shall be named as an additional insured.

b. DEVELOPER shall submit five (5) copies of Shop Drawings to the AUTHORITY'S ENGINEER for review and comment.

c. DEVELOPER shall have executed SEWER EXTENSION AGREEMENT

d. DEVELOPER to have established the escrow account to the dollar amount specified in the SEWER EXTENSION AGREEMENT.

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

E. Construction Phase

1. The DEVELOPER will be issued a Notice to Proceed once all the above items are addressed.

2. The DEVELOPER shall be 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 shall include at a minimum the DEVELOPER'S CONTRACTOR, DEVELOPER, AUTHORITY, Project Representative, and AUTHORITY'S ENGINEER.

3. DEVELOPER shall install the sewers in accordance with AUTHORITY'S Standard Construction and Material Specifications.

a. The DEVELOPER shall be responsible for record keeping of lateral locations, final elevations of manholes and final location of all piping.

b. The DEVELOPER shall be responsible for survey and layout of sewer.

4. The AUTHORITY'S Project Representative shall observe installation and testing of the sewer extension.

5. The AUTHORITY'S Project Representative shall prepare a list of punch list items.

6. The DEVELOPER shall complete all punch list items.

F. Post Construction

1. DEVELOPER shall submit Record Drawings as outlined later in Section 01300.

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

3. Until Record Drawings and plats and legal descriptions required under Items 1 and 2 above are provided, the DEVELOPER shall place in escrow an amount sufficient to survey the development and provide record drawings, straight-line diagrams, deed of dedication, bill of sale and all other items listed in the Lower Paxton Township Authority Sewer Extension Agreement Amendment (sample amendment attached). In an effort to offset some of the escrow amount, the DEVELOPER'S land development engineer can submit on a computer disk or CD-ROM a copy of the land development plans and profiles of the sewer extension so that the field survey of as-built conditions would only need to be verified.

4. DEVELOPER shall submit to the AUTHORITY a Guarantee Phase Financial Security (Maintenance Security).

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

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

   c. Thirty (30) days prior to expiration of the Maintenance Security, the AUTHORITY or the AUTHORITY'S ENGINEER may perform an inspection of the sewer extension. Any deficiencies shall be corrected at the Developer's expense. If Developer refuses to correct deficiencies, the Maintenance Security will be used by the AUTHORITY to correct them.

5. Upon completion of construction and receipt and approval of the above Post Construction Submissions and Financial Security, the AUTHORITY will then permit issuance of individual connection permits in accordance with the SEWER EXTENSION AGREEMENT.

1.03 DEVELOPER'S DRAWINGS SUBMISSION

A. General:

1. Submit three copies of DEVELOPER'S Drawings for review. After review of these drawings, make any corrections required and resubmit three corrected copies.

2. If a WQM or Part II permit is required from DEP, submit six (6) copies.

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 LOWER PAXTON TOWNSHIP AUTHORITY STANDARD CONSTRUCTION AND MATERIALS SPECIFICATIONS."

6. Drawings shall include all details (e.g. manholes, manhole connections, bedding, encasement, etc.) necessary for construction of the project. (For reference, all detail drawings are contained in this document "Standard Construction and Materials Specification".) Include the following note on each drawing, "For sewer detail drawings the contractor shall reference the latest Standard Construction and Material Specifications and the Specifications for Building Sewer Installation of Lower Paxton Township Authority."

7. Include the following note on each drawing, "DEVELOPER/DEVELOPERS 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. Include the following note on each drawing if the sanitary sewers are to be dedicated to the Authority, "The developer offers the sanitary sewers to the Lower Paxton Township Authority."

9. Include the following note on each drawing, "When sewers are installed through Authority's right-of-way including planter 'islands', no house, structure, trees, shrubs, gardens, or obstruction on or over, or that will interfere with vehicular access for the construction, maintenance or operation of any sewer, shall be installed within limits of the easement, and no changes in the grade or contour over the sewer shall be permitted in accordance with the Authority's standard Deed of Dedication."

10. Bind drawings in sets and number them consecutively.

11. A design checklist is attached. At a minimum, the DEVELOPER shall comply with items on the checklist.

B. Required general information to be shown on the Design Drawings:

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 Design Serial Number and Logo (and all subsequent amendments thereto).

C. Required drawings:

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

2. Index Map(s): Drawn to a scale of 1" = 400' and having the following items included thereon:

   a. Scale.

   b. Sewer sizes and type if other than 8" sewers.

   c. Names of all streets.

   d. Orientation and point(s) of connection(s) of proposed sewer extension with the existing sewer system.

   e. Number designation of each manhole shall begin at the existing main, and progress upward with highest number being the most upstream manhole. The AUTHORITY will specify new manhole numbers.

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

   a. 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.

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

   c. Top elevations of manholes (Profile View).

   d. Invert elevations of manholes (Profile View).

   e. Manhole numbers corresponding to those on Index Map (Plan View and Profile View).

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

   g. Grade of proposed sewer (Profile View); minimum 0.50 percent on 8-inch main and 1.0 percent for terminal manhole runs.

   h. All sewers installed in fill areas shall be ductile iron pipe lined with Protecto 401 Ceramic Epoxy Lining.

i. All sewers installed in wetlands shall be ductile iron pipe lined with Protecto 401 Ceramic Epoxy Lining.

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

k. 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.

l. Service Connection Ties:

1) The measurement to locate tee 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 closest 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.

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

m. Show proposed access right-of-way to existing or proposed off-street sewers and note that "access shall be perpetual for maintenance vehicles and that nothing shall be erected or planted during construction of sewers, streets, utilities, buildings, or landscaping, or thereafter, that would hinder or prevent vehicular access". Provide access right-of-way around any existing or relocated streams, swamps, wetlands or steep slopes and provide curb cuts at access point from street. Access shall not be across a private paved driveway, nor shall it be hindered by construction, retaining walls or other utilities and appurtenances such as boxes or fire hydrants.

D. Submit the following information as a supplement to the construction drawings:

1. Number of persons to be served initially

2. Number of persons to be served in the future.

3. Number of acres to be served initially.

4. Number of acres to be served in the future.

5. Initial and future sanitary sewer flows, if the development is other than residential.

E. Final Acceptance Submissions:

1. Record Drawings:

a. Before the work will be accepted by the AUTHORITY, submit PDF and AUTOCAD format digital file (after final approval), reproducible mylars (after final approval) 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 Underground Utilities Act 287 and its amendments thereto.

c. A checklist for record drawings is attached. At a minimum, the DEVELOPER shall comply with items on the checklist. The AUTHORITY reserves the right during the review process to request changes or modifications to the drawings that make the plan clear and legible.

d. Record drawings shall indicate:

1) Sheet size 24" x 36"

2) Index Map at 400' scale as identified in Section 01300.1.04.C.2- Index Map.

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

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

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

6) Name of DEVELOPER including address.

7) All manhole numbers as provided by the AUTHORITY

2. Straight Line Diagrams: DEVELOPER shall prepare and submit one copy of the lateral locations to the AUTHORITY. See sample form immediately following this Section. Forms are available from the AUTHORITY. Sewers including manhole numbers shall be indicated.

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

4. 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 DEVELOPER, DEVELOPER'S CONTACTOR, or Subcontractors arising out of performance of the sewer contract work either have been paid or that the DEVELOPER, DEVELOPER'S 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 DEVELOPER'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.

5. Submit a copy of the existing deed indicating that the DEVELOPER owns the land to be conveyed to the AUTHORITY.

6. Submit 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 2 copies of all required plats and descriptions for rights-of-way during the design phase. Generic form for Deed of Easement to be used is attached at the end of this Section. Attention is directed to the prohibitions for changes in grade or construction within the easement. Rights-of-way shall be recorded in the courthouse by the AUTHORITY.

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

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 01300

Design Checklist 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 Lower Paxton Township Authority."		
3	Note on Drawings "For sewer detail drawings reference Standard Construction and Material Specifications, Lower Paxton 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, utilities, structures, etc. shall be installed within limits easement in accordance with the Authority's standard Deed of Dedication."		
6	Note on Drawings "Lateral locations to be placed outside driveway and sidewalk areas, 10 feet from any water service and five (5) feet from any street tree."		
7	Name of Engineer/Surveyor.		
8	Seal of Engineer/Surveyor.		
9	Signature of Engineer/Surveyor.		
10	Name of Development and Owner.		
11	Act 287 Utility Lists and Design Serial Number.		
12	Index Map (1"=400') indicating		
12.1	Sewer Other than 8-inch		
12.2	Names of Streets		
12.3	Manhole Numbering		

12.4	Existing MH Labels		
13	Location of building(s) and lots.		
14	Note indicating those lots not having basement service.		
15	Elevation of Basements shown on Plan or if no basement service then show first floor elevation and add "Note: Basement service not provided for these lots."		
16	Plan view 1"=50' Profile 1"=10'		
17	Minimum Cover of 5 feet.		
18	Minimum manhole height with standard 4-feet diameter manhole and 8-inch pipe is 5.1 feet. If flattop manhole is necessary, verify necessary minimum height.		
19	Minimum slope across manhole 0.1 feet.		
20	Check Prefix and number system.		
21	Check for clearance with water (10 feet).		
22	Check for clearance with storm sewer (5 feet).		
23	Do the plans indicate Electric or Other Utilities to be installed in the sewer easement? Minimum distance = 5 feet.		
24	Right-of-Way – 30 feet (min).		
25	Steep slope sewers in Right-of-Way constructed on DIP.		
26	Constructability.		
27	Maintenance access.		
28	Maximum Run length of 400 feet.		
29	Placement of manholes on street. Are they in the wheel path?		
30	Placement of manholes in parking lots. Are they in the parking space?		
31	Minimum Slope of 0.5% for 8-inch pipe.		
32	Terminal Run Minimum Slope of 1.0%.		
33	Invert Ins, Invert Outs, Rim Inverts shown on Drawings.		
34	Lateral Stationing from downstream manhole.		
35	Size of Laterals Shown, should be 6-inch.		
36	Lateral Length.		
37	If steep slopes (4% to 9%), are the inverts across manholes shall be 4-inches for constructability?		

38	If steep slopes (9% to 20%), the inverts across manholes shall be 6-inches for constructability?		
39	If steep slopes (greater than 20%), the inverts across manholes shall be 12-inches for constructability.		
40	Verify depth of sewer doesn't exceed Authority requirements.		
41	Where there is fill beneath proposed sewer, a note about 95% percent compaction should be on the drawings.		
42	If sewer is deep, greater than 18 feet, DIP should be used.		
43	Sheet Size 24 × 36.		
44	Revision Date Shown.		
45	Phasing of sanitary sewer should indicate the last sewer section installed to extend 1 manhole run beyond current phase being constructed.		
46	Correct slopes and lengths.		
47	Curb cuts and access roads when sewer extends off of streets so that there is right-of-way access for vehicles.		
48	Is a right-of-way gate needed?		
49	If on-lot grinder pumps are needed, does the design comply with the Specifications?		
50	Indicate those manholes that require watertight covers.		
51	If private sewer extension, indicate "Private Sewer" on covers.		
52	Indicate all utilities on the plans and profiles.		
53	10' separation between water services and laterals		
54	Do stream crossings meet County standards for use of ductile iron pipe (DIP) or concrete encased?		
55	Existing sewers to be abandoned shall be filled with flowable fill.		
56	Is a grease trap required? What size? Show sampling MH for grease trap.		
57	Is planning module approval shown on drawings?		

Record Drawings
Technical Review Checklist

Job Number: _____

Developer: _____

Development: _____

Date: _____

Submittal No.: _____

Item Number	Item	Acceptable	Unacceptable
1	Drawings Titled "Record Drawings" ("As-Builts" are not acceptable).		
2	Base Datum on existing sewers.		
3	Name of Engineer/Surveyor.		
4	Seal of Engineer/Surveyor.		
5	Signature of Engineer/Surveyor.		
6	Name of Development and Owner.		
7	Index Map (1"=400')		
7.1	Sewer Other than 8-inch		
7.2	Names of Streets		
7.3	Manhole Numbering		
8	Location of building(s).		
9	Plan view 1 inch = 50 feet; Profile 1 inch = 10 feet		
10	Check MH Prefix and number system.		
11	Right-of-way – 30 feet add note about perpetual access for maintenance.		
12	Invert Ins, Invert Outs, Rim Inverts shown on Drawings.		
13	Lateral Stationing from downstream manhole.		
14	Size of Laterals Shown.		
15	Lateral Length - from Main to end of pipe.		
16	Lateral Depth at end of service lateral.		
17	Sheet Size 24-inch × 36-inch.		
18	Correct Slopes.		
19	Type of mainline pipe indicated on profile.		
20	PDF and AUTOCAD format drawings (features shall be contained in separate layers)		

LOWER PAXTON TOWNSHIP AUTHORITY
AS-BUILT SANITARY SEWER LATERAL LOCATIONS

Project ______________________________ Length __________ LF

Street ______________ Pipe Size ______________ Type __________

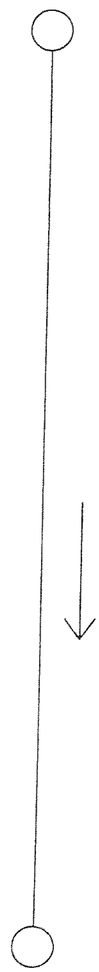
Contractor ______________ Grade __________ % Max Depth __________ FT

Engineer ______________ Air Test ______________ Lbs __________ Secs.

Submitted ______________ Internal ______________ Final __________

House/Lot No.	Depth at End	Lateral Length	Station of "T"

<u>MH</u> <u>INVERT</u>



STA 0+00

<u>MH</u> <u>INVERT</u>

Station of "T"	Lateral Length	Depth at End	House/Lot No.

DEED OF DEDICATION
SANITARY SEWER RIGHTS OF WAY FOR _____

THIS INDENTURE, made the _____ day of _____, in the year two thousand and _____

BETWEEN

_____, Grantor

AND

LOWER PAXTON TOWNSHIP AUTHORITY, Dauphin County, Pennsylvania Grantee

WITNESSETH That the said Grantor, for and in consideration of the sum of _____, has granted, bargained, released and confirmed and by those presents does grant, bargain, release and confirm unto the said Grantee, its successors and assigns those certain rights-of-way, including the sewer main lines and manholes located within the said rights-of-way and dedicated simultaneously herewith, to the Lower Paxton Township Authority, County of Dauphin, Pennsylvania, as more particularly described on the attached legal description marked as Exhibit "A" and the attached plat(s) marked as Exhibit "B".

SAID rights-of-way being part of the same premises which _____, by a deed dated _____ and recorded in the Office of the Recorder of Deeds in and for Dauphin County, Pennsylvania in Deed Book _____ Page _____, granted and conveyed unto _____, Grantor herein.

TO HAVE AND TO HOLD the said rights-of-way located within the above described tract, unto the said Grantee as more particularly described on attached Exhibits "A" and "B" to the said Grantee to and for the only proper use and behoof of the said Grantee, its successors and assigns forever as a part of the public sewer system, to operate, maintain, replace and remove such sewer system as the Grantee may from time to time require, consisting of underground pipes, conduits, manholes and drains, upon, over and under a strip of land as more particularly described in Exhibits "A" and "B" hereto attached and made a part hereof; together with the right of ingress and egress over and across the lands of the Grantor to and from said strip for the purpose of exercising the rights herein granted; to place surface markers beyond said strip, to clear and keep cleared all trees, roots, brush and other obstructions to allow vehicular access from the surface and sub-surface of said strip, and to install gates and stiles in any fences crossing said strip.

The Grantor is to have full use and enjoyment of said premises except for the purposes granted said Grantee, and provided that Grantor shall not construct or permit to be constructed any house, structure, trees, shrubs, gardens, or obstruction on or over, or that will interfere with vehicular access for the construction, maintenance or operation of any sewer line or appurtenances constructed hereunder, and will not change the grade or contour over said sewer line without written approval of Grantee.

The rights-of-way hereby granted shall be subject, however, to the rights of the Grantor herein in the future development of the real estate adjacent to the rights-of-way to lay out and dedicate a street on, upon and over said rights-of-way.

AND, the parties hereto, for themselves, their heirs, executors, successors and assigns, hereby covenant and agree that no structure or obstruction shall be constructed or permitted on said right-of-way.

AND, the said Grantor, for itself, its successors and assigns, by these presents, covenants, promises and agrees to and with the said Grantee, its successors and assigns, that neither the said Grantor, nor its successors and assigns will at any time hereafter ask, demand or recover or receive of or from the said Grantee, its successors and assigns, any sum or sums of money as and for damages for and by reason of the conveyances of the aforesaid tracts of land for public sanitary sewer purposes, and by reason of the physical grading, improving and maintaining said sanitary sewer rights-of-way.

AND, the said Grantor, for itself, its successors and assigns, does covenant, promise and agree, to and with the said Grantee, its successors, by these presents, that it, the said Grantor and its successors and assigns, by these presents, that the Grantor has not done or committed any act, matter or thing whatsoever whereby the premises hereby granted, or any part thereof, is, are, shall or may be impeached, charged of encumbered in title, or otherwise howsoever.

IN WITNESS WHEREOF, the Grantor, has caused this indenture to be signed the day and year first above written.

ATTEST:

_____
Grantor

_____

By: _____
Title

Certificate of Residence

I hereby certify that the mailing address of the Grantee is:

425 Prince Street
Harrisburg, PA 17109

_____
Agent/Attorney for Grantee

ACKNOWLEDGEMENT

COMMONWEALTH OF PENNSYLVANIA :
: **ss:**
COUNTY OF DAUPHIN :

On this, the _____ day of _____, 200__, before me, a Notary Public, the undersigned, personally appeared _____, known or proven to be the President of _____, the Grantor in the foregoing instrument and that he executed the foregoing instrument on behalf of Grantor for the purposes therein contained.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

_____
Notary Public

My Commission Expires:

Lower Paxton Township Authority
Sewer Extension Agreement Amendment

Development
(Gravity Sewer Installation)

WHEREAS, Item #5 of the Sewer Extension Agreement between Developer, "Developer" and Lower Paxton Township Authority "Authority" requires that prior to individual connections to the sanitary sewer system, the Developer shall furnish to the Authority record drawings, straight line diagrams, final acceptance affidavits, plat and legal description for deed of dedication, right-of-way drawings, and maintenance security.

WHEREAS, the Developer has requested individual connections to the sanitary sewer for the properties located in Development.

WHEREAS, the Developer has deposited with the Authority monies toward costs related to the Sewer Extension Agreement. These funds have been deposited in an escrow account, bearing interest, with monthly statements provided to the Developer.

WHEREAS, the Developer has agreed to provide the Authority permission to utilize these funds to prepare Item #5, sub-paragraph a, b, c and d of the Sewer Extension Agreement.

NOW, THEREFORE, in consideration of the payments and promises hereinafter made in accordance with the Municipality Authorities Act of 1945, Act of May 2, 1945, P.L. 382, as amended, 53 P.S. 301, et seq, both parties intending to be legally bound, do mutually agree as follows:

1. If the final acceptance submissions under Item #5, sub-paragraph a, b, c and d of the Sewer Extension Agreement are not provided by Date, the Authority at the cost and expense of the Developer, shall use escrow funds established under the Sewer Extension Agreement to prepare said documents. The documents shall be prepared

by a Professional Engineer licensed in the Commonwealth of PA all details and documents required.

2. The Authority agrees to provide a statement indicating all funds paid to the engineer for this service.

3. Before the Authority issues connection permits for the properties the Developer shall deposit with the Authority a check in the amount of $ Amount to cover additional fees that may be incurred under this agreement.

4. In accordance with the Agreement, the Authority agrees to return the balance remaining in the escrow account upon completion of the project.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals on this _____ day of _____, _____.

ATTEST:

_____
Secretary

Lower Paxton Township
As Agent for the Authority

_____
Chairman

Developer
Developer

_____
Signature and Title

Address

Phone: Phone
Fax: Fax

_____
WITNESS: (Seal)

SECTION 01500 – TEMPORARY FACILITIES AND 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. Approved Erosion and Sedimentation Control Plan
B. Stream Crossing and Wetlands Encroachment Permits
C. Traffic Control Plan(s)
D. Other Local and State Regulatory Requirements as Applicable

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, AUTHORITY will obtain the necessary permits for wetlands and stream crossings from the Pennsylvania Department of Environmental Protection and the Pennsylvania Fish Commission. DEVELOPER 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 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 shall provide suitable dry trench conditions for laying the pipe by diverting streams and/or dewatering the swamp areas. In diverting streams, extreme care must be used to prevent property damage.

D. Ductile iron pipe with mechanical joints shall be required for crossing of streams or other wet areas. The bottom of the trench shall be stabile in order to maintain the proper grade

of the pipe. If the material in swamp areas or stream bottoms is soft, the unsuitable material shall be removed to a depth at which stabile, 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 sub-bedding shall be backfilled with No. 3 coarse aggregate in accordance with the Detail Drawings. If wetlands or stream bottom is rock, normal pipe bedding is required.

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 of this Section.

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 Sedimentation Control Handbook, Dauphin County Conservation District and with DEVELOPER'S approved plan.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 REMOVAL

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

END OF SECTION 01500

SECTION 01570 - TRAFFIC REGULATION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Purpose: The purpose of this Section is to provide the DEVELOPER 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 promote safe and efficient traffic movement through work areas and safety for the DEVELOPER'S work force. The DEVELOPER, however, is responsible for all safety on the job site. The traffic control plan should be submitted to the Lower Paxton Township Police Department and Public Works Department for review.

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 Pennsylvania Department of Transportation Specifications.

2. Traffic regulation on Township streets shall conform in all respects to the requirements for traffic control on State Highways except enforcement will be by Township police. A traffic control plan should be submitted and approved by the Lower Paxton Township Police.

3. State Highways:

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

1) PA Code Title 67, Transportation: Chapter 213 – 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 DEVELOPER'S failure to provide adequate traffic control shall be borne solely by the DEVELOPER.

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 Pennsylvania Department of Transportation Specifications Publication 408 (as supplemented) and to requirements specified in the current edition of PA Code Title 67, Transportation: Chapter 213 – Work Zone Traffic Control which complements Section 901.

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

PART 3 – EXECUTION

NOT USED

END OF SECTION 01570

Division 2

Site Work

SECTION 02010 - SUBSURFACE EXPLORATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Digging Test Pits:

1. In locations where new sewers are to be connected to existing sewers, the DEVELOPER'S CONTRACTOR will not be permitted to proceed with new construction until he has dug test pits and determined the exact location and elevation of the existing sewers. Dig such test pits only at the locations agreed to by the ENGINEER.

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

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 02010

SECTION 02211 - ROCK REMOVAL

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Rock Removal - Mechanical Method

B. Rock Removal - Explosive Method

1.02 RELATED WORK

A. Section 02221 - Trenching. Comply with Paragraph 1.05 – Protection, as applicable.

1.03 QUALITY ASSURANCE

A. DEVELOPER'S CONTRACTOR: DEVELOPER'S 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 the Township, DEP and any other authorities and state agencies having jurisdiction before explosives are brought to site or drilling is started.

C. DEVELOPER to obtain blasting permit from Township.

1.05 REFERENCES

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

B. Department of Environmental Protection, Chapter 210-Blasters Licenses and 211 – Storage, Handling and Use of Explosives

PART 2 - PRODUCTS

2.01 MATERIALS

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

B. Delay Devices: Type recommended by explosives firm.

C. 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. 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:

1. Apply for and obtain DEP Blasting Activity Permit and any other permits that may be required. Comply to all guidelines, conditions and requirements of permits.

    a. Make determination if blasting activity qualifies for "Permit-by-Rule".

    b. Submit to the ENGINEER blasting permit or permit-by-rule notification prior to blasting.

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

3. Provide Seismographic monitoring during progress of blasting operations and comply with regulations of the Pennsylvania Department of Environmental Protection.

4. Disintegrate rock and remove from excavation.

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

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

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

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

e. Store caps and exploders separately from explosives.

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

5. 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 Protection regulations.

6. Repair any damage to structures, walls, pavement, etc. resulting from blasting activities to the satisfaction of property owner(s).

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

C. DEVELOPER'S CONTRACTOR is fully responsible for all rock removal methods and materials. AUTHORITY and ENGINEER assume no responsibility for rock removal methods and materials selected and utilized by the DEVELOPER'S CONTRACTOR.

3.04 FIELD QUALITY CONTROL

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

END OF SECTION 02211

SECTION 02221 - TRENCHING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Excavated trenches for piping shown on Drawings.

B. Compacted bed and compacted fill over piping 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 (PennDOT) Publication 408.

1.04 PERMITS

A. TOWNSHIP ROAD OCCUPANCY PERMIT and/or STREET-CUT PERMIT.

B. State highway occupancy permit in AUTHORITY'S name.

C. Blasting permits (Township or other).

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. DEVELOPER, 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 DEVELOPER 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. Protect all property including land, ornamental shrubs and trees, fences, and other existing improvements and replace in kind all those damaged.

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

C. It shall be the DEVELOPER'S responsibility to obtain all other rights-of-way for access to the construction site. Written authorization from all affected 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. 2RC.

E. Coarse Aggregate PA No. R-3.

2.02 COMMON FILL MATERIALS OR SUITABLE BACKFILL MATERIAL

A. Subsoil: Reused or imported; graded free of stones and rocks greater than 3 x 6 inches, clay lumps, brush roots, weeds or other unsuitable materials.

B. On a case by case basis, with the Engineer's approval, native material with rock fragments larger than six (6) inches may be used to backfill the trench provided that the bedding depth is increased to eighteen (18) inches over the pipe and no rock fragments larger than six (6) inches in diameter are present in the first eighteen (18) inches of backfill over the bedding. Large rocks shall be kept to the side of the trench.

C. If the above noted conditions cannot be met, acceptable fill materials shall be brought on site. All imported fill and backfill material must comply with the Pennsylvania DEP regulations pertaining to "Clean Fill" as found in Document 00800, Article 6 of the Project Manual.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify stockpiled fill to be reused is approved.

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

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

B. Removal of Pavement and Storage of Materials.

1. Grub and clean surface of all materials of whatever nature over the line of trench.
2. Classify material removed and preserve such material as may be required for use in backfilling.
3. Store material removed and preserve such material as may be required for use in backfilling.
4. Cut paving to neat lines equidistant from the centerline of the trench. Width of paving removed initially shall be no greater than the trench width.
5. In business streets, important thoroughfares, narrow streets, or other limited areas, proceed as follows:

a. Remove from streets, the first 100 feet or additional length as may be necessary when directed by the ENGINEER.

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. DEVELOPER shall at his own expense bring back as much of the required material removed as may be required to properly backfill the trench or if so required furnish other material as may be necessary.

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.

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 filed with the 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 DEVELOPER. The DEVELOPER shall 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 Detail 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 Detail Drawings. Backfill compacted using a trench roller or a wacker shall be installed in one (1) foot lifts. Backfill compacted using a hydraulic tamper or boom mounted tamper shall be installed to a minimum depth of four (4) feet above the top of the pipe and then compacted in accordance with the written instructions of the tamper manufacturer.

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 or Class A concrete bedding when directed by the Engineer.

3.06 TOLERANCES

A. Top Surfaces of Backfilling: As required to meet existing grade and/or ground elevations.

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 DEVELOPER'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.

4. Spread seed from March 15th to June 1st and August 1st to October 15th. Extended seeding dates subject to AUTHORITY approval.

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	Min Percent Germination	Max Percent Weed Seed
Kentucky 31, Tall Fescue	20	90	90	0.50
Kentucky Bluegrass	60	85	80	0.40
Perennial Rye Grass	20	90	90	0.50

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

Species in Mix	Mix Percent By Weight	Min Percent Purity	Min Percent 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 02221

SECTION 02270 – EROSION AND SEDIMENT POLLUTION CONTROL

PART 1 - GENERAL

1.01 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 and as contained in the Developer's approved Land Development Plan.

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 DEVELOPER.

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 USED

PART 3 - EXECUTION

NOT USED

END OF SECTION 02270

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

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 (PennDOT), and the work must be performed in accordance with the requirements of the latest edition of the Commonwealth of Pennsylvania, Pennsylvania Code, Title 67, Transportation, Department of Transportation, Chapter 459, Occupancy of Highways by Utilities.

2. Inspection, insurance or other charges demanded by PennDOT, or other authority having jurisdiction shall be paid for by the Developer.

D. Source Quality Control:

1. Shop Tests: 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. PennDOT Specifications Publication 408, as supplemented.

1. PennDOT 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 or railroad company.

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

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

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

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

4. Excavation Conditions: As specified in Section 02221.

5. Excess Materials: As specified in Section 02221.

6. Borrow Material: As specified in Section 02221.

PART 2 - PRODUCTS

2.01 ENCASING CONDUIT

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

1. Minimum Inside Neutral Axis Diameter: As shown on the DEVELOPER'S Drawings and/or the Detail 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 DEVELOPER'S Drawings and/or Detail 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 DEVELOPER OPTIONS IN PRODUCTS

A. The DEVELOPER may install a larger diameter encasing conduit than is shown on the DEVELOPER'S Drawings and/or Detail Drawings, provided that the DEVELOPER has secured the prior written approval of the applicable agencies having jurisdiction. If the DEVELOPER elects to install a larger diameter encasing conduit than is shown on the DEVELOPER'S Drawings and/or Detail Drawings, 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 DEVELOPER 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 DEVELOPER'S Drawings and/or Detail Drawings or required by the ENGINEER or PennDOT.

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

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

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

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

   f. Paint field bolt heads and nuts.

2. Grouting:

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

   b. Provide grout holes tapped for no smaller than 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 DEVELOPER'S Drawings and/or Detail 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 DEVELOPER'S Drawings and/or Detail 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 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 02300

SECTION 02605 – MANHOLES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. DEVELOPER'S Drawings and Detail Drawings

B. Division 1 Specifications

C. Division 2 Specifications, as applicable, including proprietary specifications of individual system and product manufacturers.

1.02 WORK INCLUDED

A. Installation of manholes and appurtenances.

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 may be performed. A manhole acceptance vacuum test shall be conducted after backfilling and bituminous concrete base course or binder course has been completed unless otherwise directed by the ENGINEER or AUTHORITY.

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

2. Vacuum Testing Equipment:

a. Furnish testing equipment as specified in the manufacturer's written instructions. Only manhole testing equipment is acceptable. Pressure gauge for this procedure MUST read in inches of mercury, not in PSI and gauge must read in 1/10 increments.

3. Vacuum Test Procedures:

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

b. Draw a vacuum of ten (10) inches of mercury and close the valves.

c. Manhole will be acceptable when vacuum does not drop below nine (9) 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 Paragraph 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

B. Anti-flotation Design shall be responsibility of the manufacturer.

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

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

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

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

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

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

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

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

3. Monolithic Cast-In-Place Concrete Manhole Bases:

   a. Cast-in-place manhole bases are not permitted.

4. Concrete used for channels inside precast manhole bases shall be of a 3500 psi mix design with a 3/8" diameter maximum allowable aggregate size.

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

   b. Portland cement: Composition and compressive strength conforming to ASTM C478 except use ASTM C150, Type I or Type III with Xypex Concentrate Admix C-2000 (for sulphate resistenance), or ASTM C150 Type II cement or Type I with portland blast-furnase slag cement or

portland-pozzolan cement conforming to ASTM C595, except that the pozzolan constitiuents of the Type IP portland-pozzolan cement shall be fly ash and shall not exceed 25% by weight.

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 cleaned, sealing compound applied, and joint made in strict conformance with the written specifications of the sealing compound manufacturer.

8. Pipe Openings and Seals:

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

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

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

   b. Anti-seize compound shall be used on all threaded surfaces of bolts and frames.

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 PS4

      2) Or approved equal

   c. Field installation of manhole steps shall not be permitted. Steps shall be aligned vertically and spaced so as to be on equal centers in the assembled manhole, a maximum distance of 12 inches apart. 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 and shall be 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 $\pm$ 1/16 inch.

f. Manhole Casting Schedule:

1) Standard Frame and Cover or Private Sewer Frame and Cover.

2) Finish: Cover bearing surfaces machined to prevent rocking and rattling under traffic.

3) Identification: Cast the word "SEWER" or "PRIVATE SEWER" integrally on cover in 2-inch size raised letters.

4) Cover Gasket: One piece O-ring gasket factory installed in a machined rectangular or dovetail groove in the cover bearing surface. No flat gaskets shall be permitted.

a. Gasket material of neoprene composition having good abrasion resistance, low compression set, 40 durometer hardness and suited for use in sanitary sewer manholes.

b. Gluing of gasket in cover is required.

5) Tensile Test Bar: Size B, cast separately, but poured from same iron as castings they represent.

g. Watertight Manhole Frame and Cover: Gray iron castings conforming to previously specified requirements for manhole frame and cover with the addition of cover hold-down bolts.

1) Cover Hold-Down Bolts: Type 316 stainless steel, ASTM A 276, bolts and washers.

2) Threaded Sleeves: Manhole frame factory fitted with stainless steel threaded sleeve to accept cover bolts. Anti-seize compound shall be used on all threaded surfaces of bolts and frames.

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

i. Manufacturer:

1) East Jordan Iron Works, Inc., Middletown, DE

2) Neenah Foundry Company, Model 1916F, Neenah, WI.

3) Or approved equal

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 2 inches in thickness. Split grade rings are unacceptable. Broken or cracked concrete grade rings will not be acceptable.

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. Intermediate Platforms:

    a. In manholes 20' or deeper, intermediate platforms made of stainless steel or aluminum shall be installed.

    b. The platform shall be as indicated on the Detail Drawings and ultimately be approved by ENGINEER.

    c. Manholes with intermediate platforms should be 5' in diameter.

16. Drop Manholes: Construct in accordance with Type indicated in Details on the Drawings, or bound in Project Manual. Drop connections are required for manholes with invert in and invert out elevation differences greater than 24-inches.

    a. Inside Drop Connections: AUTHORITY'S approval required.

        1) PVC bowl with S.S. expansion anchors.

2) S.S. adjustable clamping brackets (304 S.S.).

3) Acceptable manufacturers:
Reliner – Duran, Inc.,
53 Mt. Archer Road,
Lyme, CT 06371
(800) 434-0277

b. Outside Drop Connections: Use DIP and fittings in drop connection.

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 or reinforced plastic steps.

2. DEVELOPER shall provide precast reinforced concrete bases for manholes.

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. Manholes installed within streets should be 7' away from curbs and located outside of wheel paths.

6. Where the DEVELOPER'S 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 or 2' above final grade, unless otherwise directed by ENGINEER.

7. Cast-in-place concrete bases are not permitted.

8. Connections to existing manholes shall include vacuum testing of manhole prior to and after connection to assure water-tightness of new connection.

9. Where new manholes are constructed on existing sewers, a pre-cast base shall be installed. Cast-in-place bases are unacceptable. Installation of new base shall include cutting and removal of mainline, installation of new pre-cast base, sewer pipe and connectors to existing pipe. Vacuum acceptance testing of new manhole is required. Testing of reconnection of existing pipe is required.

10. Any manhole components damaged shall be replaced. Grouting to repair damage is unacceptable.

11. DEVELOPER is responsible for maintaining sewage flow during construction and acceptance testing.

12. Preformed plastic gasket material shall be artificially warmed in cold weather.

13. Minimum drop of 0.10 feet in manhole between invert in and invert out for 8 inch pipe.

14. New pipe connections to existing manholes must be core bored. Core boring is not permitted to be done under steps of manhole.

15. CIPP lining or Sprayroq shall be installed in manholes with force main discharges and in 3 to 4 manholes downstream of pumping station connections and 1 to 2 manholes downstream of grinder pump connections.

16. All manholes and frames and covers shall be installed so that the manhole covers are outside the tire path.

B. Manhole Bases (Precast 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. Manholes having less than 24 inches of fall shall have smooth flow trasitions (channel) from influent to effluent pipes to eliminate splash conditions.

4. 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. The channels must be the same width and shape as the pipe to ensure that plugs and internal inspection equipment shall pass without restricton into all pipes.

5. Precast channels are allowed. However, they must be formed to above specifications and are subject to rejection if they do not meet specifications or are deemed to be unsatisfactory.

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. 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.

3. Through wall lift holes are not acceptable.

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

5. Repair of manhole sections using grout is not permitted. If any damage occurs, the entire manhole section shall be replaced.

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.

2. Any loose steps shall constitute replacement of entire manhole section.

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. Concrete grade rings shall be 2" thick or greater.

3. 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.

4. The joint between the bottom of the frame and the top of precast concrete grade rings, 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 off street (R/W) manholes shall be bolted to the manhole and covers shall be water tight 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 through riser rings so bolts are securely fastened to top manhole section.

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

END OF SECTION 02605

SECTION 02700 - PIPED UTILITIES-SANITARY SEWERS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. DEVELOPER'S Drawings and Detail Drawings

B. Division 1 Specifications

C. Division 2 Specifications, as applicable, including proprietary specifications of individual system and product manufacuturers.

1.02 WORK INCLUDED

A. Installation of sanitary sewers and specials.

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, sanitary sewer reconnects, and plugged laterals shall be air tested. Sewer lines will be tested for leakage between manholes as the work progresses. The air testing shall apply to each reach of sewer line, manhole-to-manhole.

b. All types of sewer pipe installed shall be tested for deflection.

c. All sewer runs shall be lamped.

d. All sewers, including manholes, shall be inspected prior to air testing/vacuum 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.

e. The DEVELOPER shall repair all visible or detectable leaks or defects of any nature.

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

2. Testing equipment:

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 1/10 psi 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.

c. Lamping:

1) Lamping shall be performed by AUTHORITY staff.

2) If a "full moon" does not exist, the sewer run shall be repaired/replaced until passes AUTHORITY'S inspection.

3. Cleaning Prior to Tests:

1) It shall be the responsibility of DEVELOPER to have the pipe clean at the time of air testing and deflection testing.

2) Clean piping before tests are conducted, including sewers, branches and service connections, until free of dirt, silt and/or other construction debris.

a) Provide a means to trap and collect the debris produced during the sewer and manhole cleaning prior to testing.

b) Manholes are to be pumped down during the flushing process.

c) Flushing to be performed using a high pressure flushing machine.

d) Flushing to be performed prior to any other testing.

4. Air Testing Procedure:

a. All 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 will not be conducted until backfill and compaction are completed. Each pipe section shall be tested with low pressure air at a minimum pressure of 5 psig. Where ground water is present, the test pressure shall be determined as follows:

Test pressure = H/2.31 + 5 psig, where H is the depth of groundwater over pipe.

c. At least two minutes shall be allowed for temperature stabilization, adding only the amount of air required to maintain pressure.

d. The pipe shall hold the required test pressure for the duration prescribed in the air test table (Table 1) attached to this Section. The times listed in the table are additive when testing pipes of different sizes.

e. Any pressure drop is considered a failure of test.

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

g. Maximum test pressure is 10 psig when testing PVC pipe.

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 as specified in DEP Sewage Manual, Section 25.85 Defelection Test and as shown below for PVC SDR 35 pipe. Use pipe manufacturer's requirements if pipe type is other than PVC SDR 35.

Nominal Size (in)	Average Inside Diameter (in)	5% Deflection Mandrel (in)
8	7.891	7.28
10	9.864	9.05
12	11.737	10.79
15	14.374	13.20

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

d. Deflection testing will be done at least 30 days after pipe installation.

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 Paragraph 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, Sweeping Tees and End Plugs.
2. Gaskets, Adapters, and Other Appurtenances.
3. Detection Tape.
4. Stone Certification.

B. Submit manufacturer's Pipe Certification Certificate.

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

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle the piping 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 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. Pipe, 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. PVC Pipe: Gravity Sewers

1. 4" - 15" Diameter: (only smooth wall exterior pipe is allowed in these diameters)

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

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

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

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

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

2. 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) Profile 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.

B. Ductile Iron (DIP):

1. Pipe.

a. Ductile iron pipe shall be centrifugally cast, annealed ductile iron manufactured in accordance with ANSI A21.50 and 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. Number of joints to be restrained shall be determined by the pipe manufacturer for the conditions encountered (minimum of four (4) joints on each side of the fitting and/or bend shall be restrained). Restrained joint pipe shall be as manufactured by U. S. Pipe, Clow, American or approved equal. The use of mechanical joint pipe with retainer glands may also be used.

c. Mega lugs shall also be provided at each fitting and/or bend.

d. Furnish Class 52 pipe.

e. Gaskets for restrained joints shall be Field Lok 350 gaskets as manufactured by U.S. Pipe, Snap-Lok as manufactured by Griffin Pipe or approved equal.

f. Ductile iron pipe used for main line gravity sewer construction shall be push-on joint. Ductile iron pipe used for drop manhole connections shall be mechanical joint.

2. Fittings.

a. Furnish fittings in accordance with ANSI 21.10 250 psi rating.

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

c. If restrained joint pipe is furnished, furnish fittings of the same type

d. Compact fillings may be used.

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

4. Manufacture's standard asphalic coating, approximately one mil thick in accordance with AWWA C151, applied to the outside of pipe and fittings.

5. The interior of all ductile iron pipe and fittings is to be lined with Protecto 401 Ceramic Epoxy Lining (or approved equal), in accordance with the manufacture's specifications.

C. High Density Polyethelyne Pipe (HDPE) Force Mains

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

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

Property	Test Method (1)	Nominal Value
Material Designation	PPI/ASTM	PE 3408
Material Classification	D3350	345444C
Density	D1505	0.957
Flow Rate	D1238(190/21.6)	8.5
Flexural Modulus	D790	136,000
Tensile strength @ yield	D638	3,500
ESCR	D1693	F_0>10,000
ESCR, compressed ringF1248	F_0>10,000	
UV stabilizer (C)	D1603	2.5
Elastic modulus	D638	125,000
Brittleness temperature	D746	<-180
Melting Point	D789	261
Vicat softening temperature	D1525	255
Hardness	D2240	64
Thermal expansion	D696	1.1×10^{-4}
Volume resistivity	D991	2.6×10^{16}
HDB @ 73.4°F	D2837	1600
HDB @ 140°F	D2837	800
Molecular weight category		Extra high
Molecular weight	GPC	330,000

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

3. Pipe and fittings shall be manufactured from identical material meeting the requirements listed and shall be designed for a 100 psi working pressure. The manufacturer shall certify that samples of the manufacturer's production pipe have been tested in-house, in accordance with ASTM D-2837, and validated in accordance with the latest revisions of PPI TR-3. Under these procedures, the minimum hydrostatic design basis shall be certified by the manufacturer to the 1600 psi at 73.4°F and 800 psi at 140°F. The pipe and fitting manufacturer shall have an independent PPI Material Listing in accordance with PPI TR-3 and TR-4.

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

5. 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.

6. 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.

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

D. Bolted Steel Coupling:

1. Sleeve complying with ASTM A-53.

2. Followers: Ductile Iron ASTM A 536 or AISI C1020 steel.

3. Bolts and Nuts: High strength low alloy steel with heavy, semi-finished hexagon nuts to ASTM A 325-80 and ASTM A563-80, respectively.

4. Gaskets: Grade 30

5. Approved manufacturers:

   a. Dresser, Bradford, PA

   b. Smith-Blair

E. Flexible Pipe Coupling with Anti-Shear Stainless Steel Collar (Only for pipes 6-inches in diameter and under)

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

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

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

4. Approved manufacturers.

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

   b. Or. Equal.

F. Mechanical Pipe Coupling (For pipes 8-inches in diameter and greater)

1. All couplings and adapters for pipes 8-inches in diameter and greater shall be solid sleeve.

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

3. Approved manufacturers.

   a. Mission, Corona, CA

   b. Calder, Gardner, CA

   c. Dresser, Bradford, PA

G. Location Tape:

1. Location tape shall be a metal detectable reinforced underground utility marking tape with a solid aluminum foil core with permanent printing under a mylar layer.

2. The location tape shall consist of a minimum 5.0 mil (0.0005") overall thickness, coated and colored cross-woven polyethylene, with no less than 4,400 psi of tensile strength and color coded suitable for direct burial.

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

H. Lateral and Service Connection Pipe and Fittings:

1. Connections for new development:

   a. Polyvinyl Chloride (PVC) Pipe; Provide 6-inch diameter. SDR 35 pipe conforming to ASTM D 3034 and made from Class 12454-B rigid PVC compounds with a hydrostatic design stress of 2,000 psi and designated as PVC 1120.

      1) Joint and Fittings: Socket-type for solvent welding; fittings shall conform to ASTM D 2467 and made from Class 12454-B rigid PVC compound.

      2) Joint Solvent: Conforming to ASTM D 2564.

2. Pipe Plugs: Designed for permanent installation and removable. Obtain plugs for various types of pipe used from the respective pipe manufacturer. Pipe plugs shall be able to withstand the pressures of the line acceptance test as outlined hereinafter.

3. Cap Protection Casting: Gray iron casting conforming to ASTM A48, Class No. 35, designed for AASHTO Highway Loading Class HS-20. Casting shall be a product of the U.S.A.

   a. Finish: Cover bearing surface machined to prevent movement under traffic. Casting surfaces factory cleaned and coated with manufacturers standard asphalt paint; non-tacky drying.

b. Acceptable Manufacturers:

1) East Jordan Iron Works, Inc.; Catalog No. 10037.

2) Or Equal.

c. Use cap protection casting with all cleanout/observation tees and cleanouts on service laterals and building sewers where potentially exposed to traffic load, as directed by OWNER.

PART 3 - EXECUTION

3.01 LAYING PIPE

A. General:

1. Maximum sewer run length is 400 ft.

2. Minimum cover over sewer pipe is five (5) feet except when crossing streams, in which case the amount of cover shall be in accordance with the DEP Design Manual.

3. Minimum grade of mainline sewer shall be twenty-five (25) percent greater than the minimum grade required by the DEP, except as approved by the AUTHORITY (example minimum grade of 8-inch sewer is 0.5 percent compared to DEP minimum of 0.4 percent)

4. Sewer depth shall not exceed 20 feet unless specifically approved by the AUTHORITY.

5. Slopes shall not exceed 25% without prior authorization by Engineer.

6. Sewers at depths greater than eighteen feet shall be Class 52 D.I.P.

7. A change in pipe type when constructing a run is only acceptable when constructing a DIP outside drop connection.

8. 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.

9 Each section of pipe shall rest upon the pipe bed 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 DEVELOPER'S Drawings is that of sewer invert. Tolerance $\pm$ ¼- inch.

10. 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.

11. 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.

12. 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.

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

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

15. 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, connect new sewer pipe to existing sewer. Reconnection shall be covered so there is no visible sewage.

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

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

16. DEVELOPER 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.

17. Connections to existing manholes shall require vacuum testing prior to connection and after connection to assure water tightness of manhole.

B. PVC and HDPE Pipe:

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

2. Install 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 SERVICE LATERAL CONSTRUCTION

A. General Requirements: Build service laterals (house or other service lines) to such points as directed by the AUTHORITY, and in accordance with the Building Sewer Installation Specification. Lay and join service laterals in every respect as specified previously for sewer construction methods except as follows:

1. Line and Grade: Lay service laterals true to line and grade furnished by ENGINEER, and unless otherwise required by ENGINEER, at a 90 degree angle to curb line.

2. Cleanout/ObservationTees: Install a 6 x 6 x 6-inch sweeping tee for OWNER use in inspection and testing building sewer lines connection. Extend cleanout/observation tee vertical riser pipe to a point 36 inches above grade at the time of installation and plug. Cleanout/observation tee riser to be of same material as service lateral line. When final grading is accomplished, install cleanout protective casting at finished grade in accordance with the Standard Details. Close the outlet of sweeping tee on the building sewer side with a plug. Type of plugs used and method of installation subject to ENGINEER'S approval. Installed plug shall successfully pass Line Acceptance Test.

   a. All Observation Tee riser stacks shall be extended 36 inches above grade at the time of installation. Any observation tee or riser damaged during the construction process between installation and final grading must be retested even if it previously passed an air test.

   b. When final grading is accomplished, install cleanout protective casting at finished grade in accordance with the Standard Details.

3. In general, where depth of sewer invert is 12-feet or more, or elsewhere as designated by the ENGINEER, install service connections to enter the sewer as shown on Sewer Detail Drawings for "Service Connection-Deep Sewer". Use same material used for service connections.4.

4. Where DIP is used for pipe sewer mains, use DIP pipe for service connection piping.

5. Service connection lines shall not exceed a maximum distance of 100 feet without having a clean-out installed. Cleanout shall include a riser of the same material and size as the service connection line.

   a. All cleanout riser stacks shall be extended 36 inches above grade at the time of installation. Any cleanouts or riser damaged during the construction process between installation and final grading must be retested even if it previously passed and air test.

   b. When final grading is accomplished, install cleanout protective casting at finished grade in accordance with the Standard Details.

6. Service laterals and connection lines shall not have ¼ bends. Any 90 degree bends required by the Authority shall be with two 45 degree bends separated by a minimum of 1 foot, to be used only with Authority approval.

7. Service connections which come into a terminal manhole shall be air-tested.

8. Building sewer connections to service connections shall be made in accordance with the AUTHORITY'S Building Sewer Installation Specifications.

   a. Sewage flowing in existing sewer shall be temporarily plugged or diverted around or through the construction by 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, connect new sewer pipe to existing sewer. Reconnection shall be covered so there is no visible sewage.

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

   d. DEVELOPER 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 indicated 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.

C. Laying Ductile Iron Pipe: Installation and joint assembly according to AWWA C 600, and as follows:

1. Where necessary to field cut pipe, use approved pipe cutter, milling cutter or abrasive wheel saw.

2. Make joints as specified previously under "Joints."

3.03 CONCRETE FOUNDATIONS

A. Where required by ENGINEER, or where shown on the DEVELOPER'S Drawings and/or Detail Drawings, pipe shall be placed on a formed concrete cradle, or unformed concrete shall be placed around pipes for bedding and encasement.

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

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

3.04 The AUTHORITY reserves the right to retest, at the DEVELOPER'S expense, any piping throughout the duration of the Construction Period.

A. Make repairs to piping found defective by such AUTHORITY conducted tests.

3.05 The AUTHORITY will make a final inspection of the installed sewer system upon completion of the street construction, including paving. This inspection will be made to verify final grade of manhole frames and covers and that the interior manholes are clean and free from leaks.

A The warranty period shall begin with all conditions being satisfactory to the AUTHORITY in its final inspection.

3.06 Before 18 months following the AUTHORITY'S final inspection and approval of developer installed sewer extensions, a re-inspection may be performed to verify that the manholes and sewer mains continue to be free of leaks and defects. Defects found shall be repaired as if under the terms of the original contract.

END OF SECTION 02700

SPECIFICATION TIME REQUIRED
FOR SIZE AND LENGTH OF PIPE INDICATED

Pipe Diameter (in.)	Minimum Time (min:sec)	Length for Minimum Time (ft.)	Time for Longer Length (sec x Length, ft.)	Specification Time for Length (l) Shown (min:sec)							
				100 ft.	150 ft.	200 ft.	250 ft.	300 ft.	350 ft.	400 ft.	450 ft.
4	1:53	597	0.190 x Length	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 x Length	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760 x Length	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 x Length	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 x Length	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 x Length	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 x Length	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 x Length	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 x Length	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 x Length	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683 x Length	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926 x Length	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384 x Length	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23
42	19:54	57	20.942 x Length	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04
48	22:47	50	27.352 x Length	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09
54	25:31	44	34.618 x Length	57:42	86:33	115:24	144:15	173:05	201:56	230:47	259:38
60	28:20	40	42.738 x Length	71:14	106:51	142:28	178:05	213:41	249:18	284:55	320:32

SECTION 02720 - BUILDING SEWERS AND SERVICE LATERALS

PART 1 - GENERAL

1.01 SITE CONDITIONS

A. Pipe Line Ownership: The Lower Paxton Township Authority (AUTHORITY) is not the owner of the Building Sewer being installed under this specification section. The property owner is the ultimate owner of the pipeline. Access to the property is by permission of the property owner to be secured by AUTHORITY.

1. The construction of the Building Sewer pipeline shall conform to the requirements of this specification section.

B. Environmental Requirements: Do not perform pipe installation when weather conditions are such that work cannot be performed satisfactorily.

1. Keep trenches dewatered until pipe joints have been made and inspections and tests have been performed.

2. Under no circumstances lay pipe in water or on bedding containing frost.

PART 2 - PRODUCTS

2.01 BUILDING SEWER MATERIALS

A. Elastomeric Materials: Elastomeric materials used in pipelines shall be suitable for continuous contact with domestic sewage.

B. The use of Schedule 40 PVC is prohibited.

C. SDR 35 Polyvinyl Chloride (PVC) Pipe (4 or 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 F789. (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 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.

e. Double Sweeping Tee: Fabricated from SDR 35 PVC material and as manufactured by HEAD Mfg. Inc., 941 S. Hwy. 91, Preston, Idaho 83263; Phone No. 800-635-2790, or approved equivalent.

D. Ductile Iron Pipe (DIP): Provide pipe conforming to ANSI A21.50 and ANSI A 21.51 requirements and having a Class 52 wall thickness.

1. Use DIP only where required by special site conditions or as directed by the AUTHORITY.

2. Fittings: Gray iron or ductile iron conforming to ANSI A21.10 requirements.

3. Joints: Provide push-on or mechanical style rubber-gasket joints conforming to ANSI A 21.11 requirements.

4. The interior of all DIP and fittings is to be lined with Protector 401 Ceramic Epoxy Lining (or approved equal), in accordance with the manufacturer's specification.

5. Pipe and Fitting Coating: Manufacturer's standard asphaltic coating, approximately one mil thick in accordance with AWWA C151, applied to the outside of pipe and fittings.

6. Use DIP only where required by special site conditions and only upon AUTHORITY'S written approval.

E. Flexible Pipe Couplings with Anti-Shear Stainless Steel Collar:

1. Provide flexible pipe couplings with anti-shear stainless steel collar designed for differing pipe material connection; and for transition/reducing conditions of differing pipe material connections. (Flexible-couplings are not permitted for connecting pipe of like materials.)

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

3. Acceptable Manufacturers:

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

b. Or Equal.

F. Cleanout Caps and Plugs: Designed for permanent installation but removable at a future time. Pipe caps and plugs shall be able to withstand the pressures of the line acceptance test as outlined hereinafter.

1. Cleanout Cap Construction: In non-traffic areas, provide Panella-type push-on clean out cover with cast iron body and brass cap with countersunk lug, as shown on the Detail Drawings.

G. Cap Protection Casting: Gray iron casting conforming to ASTM A 48, Class No. 35, designed for AASHTO Highway Loading Class HS-20. Casting shall be a product of the U.S.A.

1. Finish: Cover bearing surface machined to prevent movement under traffic. Casting surfaces factory cleaned and coated with manufacturers standard asphalt paint; non-tacky drying.

2. Acceptable Manufacturers: East Jordan Iron Works, Inc., Model No. 1565, or Neenah Foundry Company Model NF-1975 479.

3. Use Cap Protection Casting with all observation tees and any cleanouts located in areas of vehicular traffic.

2.02 SERVICE LATERAL MATERIALS

A. General Requirements: Where a new Service Lateral is to be constructed along with the Building Sewer (for connection into the existing main sewer), the DEVELOPER shall make the connection to the main sewer using the fittings as specified in the following paragraphs. Use the fitting type as appropriate to the type of main sewer pipe being connected into, unless otherwise directed by the AUTHORITY.

B. Pipe and Fitting Materials, Flexible Pipe Couplings with Anti-Shear Collar, Cleanout Plugs, and Cap Protection Casting: Use same as specified under 2.01 Building Sewer Materials.

C. Saddles: No saddle connections are allowed on main line unless specifically authorized by AUTHORITY. If authorized, test installation as directed by AUTHORITY and provide as follows:

1. Cast Iron Saddles (for connections to other than plastic sewer mains): Use for lateral connections on RCP, VCP and ACP. Provide saddle correctly contoured for outside diameter of pipe and incorporating a gasket and band assembly.

a. Saddle Body: Cast iron, ASTM A 48, Class 35, coated inside and out with heavy coat of black asphaltum type paint.

b. Gasket: Compound rubber (neoprene) tubular O-ring design, ASTM C 361.

c. Band: Type C 304 stainless steel band assembled with two 3/8-inch Type C-304 stainless steel T-bolts, washers and hex nuts.

d. Provide bell inlet saddle suitable for connection with 6-inch SDR 35 PVC.

e. Acceptable Manufacturer: The General Engineering Company; Sealtite.

f. All saddle connections must be air tested.

2. Polyvinyl Chloride (PVC) Saddles: Provide saddle correctly contoured for outside diameter of pipe and incorporating ring gasket bell outlet.

a. Tee saddle of same material as specified previously for sewer pipe with gasketed saddle skirt.

b. Saddles anchored on pipe with two stainless steel bands.

c. Solvent Cement: Conforming to ASTM D 2564.

d. All saddle connections must be air tested.

3. ABS Saddles: Provide ABS saddles for use only on existing ABS truss pipe main sewers. Provide correctly contoured saddles for solvent weld installation to outside diameter of the truss pipe.

a. Tee saddles of ABS with gasketed saddle skirt and two stainless steel bands to anchor saddles on pipe.

b. All saddle connections must be air tested.

c. All cut sections of pipe must be completely sealed at end with ABS solvent cement prior to installation of saddle or in any case of existing ABS pipe that has been cut through.

PART 3 - EXECUTION

3.01 PREPARATION

A. Inspection: Inspect each section of pipe and each pipe fitting before laying in conformance with the inspection requirements of the appropriate referenced standard.

1. Mark with large, painted X and remove rejected pipe from the Project.

B. Pipe Cleaning: Clean piping interior prior to laying pipe and following pipe laying. Keep open ends of piping and pipe attachment openings capped or plugged until actual connection or actual pipe testing.

3.02 CONSTRUCTION METHODS

A. General Requirements: Use proper and suitable tools and appliances for the proper and safe handling, lowering into trench and laying of pipes.

1. Lay pipe proceeding upgrade true to line and grade. Lay bell and spigot pipe with bell end upgrade.

2. Exercise care to ensure that each length abuts against the next in such manner that no shoulder or unevenness of any kind occurs along inside bottom half of pipeline.

3. Before joints are made, bed each section of pipe full length of barrel with recesses excavated so pipe invert forms continuous grade with invert of pipe previously laid. Do not bring succeeding pipe into position until the preceding length is embedded and securely in place with Initial Backfill.

4. Dig bell holes sufficiently large to permit proper joint making and to insure pipe is firmly bedded full length of its barrel.

5. All pipe should be properly bedded to haunchline with applicable aggregate stone to prevent deflection and/or egg shaping before backfill is placed above the pipe.

6. Walking or working on completed pipeline, except as necessary in tamping and backfilling, not permitted until trench is backfilled one-foot deep over top of pipes.

7. Take up and relay pipe that is out of alignment of grade, or pipe having disturbed joints after laying.

8. Take up and replace with new piping, such newly installed pipe sections found to be defective after installation.

9. In the case of repairs, perform pipe reconnections in accordance with the Pipe Reconnection Detail Drawing. Place 40 lb. bags of concrete beneath repair couplings.

B. Pipe Laying and Joining: Perform pipe laying and joining in strict accordance with pipe manufacturer's installation instructions and such additional requirements as specified herein.

1. Make joints absolutely watertight and immediately repair detected leaks and defects in newly installed pipe. Methods of repair subject to approval of the AUTHORITY.

a. Laying Specified Types of Plastic Pipe: Installation and joint assembly according to ASTM D 2321 for Class I bedding material.

b. Laying Ductile Iron Pipe: Installation and joint assembly according to AWWA C 600. Where necessary to field cut pipe use approved pipe cutter, milling cutter or abrasive wheel saw.

C. Service Lateral-to-Main Sewer Connection:

1. PVC Fitting in Mainline:

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 straight tee connection 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. Observation tees shall be installed at the connection between the Building Sewer and the Service Lateral or within the right-of-way line (easement).

d. All sewer Laterals, including the reconnection at mainline, tee and all pipe, shall pass an air test before AUTHORITY acceptance.

2. Saddles: Only as specifically authorized by AUTHORITY. Make connections to main sewers, which incorporate a saddle connection, by machine cutting a hole in the sewer of proper size to accommodate the saddle. Use a machine specifically designed for the purpose; no other means of making the hole permitted.

a. Notify the AUTHORITY for inspection of the sewer main tap after the hole is cut in the piping.

b. After AUTHORITY approval, install saddle in accordance with saddle manufacturer's installation instruction.

c. All saddle connections must be air tested.

D. Service Lateral-to-Manhole Connection: Cut the required pipe opening in the manhole by core drilling methods only. Make the pipe opening no more than 2-inches above the bench of the manhole base or into the base. Make the opening of sufficient size to accommodate the pipe with a pipe opening seal.

1. Pipe Opening Seal: Provide KOR-n-SEAL pipe opening seal as manufactured by NPC Systems, Inc. and as distributed by Monarch Products Co., Inc., York Haven, PA; substitutes not allowed by AUTHORITY.

2. DEVELOPER must vacuum test manhole prior to core bore and after core bore if required by AUTHORITY.

3. Drop connections are not allowed unless specifically approved by AUTHORITY on a case-by-case basis.

4. Form a new channel in the existing manhole bench for the new connection. Form the channel to a depth and width of one-half the pipe diameter of the new pipe entering the existing manhole. Channels may not be formed by using brick, block or any other preformed material. Channel must have a smooth finished surface.

5. Core boring for new lateral connections are not allowed to be cut under existing steps or over an existing lateral connection.

3.03 PIPELINE CONSTRUCTION

A. General Requirements: Construct Building Sewers, and laterals where required, to such points as directed by the AUTHORITY, and in accordance with the Detail Drawings included in these Specifications. Lay and join piping in every respect as specified previously and the following additional requirements:

1. Cleanouts and Observation Tees: Where the observation tee is not present on an existing connection to a Service Lateral, install a double sweeping tee on the end of the existing Service Lateral (tee for AUTHORITY'S use in cleanout, inspection and testing). Provide tee of same material as specified previously for PVC pipe fittings. Sizes of tees as indicated on the Detail Drawings.

    a. Install a cleanout riser with cap on the vertical outlet of the tee. Cleanout riser of same material as Observation Tee. Sizes of cleanout risers as indicated on the Detail Drawings.

    b. All observation tees shall be located within the public easement.

    c. Install a protective casting on all Observation Tees and Cleanout Risers.

    d. Observation Tees shall not be located in any sidewalk area.

2. Building Sewers shall not exceed a maximum distance of 100 feet without having a cleanout installed. Cleanout shall include a riser of the same material and size as the Building Sewer and Service Lateral where required.

    a. All cleanout risers shall have cap protection casting to prevent damage to riser and cap. The casting shall be able to withstand any imposed traffic loads. Cleanouts shall not be located in any sidewalk area.

    b. Cleanout risers shall be at grade, but remain visible for future inspections.

    c. Cleanout risers located in all areas and at the building are to be capped with a Panella-type, push-on clean out cover, with cast iron body and brass cap with countersunk lug, as shown on the Detail Drawings.

    d. All Cleanouts shall be constructed on horizontal grade and riser shall have no bends; must be vertical.

3. Pipe Line Bends: Construct Building Sewers and Service Laterals using not greater than 45 degree bends except where indicated otherwise on the Detail Drawings in these Specifications. Provide at least 1-foot spool piece between bends.

3.04 INSPECTION AND TESTING

A. Inspections: During the progress of the Building Sewer construction, and Service Lateral construction where required, the AUTHORITY will make periodic inspections of the work. The inspections to be performed by the AUTHORITY may include the following:

1. Inspection of pipe bedding procedures

2. Inspection of air testing procedures

3. Inspection of backfilling procedures

B. General Requirements for Testing: Conduct test specified herein so that each pipe line installed in the Project is tested to the satisfaction of the AUTHORITY. Tests shall be conducted in the presence of the AUTHORITY.

1. Provide tools, materials, apparatus and instruments necessary for pipeline testing.

2. Give the AUTHORITY a minimum of 24 hours advance notification of the time when the testing is to be performed. Schedule all inspections as stated in Section 1 of General Instructions.

C. Testing Equipment: Control valve and test gauge apparatus shall be located above grade during the testing to allow for observation by the AUTHORITY.

1. Use testing apparatus equipped with necessary piping, control valves and gauges to control pressure within piping test section and to monitor pressures throughout the test.

2. To prevent accidental overloading of piping test section, provide testing apparatus with an approved pressure relief device set to relieve at 10 psi.

3. The test gauge shall be in satisfactory operating condition and recently calibrated. Gauge shall read in one-tenth increments.

D. Line Acceptance Test: After the pipe line is constructed, observed by AUTHORITY representative and then partially backfilled to at least 2 feet above the pipe, perform a low pressure air line acceptance test in accordance with the Standards listed herein and the following:

1. Seal in pipeline at the connection to the main sewer or lateral end observation tee, and at the property owner's structure, using plugs.

a. Test the seal plugs before actual use by testing plugs outside the trench in a short length of pipe pressurized to maximum anticipated testing pressure. Plugs shall hold and be properly braced, and show no movement. All Building Sewers to be tested from 6-inch clean out riser previously installed by pipe excavation contractor. A 4-inch clean out after 6-inch stub for the purpose of testing of Building Sewer acceptance test will not be allowed. The installation of clean out for testing will be grounds for rejection of Building Sewer.

2. Introduce low-pressure air slowly into sealed pipeline until internal air pressure meets the following requirements. Introduce air until the pressure stabilizes after which the test period shall begin. Test pressure shall be 5 psig.

(Or, if groundwater conditions are known, the test pressure shall be determined as follows:

Test Pressure = 5 psig + $\frac{H}{2.31}$

where H = depth of groundwater above the pipe in feet.)

a. A successful test is when no drop in pressure (no loss of air at all) is observed with the trench partially backfilled; and when pressure is maintained throughout the backfilling operations, as may be required by the AUTHORITY according to the next paragraph.

b. DEVELOPER may be required to hold the pipe line under air test pressure while performing the remainder of the backfilling operations. This requirement is necessary in order to determine leakage, if any, produced by backfilling operations under certain adverse conditions and shall be at the discretion of the AUTHORITY.

F. Repair and Retest: When the pipeline fails to meet test requirements specified previously, comply with the following procedures.

1. Determine source or sources of leakage.

2. Repair or replace defective material, and if a result of improper workmanship, make corrections in the presence of the AUTHORITY.

3. Conduct additional test required to demonstrate that pipeline meets specified tests requirements.

G. The AUTHORITY will make a final inspection of the installed pipeline upon completion of the street restoration (if any), including paving.

END OF SECTION 02720

SECTION 02721 – GREASE INTERCEPTOR

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Installation of Building Sewer grease interceptor.

1.02 RELATED WORK

A. Section 02221 – Trenching
B. Section 02605 - Manholes
C. Section 02720 – Building Sewers and Service Laterals

1.03 QUALITY ASSURANCE

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

B. Repair or replace defective grease interceptor components and piping.

1.04 SUBMITTALS

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

1. Manufacturer shop drawing of grease interceptor.
2. Gaskets, couplings, adapters, and other appurtenances.
3. Manhole covers and frames.
4. Stone certification.

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

1.05 DELIVERY, STORAGE, AND HANDLING

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

B. The grease interceptor shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall the grease interceptor be dropped or skidded against materials already on the ground.

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

D. The grease interceptor and appurtenances shall be thoroughly inspected for defects prior to being installed. Any defective, damaged, or unsound material shall be repaired or replaced.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Grease Interceptors

1. Grease interceptors shall be constructed of reinforced concrete in accordance with ASTM C478.

2. Manhole entry shall have cast iron frame and cover with reinforced concrete base and risers as specified in Section 02605.

3. Sizing of grease interceptors shall be based on wastewater flows and grease retention capacity. The minimum size of a grease interceptor is 1,000 gallons.

4. Inlet and outlet of grease interceptors shall be properly baffled.

5. Inlet and outlet of grease interceptors shall be designed to prohibit access by insects and vermin.

6. The detail drawing for the standard minimum size commercial grease trap is provided at the end of these Standard Specifications.

7. Acceptable manufacturers.

   a. Monarch Products Company, Inc.
   b. Or Equal.

PART 3 - EXECUTION

3.01 GREASE INTERCEPTOR INSTALLATION

A. Grease interceptors shall be located within 20 to 30 feet from the plumbing fixtures to be served.

B. Grease interceptors shall be located outside the rear of the building and in non-traffic areas. Where an interceptor must be located in a traffic area, the interceptor shall have a cover designed for heavy traffic loading.

C. Grease interceptors shall be buried so as to intercept the Service Lateral. Service Lateral should connect downstream of grease interceptor and sampling manhole.

D. The manhole entry of the grease interceptor shall be finished to grade.

E. The inlet, outlet and baffle fittings shall be of a Tee design with a vertical extension of 12 inches from the tank floor and reaching well above the water line.

F. At the AUTHORITY'S discretion, a sampling manhole shall be placed after the grease trap discharge but before any public or private wastewater is combined with the proposed establishment's wastewater. If required by the AUTHORITY, the sampling manhole will be used to sample the discharge of the wastewater leaving the proposed establishment to determine if the grease and oil concentration is in excess of the limits set forth by the Sewer Use Ordinance. For sampling manhole requirements, refer to the Detail Drawings attached and Section 02605, Part 2.01.

G. The interceptor shall be accessible at all times to the Township Plumbing Inspector and AUTHORITY personnel.

END OF SECTION 02721

SECTION 02725 - PIPED UTILITIES - FORCE MAINS AND PRESSURE SEWERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. DEVELOPER'S Drawings and Detail Drawings

B. Division 1 Specifications

C. Division 2 specifications, as applicable, including proprietary specifications of individual system and product manufacuturers..

1.02 WORK INCLUDED

A. Installation of force mains and pressure sewers

1.03 REQUIREMENTS FOR USE OF FORCE MAINS OR PRESSURE SEWERS

A. Extensions to the Authority's sewer system are to be conventional gravity sewage collection systems unless the DEVELOPER demonstrates to the satisfaction of the Authority that it is not feasible to serve the proposed development without pumping of wastewater.

B. If the AUTHORITY approves use of pumping station(s), the design capacity of the station(s) and force main(s), and location of force main connection to the existing system must be approved by the AUTHORITY prior to design of the proposed pumping and force main facilities.

C. Upon determination of force main size and anticipated head conditions, specifications for the force main materials and construction will be provided. General material requirements are as follows:

1. Force Main - 1.5 inches through 4 inches:

a. ASTM D2241 Type 1, Grade 1 PVC Pressure Pipe SDR 21 or SDR 26 200 psi

b. HDPE

c. Ductile Iron Pipe conforming to ANSI 21.50 and 21.51, Class 52 minimum

2. Force Main - 6 inches:

a. Ductile Iron Pipe conforming to ANSI 21.50 and 21.51, Class 52 minimum

b. AWWA C-900, DR 14, 200 PSI PVC

3. Force Main 8 inches and larger:

a. Ductile Iron Pipe conforming to ANSI 21.50 and 21.51, Class 52 minimum

PART 2 - PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 02725

SECTION 02831 - RIGHT-OF-WAY GATE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. DEVELOPER'S Drawings and Detail Drawings.

B. Division 1 Specifications .

C. Division 2 Specifications, as applicable, including proprietary specifications of individual system and product manufacturers.

1.02 WORK REQUIRED

A. General Requirements: Install a gate system of the type specified herein on off-street rights-of-ways to prevent unauthorized entry. The exact location for the gate system shall be selected by the AUTHORITY.

B. Gate System Design: Provide a stock gate with hinges and locking assembly, as well as pedestrian access post, in accordance with the design indicated on the DEVELOPER'S Drawings and Detail Drawings

PART 2 - PRODUCTS

2.01 GATE MATERIALS

A. Gate Frame Work: Ferrous metal elements of the gate frame and accessories shall receive zinc (Grade E) coating by the hot dip process after fabrication. Metal coated to 1.8 oz. of zinc coating per square foot of surface, in a smooth finish, free from dross, uncoated spots and foreign materials, in accordance with ASTM A 123.

1. Provide framework of roll-formed or tubular members fabricated from 50,000 psi minimum yield strength steel. Member sizes shall be adequate section and weight for the gate leaf width indicated.

B. Hinge, Locking and Pedestrian Access Posts: Provide galvanized steel posts of the nominal dimensions indicated.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Set hinge and locking posts and pedestrian access post by the post hole method. Powered augers may be used so long as the holes are made true and not over excavated. Open cut excavations for setting of posts is not acceptable.

1. Post holes shall be large enough to accept the posts with enough annular space to allow complete backfilling with concrete to eliminate post movement.

2. Mount the stock gate using gate hardware designed specifically for mounting in galvanized steel. Set hasp and keeper latch to allow for easy opening and closing operation. Hasp lock provided by the AUTHORITY.

END OF SECTION 02831

Division 11

Equipment

SECTION 11300 - PUMPING STATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. DEVELOPER'S Drawings and Detail Drawings

B. Division 1 Specifications

C. Division 2 Specifications, as applicable, including proprietary specifications of individual system and product manufacuturers.

1.02 WORK INCLUDED

A. Contruction of pumping stations, including installation and testing of pumps and controls, electrical and HVAC equipment.

1.03 REQUIREMENTS FOR USE OF PUMPING STATIONS

A. Extensions to the Authority's sewer system are to be conventional gravity sewage collection systems unless the DEVELOPER demonstrates to the satisfaction of the Authority that it is not feasible to serve the proposed development without pumping of wastewater.

B. If the AUTHORITY approves use of pumping station(s), the design capacity of the station(s) and force main(s), and location of force main connection to the existing system must be approved by the AUTHORITY prior to design of the proposed pumping and force main facilities.

C. Upon determination of required station capacity and anticipated head conditions, specifications for the specific pumping station application, including, but not necessarily limited to, wet well, enclosures, pumps and controls, piping, electrical and HVAC equipment, will be determined by the ENGINEER and AUTHORITY and provided to the DEVELOPER for the design of the facilities.

PART 2 - PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 11300

SECTION 11304 – SUBMERSIBLE GRINDER PUMP STATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: The work specified in this Section consists of providing grinder pump unit(s) with tank, internal piping, and operating controls in accordance with the AUTHORITY'S resolution for grinder pump use. This application is for grinder units provided for individual buildings that cannot be served by gravity, but that will pump into the gravity system. Low pressure sewer systems will not be accepted unless demonstrated to the satisfaction of the AUTHORITY that it is not feasible to serve the development by conventional measures. Requirements for a low pressure sewer system serving multiple grinder units shall be obtained from the AUTHORITY on a case-by-case basis.

B. Related Sections:

1. Trenching: Section 02221.
2. Manholes: Section 02605.
3. Force Mains and Pressure Sewers: Section 02725.

1.02 REFERENCES

A. American National Standards Institute:

1. ANSI B2.1, Pipe Threads.
2. ANSI B16.3, Malleable-Iron Screwed Fittings, 150 and 300 lb.
3. ANSI C2, National Electrical Safety Code.

B. American Society for Testing and Materials:

1. ASTM A 48, Specification for Gray Iron Castings.

2. ASTM A 536, Specification for Ductile Iron Castings.

3. ASTM B 62, Specification for Composition Bronze or Ounce Metal Castings.

4. ASTM B 371, Specification for Copper-Zinc-Silicon Alloy Rod.

5. ASTM B 584, Specification for Copper Alloy Sand Castings for General Applications.

6. ASTM C 581, Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass Fiber Reinforced Structures, Intended for Liquid Service.

7. ASTM C 582, Specification for Contact-Molded Reinforced Thermosetting Plastic (RTP) Laminates for Corrosion Resistant Equipment.

8. ASTM D 1784, Specification for Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

9. ASTM D 1785, Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Schedules 40, 80 and 120.

10. ASTM D 2241, Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series).

11. ASTM D 2466, Specification for Poly (Vinyl Chloride)(PVC) Plastic Pipe Fittings, Schedule 40.

12. ASTM D 3139, Specification for Joints for Plastic Pressure Pipes Using Flexible Electrometric Seals.

13. ASTM D 3299, Specification for Filament-Wound Glass Fiber Reinforced Polyester Chemical-Resistant Tanks.

14. ASTM F 477, Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

C. Federal Specification:

1. Fed. Spec. WW-C-581D, Conduit, Metal, Rigid and Coupling Elbow and Nipple, Electrical Conduit, Zinc-Coated.

D. Institute of Electrical and Electronics Engineers.

E. National Bureau of Standards: Product Standard PS 15-69, Custom Molded Reinforced Polyester Chemical Resistant Process Equipment.

F. National Electrical Code (NEC).

G. National Electric Manufacturer's Association (NEMA) Standards of Construction.

H. National Fire Protection Association (NFPA): NFPA 70; National Electrical Code, and current amendments.

I. Underwriters' Laboratories (UL) Listings and Approvals on specified Products.

1.03 SUBMITTALS

A. Checklist: Complete Table 4, Submersible Grinder Pump Check List and submit with Shop Drawings.

Table 1
Submersible Grinder Pump Check List

Job Number _____
Developer _____
Development _____
Date _____
Submittal Number _____

Developer/contractor is to initial and submit this checklist as part of the grinder pump submittal. Submittals that do not include the check list or items not submitted will be returned as incomplete.

	Applicants Initials	Authority Use: Acceptable	Authority Use: Unacceptable
1. Name and Address of developer.	_____	_____	_____
2. Project location.	_____	_____	_____
3. Site plan and elevation drawings showing building(s) location and elevation of gravity sewers, elevations of the top and bottom of the grinder pump station(s) and location and elevations of the pressure sewer(s).	_____	_____	_____
4. Submit friction calculations at various flows to produce system curve. Plot (and submit) system curve versus pump performance curve.	_____	_____	_____
5. Calculations justifying pump horsepower and impeller diameter selection	_____	_____	_____
6. Submitted grinder pump meets Authority specifications.	_____	_____	_____
7. Submitted grinder pump station basin meets Authority specifications.	_____	_____	_____
8. Submitted control components meet Authority Specifications.	_____	_____	_____

B. Operation and Maintenance Manuals: Within four weeks following the receipt of approved shop drawings, submit to the ENGINEER for review and approval, five copies of manuals prepared by the manufacturer/supplier, or the DEVELOPER'S CONTRACTOR. Incomplete or inadequate manuals will be returned to the DEVELOPER for correction and resubmission.

1. Include the following elements in each manual:

a. Erection or installation instructions.

b. Start-up procedures.

c. Recommended and alternative procedures.

d. Schedule of preventive maintenance requirements.

e. Detailed maintenance procedures.

f. Schedule of lubrication requirements.

g. Data sheet listing pertinent equipment or system information, as well as the addresses and telephone numbers of the nearest sales and service representatives.

h. Provide a list of the manufacturer recommended spare parts.

1.04 QUALITY ASSURANCE

A. Tank Design Criteria: Provide a completely watertight tank with 100 gallon capacity minimum between the pump on and pump off elevations, designed to withstand the minimum depth of bury earth load at the proposed tank location.

1. The tank manufacturer shall calculate the anti-flotation anchor and provide an appropriate design for the anchor.

B. Requirements of Regulatory Agencies: Comply with construction code requirements of State, County, and such other political subdivision specifications as may exceed the requirements of the codes, standards and approving bodies referenced throughout these Specifications:

1. Provide electrical control panels and grinder pump units constructed in accordance with the requirements of the Underwriters Laboratory, or other nationally recognized certification agency, and labeled accordingly.

2. Units shall comply with the applicable requirements of the Pennsylvania Department of Environmental Protection and the National Sanitation Foundation.

C. Source Quality Control:

1. Shop Tests: In accordance with Paragraph 1.05 of the General Instructions, factory test each unit. The manufacturer shall have facilities to perform listed tests. 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.

a. Submit the proposed types of tests in the shop drawing submittal.

b. Test to assure water tightness of the unit for the proposed installation depth.

c. Test pump output in gallons per minute at 15 psi and 35 psi.

d. Test amperage and wattage of electrical consumption.

2. Laboratory Tests: The ENGINEER reserves the right to require that laboratory tests also be conducted on units that have been shop tested. When the ENGINEER so orders, furnish without compensation, labor, materials, and equipment necessary packaging, and shipping the grinder pump unit to the Test Laboratory.

3. Provide certification that the units have been tested successfully for water tightness.

4. Single Source Responsibility: To ensure single source responsibility and part supply, provide the pump components, tank, internal piping system and electrical controls from one grinder pump manufacturer.

D. AUTHORITY Inspections: An AUTHORITY representative will be present during grinder pump unit initial installation and testing operations. To accommodate the AUTHORITY concerning the inspections, the DEVELOPER shall observe the following:

1. Notice: Give the AUTHORITY a minimum of 24 hours notice for an inspection. Call 657-5617 between 8:00 a.m. and 5:00 p.m. prevailing time, Monday through Friday. Schedule inspection appointments with the AUTHORITY only between the hours of 7:00 a.m. and 2:00 p.m. prevailing time, Monday through Friday.

a. No weekend or holiday inspection appointments allowed.

2. Initial Unit Installation and Inspection: To serve as the minimum acceptable conditions of installation throughout the Project, install the first unit in the Project to demonstrate the stages of installation stated in the following sentences. The AUTHORITY representative shall inspect each of the following stages of installation.

a. Bedding and concrete construction.

b. Pipe connections to the unit and water tightness of the complete unit.

c. Proper electrical work operation of the unit.

d. Proper backfilling procedures.

1.05 DELIVERY, STORAGE AND HANDLING

A. To prevent damage and defects, transport, store and handle the units and products specified herein in a manner recommended by the respective manufacturers.

1.06 SITE CONDITIONS

A. Environmental Requirements: In no instance, set units on subgrade containing frost or on unacceptable subgrade, which condition has been determined unacceptable by the ENGINEER.

B. Electrical Interface: Install or mount those electrical components or apparatus as furnished by the product manufacturers of those products specified herein.

1. Property owner shall be responsible for permanent power wiring, including final connection of such to the electrical components or apparatus of the grinder pump units. Owner shall have all electrical work inspected by Township Code Department.

1.07 MAINTENANCE

A. Maintenance shall be the sole responsibility of the property owner in accordance with provisions of the AUTHORITY'S resolution for grinder pump use.

PART 2 - MATERIALS

2.01 SUBMERSIBLE GRINDER PUMP STATION

A. General:

1. Residential Locations:

a. Simplex grinder pump installations are permitted at residential property locations. Duplex grinder pump unit can be used so that in the event one pump fails, the second pump will operate and the connected facilities can still be used.

2. Commercial Locations:

a. Duplex grinder pump unit shall be used at commercial facilities so that in the event one pump fails, the second pump will operate and the commercial facility can maintain service.

3. Grinder pump station shall be installed in a fiberglass-reinforced polyester basin for outdoor installation only. Indoor installation is not be permitted.

4. Grinder pump station shall consist of submersible grinder pump and motor, complete with fiberglass basin, junction box and all internal wiring, slide away mounting system, mercury float switch system, high water alarm, piping and valves, and motor controller.

5. A control panel shall be provided for each unit and installed on the exterior or interior of each home.

6. The manufacturer of the grinder pump station shall be:
a. Aurora/Hydromatic Pumps.

b. ENGINEER approved equal.

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 minimum of 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 with existing 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 leakproof 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 from 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 PVC upper guide rail brackets with the slide rail assembly made from fiberglass channel section. The stationary and movable portions of the hydraulically sealed discharge coupling assembly shall be PVC. The upper guide rail bracket shall mount to the basin wall and position the upper end of the fiberglass guide rail while a stainless steel base positions the lower end of the guide rail.

5. Level Control:

a. Level control shall be by means of mercury float switches, single action design, capable of withstanding water penetration under 25 feet of water with at least a 3 to 1 safety factor. Float switches shall be mounted firmly in place in such a way that prevents tangling or fouling in the basin.

b. Two float switches shall be used to control level; one for pump turn on, and one for pump turn off. A third switch shall be provided for high water alarm.

6. Junction Box:

a. NEMA 4X watertight junction box shall be installed in the basin for connection of the pump and control wiring. The box shall be constructed of self-extinguishing ABS plastic with minimum wall thickness of 3/16 inch. The box cover shall be bolted on with stainless steel fasteners and sealed with a neoprene gasket. Individual corrosion-resistant and liquid tight cable connectors constructed of thermoplastic with neoprene bushing and sealing ring shall be provided. The box and all connections shall be completely watertight and shall be capable of withstanding an external liquid pressure of 10 PSI. The junction box and fittings shall be of waterproof design. All fittings and hardware shall be of non-corrosive construction.

b. Conduit and wiring between basin and control panel shall be installed in accordance with National Electric and all other applicable 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 the detail drawings 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 1¼-inch 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 PVC

d. The movable fitting shall be positive seal, slide design having a working pressure rating of no less than 80 PSI. The movable fitting, when in

position shall be held against the stationary fitting by the construction of the fiberglass rail, aligning the movable fitting for proper sealing of the two surfaces under pressure. Nylon rope shall be provided for pump installation and removal.

e. A 1¼ PVC plunger valve shall be installed in the discharge piping to provide shut-off capabilities during pump removal, and shall be fitted with an integral PVC 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 within the guide rail channel.

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 minimum diameters shall be as follows:

   a. Simplex system – 30-inch diameter.
   b. Duplex system – 36-inch diameter.

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 fiberglass cover. 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.

E. Controls:

1. Simplex Control Panel:
   a. The motor control panel shall be assembled and tested by a shop meeting U.L Standard 508 for industrial controls. The motor and control panel shall be assembled and tested by the same manufacturer supplying the pump so as to insure suitability and assurance of experience in matching controls to motors and to insure single source responsibility for the equipment.

   b. The controls for the pump shall be contained in a steel enclosure meeting NEMA 3R requirements with a hinged door.

c. The enclosure shall have provisions for padlocking. A nameplate shall be permanently affixed to the panel and include the pump model number, voltage, phase, hertz, pump full load ampere rating and pump horsepower rating. A warning label against electric shock shall be permanently affixed to the outer door.

d. A steel back panel with electroplated bright zinc and clear chromate finish shall be provided. A painted steel back panel will not be acceptable.

e. A run light and hand-off-auto switch shall be provided. Run light and hand-off-automatic switch shall be mounted on an electroplated bright zinc panel with clear chromate finish steel bracket. The run light and hand-off-auto switch shall be properly labeled as to function. The hand-off-auto switch shall be rocker type with an electrical life of 50,000 operations. The run light shall match the hand-off-auto switch in appearance and have an electrical life of 50,000 hours. Run light shall be red.

f. Terminal blocks with box type lugs shall be supplied to terminate all wiring for floats and heat and seal sensors for the pump, if required. The pump leads shall be terminated at the overload relay or at box type terminal blocks. The terminal blocks for the float connections shall be on the pump controller.

g. A circuit breaker shall be used to protect from line faults and to disconnect the pump from the incoming power. Circuit breaker shall be thermal magnetic and sized to meet NEC requirements for motor controls.

h. The magnetic starter shall include a contactor with a minimum life of 3,000,000 operations and a minimum contact life of 1,000,000 operations. A definite purpose contactor shall not be acceptable. The magnetic starter shall include an overload relay which is ambient temperature compensated and bimetallic. The overload relay shall have test and reset buttons. The overload relay shall be capable of being set in either manual or automatic reset mode. In the manual mode, reset shall be accomplished only by the operator. At 6 times full load amps, the overload relay shall trip within 10 seconds or Class 10 rated overload relays shall be required.

i. Wire ties shall be used to maintain panel wiring in neat bundles for maintenance and to prevent interference with operating devices. All wiring shall be color coded to facilitate maintenance and repair of the control panel. Where a color is repeated, number coding shall be added. A schematic shall be permanently attached to the inside surface of the front door.

j. All ground connections shall be made with ring tongue terminals and star washers to assure proper ground.

k. A simplex pump controller shall be provided for control logic. Pump controller shall utilize a printed circuit board to avoid conventional wiring. The printed circuit board of the pump controller shall be made of U.L. listed materials.

l. The pump controller shall indicate float circuit operations utilizing red LED indicator lights. LED indicator lights shall provide adequate information so that they can be used for diagnosis in troubleshooting problems located in the float circuits. Each LED shall be permanently labeled on the pump controller as to function.

m. Pump controller shall have provisions for connecting float level controls and heat sensor monitors, where applicable, to box type lug connectors.

n. Box type lug connectors shall be made of polyamide thermoplastic to exclude aging due to heat influences. Phenolic type terminal blocks on the pump controller shall not be acceptable. Each terminal block shall be properly and permanently labeled on the pump controller as to its purpose.

o. Wiring of hand-off-auto switch, run light, contactor, and overload to the pump controller shall be accomplished by means of plug connectors. The pump controller shall have male header assemblies from the corresponding devices as labeled on the pump controller for that male header assembly. Header assemblies shall be constructed of a corrosion-resistant thermoplastic material having a temperature range of -55°C to 105°C and copper alloy, bright acid tin over nickel plating contacts. There shall be no external lights on the pump control panel.

p. The panel shall be equipped with following additional features:

1) U.L 508, intrinsically safe circuit extensions for floats (standard construction only).

2) High level alarm light (flashing).

3) High level alarm horn with push to silence switch.

4) Seal failure light.

5) Anti-condensate heater (50 watt) with thermostat.

2. Duplex Control Panel:

a. The motor control panel shall be assembled and tested by a shop meeting U.L Standard 508 for industrial controls. The motor and control panel shall be assembled and tested by the same manufacturer supplying the pump so as to insure suitability and assurance of experience in matching controls to motors and to insure single source responsibility for the equipment.

b. The controls for the pump shall be contained in a steel enclosure meeting NEMA 3R requirements with a hinged door.

c. The enclosure shall have provisions for padlocking. A nameplate shall be permanently affixed to the panel and include the pump model number, voltage, phase, hertz, pump full load ampere rating and pump horsepower rating. A warning label against electric shock shall be permanently affixed to the outer door.

d. A steel back panel with electroplated bright zinc and clear chromate finish shall be provided. A painted steel back panel will not be acceptable.

e. For each pump, a run light and hand-off-auto switch shall be provided. Run lights and hand-off-automatic switches shall be mounted on an electroplated bright zinc panel with clear chromate finish steel bracket. The run lights and hand-off-auto switches shall be properly labeled as to function. The hand-off-auto switches shall be rocker type with an electrical life of 50,000 operations. The run lights shall match the hand-off-auto switches in appearance and have an electrical life of 50,000 hours. Run lights shall be red.

f. Terminal blocks with box type lugs shall be supplied to terminate all wiring for floats and heat and seal sensors for the pump, if required. The pump leads shall be terminated at the overload relay or at box type terminal blocks. The terminal blocks for the float connections shall be on the pump controller.

g. A circuit breaker shall be used to protect from line faults and to disconnect the pump from the incoming power. Circuit breakers shall be thermal magnetic and sized to meet NEC requirements for motor controls.

h. The magnetic starter shall include a contactor with a minimum life of 3,000,000 operations and a minimum contact life of 1,000,000 operations. Definite purpose contactors shall not be acceptable. The magnetic starter shall include an overload relay which is ambient temperature compensated and bimetallic. The overload relay shall be capable of being set in either manual or automatic reset mode. In the manual mode, reset shall be accomplished only by the operator. At 6 times full load amps, the overload relay shall trip within 10 seconds or Class 10 rated overload relays shall be required.

i. Control fuse(s) and on/off switch shall protect and isolate the control voltage from the line.

j. Wire ties shall be used to maintain panel wiring in neat bundles for maintenance and to prevent interference with operating devices. All wiring shall be color coded to facilitate maintenance and repair of the control panel. Where a color is repeated, number coding shall be added. A schematic shall be permanently attached to the inside surface of the front door.

k. All ground connections shall be made with ring tongue terminals and star washers to assure proper ground.

l. A duplex pump controller shall be provided for control logic. Pump controller shall be solid state utilizing a printed circuit board to avoid conventional wiring. The printed circuit board of the pump controller shall be made of U.L. listed materials.

m. The pump controller shall indicate float circuit operations utilizing red LED indicator lights. LED indicator lights shall provide adequate information so that they can be used for diagnosis in troubleshooting problems located in the float circuits. Each LED shall be permanently labeled on the pump controller as to function.

n. Pump controller shall have provisions for connecting float level controls and heat sensor monitors, where applicable, to box type lug connectors.

o. Box type lug connectors shall be made of polyamide thermoplastic to exclude aging due to heat influences. Phenolic type terminal blocks on the pump controller shall not be acceptable. Each terminal block shall be properly and permanently labeled on the pump controller as to its purpose.

p. Pump controller shall include alternating circuit of the low voltage type and be operational from a transformer mounted on the pump controller board. The alternator shall consist of an alternating relay which alternately switches when voltage is removed form its circuit. Alternating circuit shall have a totally isolated ground.

q. Wiring of hand-off-auto switches, run lights, contactors, and overloads to the pump controller shall be accomplished by means of plug connectors. The pump controller shall have male header assemblies from the corresponding devices as labeled on the pump controller for that male header assembly. Header assemblies shall be constructed of a corrosion-resistant thermoplastic material having a temperature range of -55°C to 105°C and copper alloy, bright acid tin over nickel plating contacts.

r. The panel shall be equipped with following additional features:

1) U.L 508, intrinsically safe circuit extensions for floats (standard construction only).
2) High level alarm light (flashing).
3) High level alarm horn with push to silence switch.
4) Seal failure light.
5) Anti-condensate heater (50 watt) with thermostat.

2.02 PRESSURE PIPE (FORCE MAIN)

A. General:

1. Pressure pipe shall be polyethylene plastic pipe of a minimum 1¼-inch diameter.

2. Pressure pipe to be SDR 26 or SDR 21 PVC

3. Approved Manufacturers:

a. Plexco Plastic Piping Systems
b. CSR
c. ENGINEER approved equal

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine units for defects that will adversely affect installation or cause latent defects in completed work. Inform ENGINEER of defects. Do not proceed with installation until defects have been corrected.

B. Refer to manufacturer's instruction and installation manual before proceeding with installation of units.

C. Verify other construction work is complete to the extent that substrates on which electrical apparatus are to be installed is ready to receive same.

D. Verify direction of motor rotation in equipment before making final connections to electrically operated equipment.

3.02 PREPARATION

A. Field Measurement: The DEVELOPER'S Drawings and/or Detail Drawings are generally indicative of the Work, but are not an exact representation of each condition involved. Therefore, set units, piping, etc. to suit actual field measurements.

1. Where proposed changes to the DEVELOPER'S design are necessitated by field conditions or other causes, submit detail drawings of proposed changes to the ENGINEER for approval.

B. Keep pipe and unit interiors cleared of debris as construction progresses.

C. Earthwork: Perform earthwork for unit installation as specified in Section 02221 and according to the following:

1. Make excavations for units to a nearly vertical plane and not to exceed the nominal dimensions of the concrete anchor outside diameter.

2. If rock excavation is required, take rock out to limits specified previously.

3. If surface pavement of any type is encountered, vehicle or pedestrian ways, cut such pavement to a rectangular shape as opposed to circular shape of unit. Make limits of cut not to exceed one-foot beyond excavation limit as specified previously.

3.03 INSTALLATION

A. General Requirements: Install units in strict accordance with manufacturer's instruction and installation manual, and at locations and in accordance with DEVELOPER'S Drawings and/or Detail Drawings.

1. Install a check valve between the unit and the main sewer piping in accordance with the Detail Drawings.

2. Install units on a six inch deep compacted layer of aggregate meeting requirements of first class bedding. Install first class bedding material as backfill up to highest pipe connection.

B. Anti-Flotation Anchor Installation, Fiberglass Tank: Form and pour concrete anchors.

1. Prefabricated anchors, as specified previously in this Section, are acceptable.

C. Underground Electrical System: Install underground electric cable in accordance with Article 300-5 of the NEC, in accordance with previous requirements of this Section, and the following requirements exceeding NEC:

1. Earthwork: Perform earthwork for buried electric cable as specified for piping under Section 02221.

2. Provide two feet minimum cover over cable unless indicated otherwise on the DEVELOPER'S Drawings and/or Detail Drawings.

3. Make electrical cable penetrations through the tank absolutely watertight.

D. Electrical System Grounding: Perform grounding of electrical system and metal enclosures in accordance with Article 250 of the NEC.

1. In addition to grounding and bonding requirements of NEC as referenced in the preceding paragraph, the following shall also apply:

a. Use approved grounding connectors only. Clean the surfaces involved in the made-grounds before connecting and finish the installation with touch-up painting or other protective coating to prevent corrosion.

E. Control Panel Installation: Fasten control panel and cable to exterior of the building or post (for post mounted) using fasteners suitable for anchoring into the particular type of surface, and fasten in accordance with current accepted trade practices. Only screw-type corrosion-resistant fasteners are acceptable.

1. Install control panel four feet above existing grade, measured to the bottom of the panel.

2. If post mount installation, provide post of sufficient length to permit three feet of embedment in ground and the four foot clearance requirement stated above.

3.04 FIELD QUALITY CONTROL

A. General Requirements: Upon completion of installation of the grinder pump units, including but not limited to control panel mounting, electrical work installation and connections, pressure service lateral installation, and unit backfilling, each being performed in a manner satisfactory to the ENGINEER, advise the unit manufacturer that the units have been installed and are ready to be inspected and tested.

1. In cooperation with the unit manufacturer, determine a mutually acceptable schedule for inspection and testing of installed units.
2. Conduct the Performance Test specified herein prior to the property owner's electrical wiring and plumbing connections to the grinder pump units.
3. Conduct tests as specified herein so that each unit installed in the Project is tested to the unit manufacturer's and ENGINEER'S satisfaction. Provide the AUTHORITY with documentation of such manufacturer's acceptance test in the form of a letter to the AUTHORITY attesting to this test requirement.
4. Provide tool, materials, water, temporary power, apparatus, and instruments necessary for unit testing. Conduct the specified tests in the presence of and to the satisfaction of the unit manufacturer and the ENGINEER.

B. Performance Test: Demonstrate (with the Personnel of the AUTHORITY observing), to the satisfaction of the ENGINEER, the mechanical performance of each unit when operated in accordance with the design intent indicated by the DEVELOPER'S Drawings and/or Detail Drawings and described in this Section of these Specifications.

1. Connect temporary power source to the alarm circuit at the control panel.
2. Fill the tank with sufficient water to test the high level audible and visual alarms at the control panel.
3. Connect 24V temporary power source to the power circuit at the control panel and run the unit through a minimum of three operation cycles to check pump operation and shut-off.
4. If the demonstrations are satisfactory to the ENGINEER, the test will be considered concluded. If deficiencies are found, they shall be corrected as follows and the test repeated until the ENGINEER determines that the unit has performed satisfactorily.
    a. Unit manufacturer shall correct pump, internal piping and control panel deficiencies.
    b. Installer shall correct installation deficiencies.

C. Electrical Systems Test: Unless waived in writing by the ENGINEER, perform tests and trials in the presence of a duly authorized representative of the ENGINEER. When the

presence of such representative is so waived, furnish to the ENGINEER sworn statements, in duplicate, of the tests made and the results thereof.

1. Inspection: have the work inspected by an authorized inspection agency, and such other agencies having jurisdiction, for compliance with National Electrical Code and obtain certificates of approval, acceptance, and compliance with code regulations. Work shall not be deemed complete until such certifications have been delivered to the AUTHORITY.

2. Testing: Test materials, supplies and parts and assemblies thereof, entering into the Work, in conformity with the best currently approved method for the particular type and class of work.

    a. Render the entire installation free from short circuits and improper grounds. Test feeders cable disconnected from the power source. Then test the entire power circuit and the panel with the pumping equipment operating. In no case, shall the insulation resistance be less than one hundred thousand ohms.

    b. Perform initial electrical system tests using meggers, ammeters, voltmeters, insulation resistance testers, and high-pot testers prior to placing electrical systems into complete operation.

        1) Use meggers with an adjustable 2.5/5.0 KV range which will permit reading of 0.05 to 100,000 Megohms. The minimum testing voltage obtained by adding 1000 volts to twice the rated voltage of the cable, device, apparatus or equipment. In no case shall the insulation resistance be less than one Megohm. However, the recommended insulation resistance measurements of each test shall conform to IEEE and ANSI Standards.

    c. Correct failures in a manner satisfactory to the ENGINEER or his authorized representative.

END OF SECTION 11304