



**UPPER MORELAND-HATBORO JOINT SEWER AUTHORITY**  
**MONTGOMERY COUNTY, PENNSYLVANIA**

**STANDARD SPECIFICATIONS FOR DEVELOPERS**

**MARCH 2016**

**PREPARED BY:**  
**UPPER MORELAND-HATBORO JOINT SEWER AUTHORITY**  
**&**



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STANDARD SPECIFICATIONS FOR DEVELOPERS  
UPPER MORELAND-HATBORO JOINT SEWER AUTHORITY  
SANITARY SEWER SYSTEM

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SANITARY SEWER SYSTEM

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## SECTION I

### GENERAL INSTRUCTIONS

#### **1.1 INTRODUCTION**

It is the intent of these instructions, specifications and construction standards, as presented herein, to comprise the minimum requirements of the Upper Moreland-Hatboro Joint Sewer Authority (Authority) for the construction of sanitary sewer systems by developers.

All work shall be performed in accordance with requirements of the Authority and these Specifications. The Work shall be executed in the best and most workmanlike manner by qualified, conscientious, and experienced workmen to meet or exceed industry standards.

#### **1.2 DEFINITIONS**

The following definitions shall be applicable in these Specifications:

- (1) Authority shall mean the Upper Moreland-Hatboro Joint Sewer Authority. The terms may also include any agent, employee, or representative of the Upper Moreland-Hatboro Joint Sewer Authority.
- (2) Borough shall mean the Borough of Hatboro. The Borough of Bryn Athyn will be identified as Bryn Athyn.
- (3) Contractor shall mean any individual, partnership, or corporation performing sewer construction work for the Developer.
- (4) Developer shall mean any individual, partnership, or corporation who has: (1) entered into any agreement with the Authority for the purpose of constructing an addition to the existing sanitary sewer system of the Authority; or (2) applied to the Authority for permission to connect to the Authority's system a sanitary sewer system proposed to be constructed in a subdivision or land development.
- (5) Developer's Engineer shall mean a Pennsylvania-registered professional engineer or architect and shall be the individual, partnership, or corporation, selected by the Developer to accomplish utility design in any development in the Township or Borough.
- (6) Engineer shall mean the duly appointed Consulting Engineer for the Authority or a representative of the consulting Engineer.

- (7) Equal shall mean consistent with the intent or function of a specified item and as approved by the Engineer.
- (8) Owner shall mean Upper Moreland-Hatboro Joint Sewer Authority.
- (9) PADEP shall mean Pennsylvania Department of Environmental Protection.
- (10) PENNDOT shall mean Pennsylvania Department of Transportation.
- (11) Township shall mean Upper Moreland Township, Upper Dublin Township or any other Township in which a sewer collection system is being constructed for connection into the Authority system.
- (12) Treatment Works shall mean Upper Moreland-Hatboro Joint Sewer Authority Wastewater Treatment Plant.
- (13) Work shall mean labor, services, materials and equipment as required for the successful completion of the construction of the sanitary sewer system.

### **1.3 RESPONSIBILITY OF THE DEVELOPER**

The Developer shall make himself familiar with all laws of the Commonwealth of Pennsylvania, and all ordinances and regulations of the Township and Borough which will apply during the performance of the Work. The Developer shall conform to all requirements of these Specifications without any deviations, exceptions or changes unless the Developer receives prior written approval from the Authority or the Engineer.

The Developer shall procure all necessary and required permits and licenses. He shall pay all charges and fees therefore, and shall give all notices necessary and incidental to the proper and lawful prosecution of the Work. This shall include any work required to obtain Pennsylvania Department of Transportation (PennDOT) road opening permits that need to be signed by the Authority.

Any contractor installing sewer lines for the Developer shall be given a copy of these Specifications and shall construct the sanitary sewer system in accordance with these Specifications. Use of the word "Developer" in these Specifications shall also mean "Contractor" where applicable. The Developer shall be ultimately responsible for the satisfactory completion of the sanitary sewer system and for the Work performed by his Contractor. The Developer shall provide an estimate of the construction timeline to the Authority in order

to estimate an inspection escrow amount by his Contractor.

When sewer line construction is in non-public streets, the Developer shall provide the Authority with permanent rights-of-way for purposes of repairing sewers when needed and which rights-of-way shall be shown on Developer's plans. The same shall be clearly marked and identified as Sewer Line Right-of-Way to be granted to Upper Moreland-Hatboro Joint Sewer Authority. The developer shall show the course and distance along the center line of said rights-of-way. The Developer shall provide a written center line description of each separate right-of-way, starting with a point of beginning oriented with a fixed point of record. In addition to the rights-of-way being depicted upon Developer's plan, he shall execute a Right-of-Way Agreement for the same unto Authority for purposes of being recorded, with rights-of-way plan and description attached, all in form satisfactory to Authority.

Upon completion of lines satisfactory to Authority, Developer shall execute and deliver unto Authority a bill of sale for same, in form satisfactory to Authority, subject to the obligation of Developer to maintain and repair the same for a period of two years from date of acceptance, and in addition, to replace or rebuild any portion of same found to be defective during said period.

#### **1.4 EQUIPMENT AND MATERIALS**

Whenever any item of equipment or material is designated by reference to a particular brand, manufacturer, or trade name in these Specifications, it is understood that an approved equal product may be substituted, if acceptable to and approved in writing by the Authority or the Authority's representative. The use of any equipment and materials other than as specified or beyond the scope of these Specifications (such as metering stations or sewage pumping stations) must be approved, in writing, by the Engineer.

#### **1.5 INSPECTION**

The Developer and his Contractor shall afford every facility for inspection by the Engineer and the Authority representative of materials and workmanship. The Developer shall prosecute the Work in a systematic manner. An inspection must be performed prior to backfilling the sewer pipe.

The Authority will make a final inspection after receipt of written notification that the Work is completed and final inspection is requested. Defective Work or Work not conforming to the Specifications is to be repaired or replaced to the satisfaction of the Authority representative prior to acceptance by and dedication to the Authority.



The Developer shall bear the cost of any inspection performed by the Authority representative and/or the Engineer including final inspection.

Project documentation and Record Drawings (As-Built Drawings) shall be submitted to the Authority in two copies, plus one set of mylar prints at the completion of the Work and such Drawings shall consist of prints approved by the Authority, legibly marked. These Drawings are to become the property of the Authority.

The Authority's Engineer may furnish full- or part-time resident inspector of the construction as authorized by the Authority. It will be the responsibility of the Developer to notify the Authority a minimum to two (2) weeks in advance of the beginning construction to arrange for inspection. Three sets of cut-sheets should be supplied to the inspector before construction begins.

## **1.6 POSSESSION AFTER TESTING**

After any section of sewer has been tested and approved in accordance with these Specifications, the Authority may use the completed section. Possession prior to completion, however, will not imply final acceptance. The Developer will be responsible for the maintenance of all completed portions of the line, whether used by the Authority or not, until the final inspection is made and the work is accepted in writing by and dedicated to the Authority. The Contractor will be responsible to make the necessary additions to the As-Built Drawing and final dedication to the Authority.

## **1.7 SUBMISSION AND REVIEW PROCEDURE**

The DEVELOPER shall cause the following actions to occur:

- A. Deposit in an escrow account, the amount estimated by Owner to cover estimated engineering, inspection, administrative and legal costs of the Authority. This sum shall insure payment to the Authority, Engineer, and Solicitor for:
  - 1. Review and approval of all design plans and specifications.
  - 2. Execution of sewer permits as necessitated by State Law, and submission to the Commonwealth of Pennsylvania Department of Environmental Protection (PADEP).
  - 3. Construction inspection of all work covered by these Specifications.
- B. The Engineer will bill the Authority on a time-and-expense basis for the above

services. It is understood that should the actual amount of work performed by the Engineer and/or Authority representative exceed the escrow account, then this excess cost shall also be borne by the Developer. Conversely, should the actual amount be less than the escrow account, the remaining funds can be withdrawn by the Developer from the escrow account. No amount shall be withdrawn from escrow until completion of the work, and certification by the Engineer and/or Authority and final acceptance by the Authority takes place. If excess costs are anticipated, the Developer shall be required to deposit additional escrow to cover engineering inspection and administrative and legal cost of the Authority.

- C. Provide and furnish to the Authority a Cash Escrow Agreement in the amount of one hundred ten percent (110%) of the estimated costs of Work for the purpose of guaranteeing that Developer shall fully complete the Work.
- D. Submit to the Engineer all plans of the sanitary sewer design in the development, for review and approval by the Authority. Such plans shall be in five (5) copies. The Authority has adopted the following scales for utilization by the Engineer in submission of all plans in the Township and Borough. Horizontal scale, 1" = 40', and Vertical scale, 1" = 4' and the maximum size of plans shall be 22" x 40". All plans shall be sealed by the Developer's Pennsylvania-registered Engineer. The Developer is also responsible to submit As-Built Drawings to the Authority.

The As-Built Drawings shall show the location of laterals. The lateral locations shall begin at 0 + 00 at the point of connection to the existing system and stationing shall be continuous. It should be noted that the final As-Built Drawings should only show sanitary sewer. Storm sewer, water and gas lines, etc., should be gray-lined.

## 1.8

### **PROCEDURES FOR PROCUREMENT OF AN INDUSTRIAL WASTE DISCHARGE PERMIT**

- 1.8.1. Any user who discharges into the treatment works must follow the guidelines set up in the Authority's Resolution 238 or any subsequent Resolution concerning the Industrial Water Discharge Permit.
- 1.8.2. The standard procedure at Upper Moreland-Hatboro Joint Sewer Authority for the review of an application for INDUSTRIAL WASTE DISCHARGE PERMIT is as follows:
  - A. The industry shall submit a written request for permission to discharge an industrial waste to the sewer.
  - B. The Authority will provide a copy of the RULES AND

REGULATIONS GOVERNING THE ACCEPTANCE OF INDUSTRIAL WASTES and an APPLICATION FOR AN INDUSTRIAL WASTE DISCHARGE PERMIT. The APPLICATION is to be completed and returned to the Authority.

- C. An inspection of the industry's facilities will be conducted by the Authority, its employees and/or agents to review the information furnished in the APPLICATION. At this time samples may be collected for analysis to determine whether or not pretreatment of the waste stream will be necessary. Split samples are permitted.
- D. The Authority may require the construction of pretreatment facilities to reduce quantities and/or concentrations of pollutants that will satisfy the limits set in the RULES AND REGULATIONS GOVERNING THE ACCEPTANCE OF INDUSTRIAL WASTES.
- E. No treatment facility will be approved until plans, specifications, technical and projected operating data and other information pertinent to its operation and maintenance is reviewed by the Authority's Engineer.
- F. Upon approval of the waste stream for discharge, the Applicant will be required to enter into an INDUSTRIAL WASTE ACCEPTANCE AGREEMENT.
- G. With the INDUSTRIAL WASTE ACCEPTANCE AGREEMENT, an INDUSTRIAL WASTE DISCHARGE PERMIT will be issued subject to the provisions of the RULES AND REGULATIONS GOVERNING THE ACCEPTANCE OF INDUSTRIAL WASTES. This PERMIT will prescribe special conditions applicable to each individual industry (i.e., pretreatment, effluent monitoring, reporting, etc.).

## **1.9 PRECONSTRUCTION CONFERENCE**

At the Authority's discretion, a preconstruction conference may be called to be attended by representatives of the Authority, Engineer and Contractor at a time and place to be determined. The conference will be for the purpose of discussing construction schedules, methods and requirements.

## SECTION 01400

### LOCATIONS OF EXISTING LINES

#### PART 1 GENERAL

##### 1.1 SCOPE

##### 1.1.1 Description of Work

Developer shall comply with all the requirements of Pennsylvania Act 287 of 1974, as amended.

Attention is directed to the fact that there may be other lines in certain locations in addition to recorded locations.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. PA Act 287 of 1974 (PA One Call), as amended
- B. EARTHWORK FOR UTILITIES, Section 02210
- C. ROCK EXCAVATION, Section 02230

#### PART 2 PRODUCTS

NOT APPLICABLE TO THIS SECTION

#### PART 3 EXECUTION

##### 3.1 LOCATING LINES

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

\*\* END OF SECTION \*\*

## SECTION 01710

### SURVEYING AND VIDEOTAPING

#### PART 1 - GENERAL

##### 1.1 REFERENCE POINTS

- 1.1.1 The Developer shall lay out his Work from base lines and bench marks established by the Owner and shall be responsible for all measurements in connection therewith. Developer shall verify bench marks and develop and make all detail surveys needed for construction. The Developer shall set and maintain all necessary intermediate points, lines, grades and elevations and provide slope stakes, offset stakes and other such items at his own expense.
- 1.1.2 The Developer shall, at his own expense, furnish all stakes, templates, patterns, platforms, equipment and labor the may be required in setting and cutting, or laying out any part of the work.
- 1.1.3 Developer shall review, verify and approve all stakeout data provided by the Owner or Engineer, including (but not limited to) survey drawings, site stakeout and similar data and documents. Developer shall specifically review, verify and approve all of such information for completeness and accuracy and, if requested by the Engineer, Developer shall certify his verification and approvals of the information by signing a copy thereof.

##### 1.2 CONTRACTOR'S SURVEY DURING CONSTRUCTION

- 1.2.1 After base lines and bench marks for the Work have been provided by the Owner, the Developer will be held responsible for the proper execution of the Work to such lines and grades, and all stakes or other marks shall be preserved by the Developer until removal is authorized. The Owner may require that Work be suspended at any time when for any reason such marks cannot be properly identified, utilized verified, or followed.
- 1.2.2 Developer shall, at a minimum, field survey with a level and rod the pipe invert of each manhole within one (1) day of placement of the manhole and shall furnish the pipe invert elevation to the Engineer the same day as the survey was performed. The accuracy of the Developer 's survey and other required data is the sole responsibility of

## SECTION 01710

### SURVEYING AND VIDEOTAPING

the Developer; the furnishing of the data to the Engineer does not constitute a transfer of responsibility.

#### 1.3 QUALITY OF CONSTRUCTION

- 1.3.1 Pipes shall be laid true to the lines and grades shown on the Plans and Drawings. The new sewer shall have a uniform grade and straight alignment between manholes.
- 1.3.2 The Engineer reserves the right to make changes in lines and grades of pipes, and in locations of pipes and manholes when such changes may be necessary or advantageous.
- 1.3.3 The Developer shall identify in writing to the Engineer any potential concerns regarding the Developer's ability to maintain elevation and/or grade within 24 hours of identification of the potential problem.
- 1.3.4 The Owner will pay for an independent, Pennsylvania-licensed surveyor to verify the elevation and location of all construction after installation.
  - a. All invert elevations shall be within 0.16 ft (2 inches) of the design elevation, and all pipes slopes shall be constructed at or greater than the design slope, unless previously documented by the Contractor to the Engineer and approved by the Owner. All pipes designed to be level shall be constructed level.
  - b. All structures, manholes, pipes, fittings, appurtenances, etc. shall be within 0.16 ft. (2 inches) of the design location, unless previously documented by the Developer to the Engineer and approved by the Owner.
  - c. All manholes and structures shall be set level, true and plumb. Wedging or placing shims to secure proper level shall not be allowed and shall not be accepted by the Owner.
  - d. Work not conforming to either the design elevation or location, or Work that is not level, true or plumb, shall be corrected by the Developer at his own expense. The Developer shall be charged the cost for the surveyor selected by the Owner to resurvey some or all of the Work after the Developer has corrected the Work found defective during the initial survey.

## SECTION 01710

### SURVEYING AND VIDEOTAPING

- 1.3.5 The Owner will internally videotape all pipes after installation. Any dips or misalignments shall be corrected by the Developer at his own expense. The Developer is advised to clean the pipes thoroughly before requesting the videotape inspection. Any debris or foreign material of any form identified in the pipes shall be removed by the Developer. The Developer shall be charged at the Owner's standard sewer videotaping rate for any re-videotaping of pipes.

**\*\* END OF SECTION \*\***

SECTION 02100  
CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SCOPE

1.1.1 Description of Work

The Developer shall not perform any clearing or grubbing outside limits of the easement/construction lines.

1.2 PROTECTION

1.2.1 Existing Facilities

A. Streets, roads, utilities, adjacent property, and other works to remain shall be protected throughout the work.

1.2.2 Existing Trees, Shrubs and Bushes

A. Shrubs, bushes and trees designated as outside the construction easement or specifically marked for saving shall be protected from damage.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

1.3.1 State and local code requirements shall control the disposal of trees and shrubs.

1.4 QUALIFICATIONS OF SUBCONTRACTORS

1.4.1 The Developer shall utilize a professional tree service subcontractor to remove all trees, bushes, etc.

1.4.2 Tree service Subcontractor shall have a minimum of five (5) years experience in felling, moving, and storing trees and bushes in close proximity to buildings and power lines.



## SECTION 02100

### CLEARING AND GRUBBING

#### PART 2 REQUIRED RECONNAISSANCE PRIOR TO TREE REMOVAL

- 2.1 Prior to any work, the Developer shall walk the entire project with the Engineer and clearly identify, with paint and/or flagging, all trees and shrubs to be cleared and grubbed for the work.
- 2.2 Any tree, which is identified in Paragraph 2.1 to be removed, that measures greater than or equal to 8-inches, as measured at 12-inches above natural grade, shall be inventoried by the Developer. This inventory shall be provided to the Engineer prior to any clearing or grubbing work by the Developer.

#### PART 3 EXECUTION

##### 3.1 CLEARING

- 3.1.1 The Developer shall clear the minimum quantity of trees practicable for completion of the project.
- 3.1.2 All initial clearing shall be done by an approved Subcontractor. Any subsequent clearing may be conducted by the Developer. Limits of grubbing and clearing shall be within the permanent right-of-way, or to limits staked on the ground by the Engineer.
- 3.1.3 Treat all work-related injuries to remaining trees and shrubs, regardless of species, in accordance with accepted agricultural practices.
- 3.1.4 Careful attention shall be made to protect and avoid contact with overhead utility lines. At no time shall a tree be felled so as to land outside the construction easement or near any structure or facilities outside the permanent easement.
- 3.1.5 Remove all stumps, roots, and matted roots per the following:
  - A. All roots, stumps, etc., of removed vegetation shall be removed from within the limits of the trench (two (2) feet on both sides of trench). Stumps required to be removed shall be to a depth of eighteen (18) inches. This depth shall be measured from the existing ground surface or the proposed finished grade, whichever is the lower.

## SECTION 02100

### CLEARING AND GRUBBING

B. The Engineer's requirements shall control removal of stumps under fills, foundations, or any construction in contact with stumps.

#### 3.2 GRUBBING

3.2.1 Limits of grubbing shall coincide with the limits of clearing.

3.2.2 Remove all stumps, roots over 4-inches in diameter, and matted roots within the limits of grubbing to the depths below:

- A. Footings ----- 18 inches from proposed finished ground
- B. Walks ----- 12 inches from proposed finished ground
- C. Roads ----- 18 inches from proposed finished ground
- D. Parking Areas - 12 inches from proposed finished ground
- E. Lawn Areas --- 8 inches from proposed finished ground
- F. Fills ----- 12 inches from proposed finished ground
- G. In the case of footings, roads, walks, or other construction on fills, the greater depth shall apply.

#### 3.3 SALVAGE

3.3.1 Material which is to be salvaged, as a result of the Developer's clearing operations, shall include the following items which are to be turned over to the individual property owners, if the individual property owner so desires.

- A. Logs and branches over six (6) inches, butt diameter
- B. Parts suitable for use as mulch
- C. Live plants suitable for replanting

3.3.2 All salvageable material not desired by the property owner shall be removed at Developer's expense.

## SECTION 02100

### CLEARING AND GRUBBING

- 3.3.3 All salvageable logs and branches desired by the individual property owners shall be neatly stacked in lengths not to exceed six (6) feet.
- 3.4 DISPOSAL
- 3.4.1 Burning of materials on the site will not be permitted.
- 3.4.2 Removal
- A. Remove from site all vegetative material (trees, stumps, shrubs, bushes, etc.) collected during clearing and grubbing operations, not scheduled for salvage, on a daily basis.
  - B. Should the Developer elect to continue work beyond normal working hours, material to be removed shall not be allowed to accumulate for more than forty-eight (48) hours.
- 3.4.3 Dumping
- A. Prior to depositing surplus material at any off-site location, the Developer shall obtain a written agreement between himself and the Owner of the property on which the disposal is proposed. The agreement shall state that the Owner of the property gives permission for the Developer to enter and deposit the material at no expense to the project Owner. A copy of the agreement shall be furnished to the Owner.

\*\* END OF SECTION \*\*

## SECTION 02210

### EARTHWORK FOR UTILITIES

#### PART 1 GENERAL

##### 1.1 SCOPE

###### 1.1.1 Description of Work

- A. Prepare trench for the installation of new pipe.
- B. Provide by-pass pumping during construction.
- C. Install new sewer pipe and laterals.
- D. Backfilling of sewer pipe and laterals.

##### 1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. LOCATION OF EXISTING LINES, Section 01400
- B. MANHOLES, Section 02601
- C. SANITARY SEWER PIPE, Section 02610

##### 1.3 LINES AND GRADES

###### 1.3.1 Grades

- A. Pipes shall be laid true to the lines and grades shown on the Plans. The grade shown on the profile is the invert to which the work must conform. Work not conforming to the grade shall be corrected by the Developer at his own expense.
- B. The grade and alignment of the pipe shall be done by one of the following methods:
  - 1. By String Line
    - (a) The string line shall be parallel with the grade line and vertically above the center line of the pipe. This line shall be established on level batter boards at intervals of not more than fifty (50) feet. Batter boards shall span the trench and be rigidly anchored to substantial posts driven into the ground on each side of the trench.
    - (b) Three (3) adjacent batter boards must be set before laying pipe to provide a check on the grades and line. Elevation and position of the string line shall be determined from the

elevation and position of offset points or stakes located along the pipe route. Pipe shall not be laid using side lines for line and grade.

- (c) The Developer shall provide elevation stakes every 100 feet and shall verify grade of pipe at the request of the Engineer.

## 2. By Laser Beams

- (a) Laser beams shall be used and operated by trained personnel and the proper safety precautions will be adhered to either as suggested by the manufacturer or as required by State Law.
- (b) The pipe elevation and alignment shall be checked at each pipe joint to assure the correct grade.
- (c) Developer shall provide elevation stakes every 100 feet and shall verify grade of pipe at the request of the Engineer.

### 1.3.2 Locations of Sewers

- A. The locations of the proposed lines shown on the Plans.
- B. New sewer elevations shown on the Plans.
- C. The Engineer reserves the right to make changes in lines and grades of pipe lines, and in locations of pipes and manholes when such changes may be necessary or advantageous.

## 1.4 TRENCHING REGULATIONS

- 1.4.1 In open trenching on State, County and Municipal roads, the Developer shall be governed by the conditions, restrictions and regulations made by the Pennsylvania Department of Transportation, the County Commissioners, the local Municipal Officials. All such regulations shall be in addition to the ones set forth in these Specifications.

## PART 2 PRODUCTS

### 2.1 BACKFILLING MATERIALS

#### 2.1.1 Excavated Materials

Excavated material from the trench or materials from other sources which are free from large clods, roots or stones may be used for non-pipe

bedding backfill. The initial backfill from the bottom of the trench to the required distance above the pipe shall be free of stones larger than eight inches (8").

2.1.2 Crushed Stone

Crushed Stone shall be as shown in the table below, not washed, with fines present to stabilize it in the trench. If amount of fines is insufficient, then stone screening shall be added to extent required to stabilize it in the trench.

Square Mesh Sieve Size	Percent Passing by Weight
1-1/2"	100
3/4"	52-100
3/8"	36-70
No. 4	24-50
No. 8	16-38
No. 16	10-30
No. 100	0-10

2.1.3 Select Backfill

Select backfill shall be used for all trenches in paved areas. Select backfill shall be open-graded subbase (OGS aggregate in accordance with Section 703.2(c) of the Pennsylvania Department of Transportation Standard Specifications, Pub. 408 (latest edition).

2.1.4 Pipe Bedding

Select backfill for pipe bedding shall be 2B aggregate, AASHTO Number 57. Placement of this bedding shall be in accordance with the Plans and Section 3.14.1 of this Section.

2.1.5 Concrete

Concrete used for cradles, thrust blocks, or encasement shall be 3,000 psi concrete (28-day compressive strength) . Tests of concrete for this usage is waived.

PART 3 EXECUTION

3.1 EXCAVATION

3.1.1 General

Developer shall perform all excavation of every description and of whatever substances encountered to the depth shown on the Plans. All excavated materials not required for fill or backfill shall be removed from the site of the work by the Developer. Materials resulting from the demolition of the existing sewer may be used for backfill materials provided they meet the conditions of paragraph 2.1.1. All excavation, unless otherwise authorized by the Engineer, shall be made by open cut. Side walls of trenches shall be kept as nearly vertical as possible and shall be properly sheeted and braced. Trenches shall be excavated true to line so that a clear space not more than eight (8) inches in width is provided on each side of the barrel of the pipe unless otherwise indicated on the Plans. Removal of the existing line will necessitate disturbance of the existing trench bed. The trench bed shall be excavated to a depth below the existing pipe to allow for proper pipe bedding of the new sewer pipe. Developer shall comply with all applicable local, state and federal laws, rules, regulations and requirements for trench maintenance, trench safety, worker safety and public safety at all times during construction.

3.1.2 Rock

Rock excavation, when needed, shall be done by mechanical means.

3.1.3 Excavation Below Grade

Where the bottom of the trench shall, by mistake of the Developer, have been taken out to a greater depth than above specified, it shall be refilled to the proper grade, using pipe bedding materials, said bedding to be placed by the Developer. Refilling with earth to bring the bottom of the trench to the proper grade will not be permitted.

3.1.4 Blasting

No blasting will be permitted anywhere within the project area. No exceptions shall be allowed.

### 3.1.5 Excavation in Paved Areas

The Developer shall, at all times, exercise care not to excavate beyond the limiting lines shown on the Plans unless otherwise authorized by the Engineer and/or Owner.

### 3.1.6 Safety

- A. Developer shall comply with all applicable local, state and federal laws, rules, regulations and requirements for trench maintenance, trench safety, worker safety and public safety at all times during construction.
- B. Developer shall provide and maintain sufficient barricades, signs and lights.
- C. The Developer shall not permit any trench excavation to remain open at the end of a working day unless specifically approved by the Engineer and/or Owner.

## 3.2 EXCAVATION NEAR EXISTING STRUCTURES

3.2.1 Attention is directed to the fact that there may be other utilities in certain locations. Some of these have been indicated on the Plans, but no attempt has been made to show all of the services, and the completeness or accuracy of the information given is not guaranteed. See Section 01400, LOCATIONS OF EXISTING LINES for additional information on buried lines.

3.2.2 All underground utility lines shall be located on the ground with pipe locating equipment (e.g., ground penetrating radar) well ahead of the work at all times. All such locations shall be plainly marked by coded paint symbols on pavement or by marked stakes in the ground. Such locations shall be established at least fifty (50) feet in advance of all trench excavation or the distance to be reached within the next two (2) working days, which ever is greater. All such location work shall be provided by the Developer at no extra cost.

3.2.3 As the excavation approaches pipes, conduits, or other underground structures, digging by conventional trenching machine methods shall be done with extreme care. No extra compensation shall be given if manual excavation is done to locate utilities and/or underground structures.

3.2.4 Excavation near structures will not be allowed closer to the structure than the depth of the excavation below the bottom of the foundation without shoring the excavation with sheeting.



### 3.3 PROTECTION OF EXISTING STRUCTURES

- 3.3.1 All existing pipes, poles, wires, fences, curbs, property-line markers, mailboxes, basketball poles, retaining walls and other structures which must be preserved in place without being temporarily or permanently relocated shall be carefully supported and protected from injury by the Developer. In case of injury, the Developer shall notify the appropriate party so that proper steps may be taken to repair any and all damage done. When the Owner does not wish to make the repairs himself, all damage shall be repaired by the Developer, or, if not promptly done by the Developer, the Owner may have the repairs made at the expense of the Developer.
- 3.3.2 All utility services shall be supported by suitable means so that the services shall not fail when tamping and settling occurs.
- 3.3.3 The Developer shall not be compensated for any additional work involved if the utilities or underground structure cross the trench line transversely above or below the pipe.

### 3.4 CARE AND RESTORATION OF PROPERTY

- 3.4.1 Excavating machinery and cranes shall be operated with care to prevent damage to existing structures and/or wires.
- 3.4.2 On paved surfaces, the Developer shall not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels of which are so shaped as to cut or otherwise damage such surfaces, unless removable protection is provided and approved by the Engineer and/or Owner, and the work area is returned to pre-construction condition.
- 3.4.3 All surfaces which have been damaged by the Developer 's operations shall be restored to a condition at least equal to that in which they were found immediately prior to the beginning of operations. Suitable materials and methods shall be used for such restoration shall be approved by the Engineer and Owner, and shall be in accordance with Owner's standards.
- 3.4.4 The restoration of existing property or structures shall be done as promptly as practicable and shall not be left until the end of the construction period.

### 3.5 TRENCHING

Trenches shall be dug to the depth required by the plans. The width of the trench at the bottom shall be as described in Section 3.1.1. Where the bottom of the trench is or appears to be soft or spongy, the excavation shall be made deeper as described under Section 3.9 of this section to permit bedding placement.

3.6 [NOT USED]

3.7 [NOT USED]

### 3.8 SHEETING AND SHORING

3.8.1 Where sheeting, shoring, bracing or trench boxes are used, they must be designed by a professional engineer licensed to practice in the Commonwealth of Pennsylvania. The design engineer shall provide the Developer with a certification signed and sealed by him stating that the design of the sheeting and bracing conforms to all applicable requirements of all applicable federal, state and local regulations. An informational copy of these data shall be furnished the Engineer before installing any sheeting, shoring, bracing or trench boxes.

3.8.2 Trenches shall, at all times, be properly and adequately sheeted and braced to prevent accidents, caving of the sides of the trench, or breaking of the ground outside of the lines of the trenches proper, or damage to buildings, or other structures along the line of construction. Underground structures of all types shall be protected by the Developer, who shall use all necessary shoring, bracing or other appliances for the protection of same. Care must be taken not to injure in any way water mains, water service pipes, drain pipes, sanitary or stormwater sewers, gas mains, oil mains, electric conduits, other structures or utilities encountered on the lines of the work.

3.8.3 In case of accident to any structures, the owner of the structures shall be notified immediately so that the proper steps may be taken to repair any and all damage done. Any damage done to such structures shall be repaired by the Developer. No sheeting or shoring shall be left in place unless so authorized by the Engineer and/or Owner.

3.9 [NOT USED]

### 3.10 TRENCHING IN ADVANCE OF PIPE LAYING

The trench for the pipe lines shall not be opened for a distance of more than forty (40) feet at any one time, unless especially authorized by the Engineer. At the close of work at night or at the discontinuance of work, Developer may leave approximately six (6) to eight (8) feet of trench open assuring the mouth of the completed pipe shall always be kept properly closed with a suitable plug to prevent the entrance therein of any water, earth, stones or other debris as well as provided safety fencing and warning devices as requested by the Engineer, Owner, Township and/or Borough.

### 3.11 KEEPING TRENCH DRY

3.11.1 All ground water which may be found in the trenches and any water which may get into them from any cause whatsoever shall be pumped or bailed out so that the trench shall be dry during pipe laying period. No water shall be permitted to reach concrete until it has set sufficiently.

3.11.2 All water pumped from the trenches shall be disposed of in compliance with the applicable local regulations of the appropriate governing body. The Developer shall provide at least two (2) pumps for each trench opened in wet ground and at the same time, he shall have one (1) pump in reserve.

3.11.3 The Developer shall provide and place all necessary flumes or other channels of adequate size to carry temporarily all streams, brooks, stormwater, sanitary sewer, industrial waste or other water which may flow along or across the lines of the pipe line. All flumes or channels thus utilized shall be tight so as to prevent leakage into the trenches. Water pumped from trenches shall be led to a natural watercourse.

3.11.4 Any pumped water from excavated areas must be filtered prior to discharge into waters of the Commonwealth. The use of filters is acceptable, provided a 150 micron filter bag is used and the filter bag is changed when one-half full of sediment or becomes clogged and is unable to maintain flow, which ever occurs first.

### 3.12 PIPE BEDDING

#### 3.12.1 Crushed Stone Bedding

A. All pipe shall be supported on crushed stone bedding.

1. The trench shall be excavated to a depth as shown on the accepted construction details. The crushed stone shall be furnished and placed in the trench for its full width to uniformly support the pipe at the required line and grade.

2. Suitable recesses shall be provided in the bedding to permit adequate clearance for bells, couplings, or similar projections. The bedding shall extend upward around the pipe barrel to form a positive cradle fitting the pipes as shown on the construction details providing a uniform support along the length of the pipe section at the required line and grade.

3. Bedding material shall be spread in four-inch layers, and each layer shall be compacted with twenty pound hand tampers or pneumatic tampers until the required total depth of bedding has been built up.

B. Where a suitable supporting soil or rock stratum occurs at a depth greater than as shown on the construction details, but less than two (2) feet below the pipe and where required by the Engineer, this foundation shall be modified as follows:

1. The trench shall be excavated to the depth necessary to reach the suitable supporting stratum. Crushed stone bedding shall be spread in four-inch layers, and each layer shall be compacted with twenty-pound hand or pneumatic tampers.

2. The bedding shall carry vertically from the supporting stratum up to the bottom of the stone bedding as indicated on the construction details. Crushed stone shall then be installed as specified above.

### 3.12.2 Concrete Cradle

A. Where unstable conditions are encountered, or where required by the Engineer, the pipe shall be supported on concrete cradle. Concrete cradles shall be installed where no suitable supporting solid or rock stratum exists within two (2) feet of the bottom of the pipe.

B. The foundation shall be furnished and installed equal to the "Concrete Encasement", except that only that portion of the encasement at and below the horizontal diameter of the pipe shall be poured, forming a true cradle under the bottom half of the pipe.

### 3.12.3 Concrete Encasement

A. Where required, the pipe shall be supported by concrete encasement. Concrete encasement shall also be installed as follows:

1. Where excavations have been carried to a greater width than the normal limits.

2. At all creek crossings, regardless of whether or not concrete encasement is specifically identified on the plans or drawings.
  3. Elsewhere, as required by the Engineer
- B. The trench shall be excavated to a minimum depth of six-inches below the bottom of the pipe or as shown on the construction details. The excavated space shall then be completely filled with, and the entire pipe encased in concrete such that the concrete encasement at any point around the outside barrel of the pipe measures a minimum six- (6) inches thick. The total minimum width of the concrete encasement shall equal the width of trench excavation. Unless otherwise shown on the construction details, concrete shall be 3,000 pounds per square inch (psi) at 28 days. Concrete mix, formwork, curing, etc., shall be in accordance with the requirements of the most recent American Concrete Institute (ACI) Code. Freshly poured concrete shall be maintained free from ground water for at least the first four hours. No backfilling of the trench shall begin until a minimum time period of twenty-four (24) hours has elapsed after the encasement has been poured. Steel reinforcing, if required, shall be as shown on the construction details or as required by the Engineer.

### 3.13 UNSTABLE TRENCH BASE

- A. If, following excavation to the proper elevation, the undisturbed trench base appears soft or spongy, the Developer shall notify the Engineer.
- B. At the Engineer's direction, the Developer shall excavate the unstable trench base material, backfill with pipe bedding material and compact to original trench base elevation.

### 3.14 BACKFILLING

#### 3.14.1 General

No backfilling shall be done before the Engineer gives permission. After pipes have been checked for alignment and bedding and accepted by the Engineer, the backfilling may be started. Backfill material may be deposited in trench either by hand or machine. Sufficient number of men shall be available to spread the backfill in uniform layers.

#### 3.14.2 Backfilling in Other Than Paved Areas

- Initial Bedding of Pipe- This portion of the pipe trench shall be backfilled with suitable materials under and around the pipe, free from large clods or stones larger than two (2) inches, carefully deposited in uniform layers on both sides of pipe, and compacted by hand tampers until backfill reaches two (2) feet above top of pipe, except as noted on Drawings where modified by crushed stone bedding, concrete cradle or concrete encasement. The depth of backfill layers shall be six (6) inches maximum. Hand tampers shall be of the proper size, to operate between trench wall and pipe without damaging the pipe. Care will be taken to insure backfill/bedding material is distributed to fill the haunches of the pipe.
- B. Backfilling Trench to Subgrade After Initial Bedding- After initial backfilling has been compacted as specified above, the remainder of the backfill meeting the requirements for common fill, consisting of the excavated material free from large clods, stones larger than 8 inches, stumps or roots. The depth of backfill layers shall be six (6) inches maximum (compact after every 6 inches). Using "Select Backfill" material, backfill the remainder of the trench in compacted layers not to exceed twelve (12) inches using a mechanical tamper up to the bottom elevation of the pavement structure.
  - C. Settlement- If settlement occurs, additional backfill shall be deposited, and mechanically compacted to required elevation.

### 3.15 COMPACTION IN PAVED AREAS

- 3.15.1 All paved roadway fill material and compaction must be to local codes and requirements. Developer shall be responsible for compliance with the requirements of the road owner (private, local, county, state, federal, authority or commission).
- 3.15.2 In all paved areas the backfill shall be thoroughly compacted over and around the pipe by use of vibratory tamping pads or, where these cannot be used, by mechanical or hand tamping. Backfilling shall be compacted to at least ninety-five (95%) percent of maximum density at optimum moisture content. When necessary to secure proper compaction, fill material shall be moistened. Place backfill material in uniform horizontal 4-inch lifts; however 8-inch lifts are acceptable when using vibratory compaction equipment.
- 3.15.3 The optimum moisture content and the maximum density of each type of material used for trench backfill shall be determined by *Tests for Moisture-Density Relations of Soils, using 10 lb. Rammer and 18-inch drop* (ASTM D1557 or ASSHO T-180).

- 3.15.4 The field moisture content of materials being compacted shall be determined by *Laboratory Determination of Moisture Content of Soil* (ASTM D2216). The field density of compacted material shall be determined by nuclear density testing or *Test for Density of Soil in Place by the Sand Cone Method* (ASTM D1556).
- 3.15.5 A soils engineering and testing laboratory shall perform sufficient tests and inspections procedures both in the field and lab to insure that the provisions of this Specification are met. The testing and control firm shall be approved by the Engineer and paid for by the Developer.
- 3.15.6 After testing is completed and reports provided, all subgrades below the paving will be examined by the Engineer before any paving is authorized.
- 3.15.7 The responsibility of the soils engineering and testing laboratory is to the Owner and Engineer, to whom that firm must promptly, faithfully and accurately report the results of its tests and inspections. The firm must work in coordination with the Developer making all necessary tests required by the work. The reports must state whether or not the reported results comply with these Specifications. The testing and control firm shall promptly type and deliver all its reports to the Engineer with a copy to the Developer.

### 3.16 DISPOSAL OF MATERIAL

Excavated material shall be so placed as not to unreasonably interfere with travel. All bituminous material, concrete and other street surfacing, portions of excavated pipes and manholes unsuitable for use as backfill material, surface loam, and sod shall be kept separate from the remainder of the excavated material. Upon completion of the backfilling, the property shall be cleaned, all surplus material removed, and the surface restored to the condition in which it was before ground was broken. Unless otherwise specified, all residual and surplus materials left over shall become the property of the Developer. If the Developer shall fail to promptly remove residual and surplus material, the Owner may have the material removed and charge the cost thereof as money paid to the Developer. All surplus excavation shall be removed from the site of the work by the Developer, but none shall be deposited on private property until written consent of the property owner has been filed with the Engineer and applicable permits/approvals obtained from government agencies. Underground structures removed, such as brick and sewer pipe, shall become the property of the Developer, unless otherwise noted on the Plans.

\*\* END OF SECTION \*\*

SECTION 02230

ROCK EXCAVATION (BLASTING)

PART 1 - GENERAL

1.1 SCOPE

1.1.1 Description of Work

Rock excavation, when needed, shall be done by mechanical means in accordance with the typical excavation requirements included in Section 02210 – EARTHWORK FOR UTILITIES.

No blasting shall be permitted. No exceptions will be granted.

\*\* END OF SECTION \*\*



## SECTION 02540

### EROSION AND SEDIMENT CONTROL PLAN

#### PART 1 GENERAL

##### 1.1 SCOPE

###### 1.1.1 Description of Work

The Developer shall provide all labor, materials, and equipment to maintain proper control of soil erosion and sediment control.

#### PART 2 PRODUCTS

2.1 All products and materials shall meet the requirements of the local soil conservation service or as specified elsewhere in these Specifications or indicated on the Drawings.

#### PART 3 EXECUTION

##### 3.1 PLANNING OF CONSTRUCTION

3.1.1 Planning and coordination of the construction is needed to reduce the potential for sediment pollution. Accurate planning shall be used to minimize the area of disturbance. Clearing shall be kept to the shortest practical distance around the construction area.

3.1.2 Restoration work shall be done as the project progresses and not be left until the end of the project. No areas shall be left unprotected for more than thirty (30) days without some form of temporary seeding or if in a non-growing season, some other form of stabilization such as mulch or hay, as specified by the requirements of the Conservation District.

## 3.2 TRAFFIC CONTROL

3.2.1 Minimization of the areas of disturbance also involves traffic control. Corridors for equipment travel shall be established to protect those areas that will not be disturbed. Instructions shall be issued that routes for convenience shall not be allowed and that the established equipment travel corridor must be used. These instructions must be enforced. Traffic shall be kept to an absolute minimum. Delivery of material will be required and this traffic shall enter and leave on a designated access route. Workmen shall walk from the street rather than drive. The filtering of sediment laden runoff by the vegetation is an important measure in the reduction of sediment. Indiscriminate and convenience travel shall not be allowed to destroy these natural filter areas.

## 3.3 STOCKPILES

3.3.1 Stockpiles areas shall be selected and maintained by on-site personnel. Site selections and stockpile design shall incorporate sediment erosion control considerations to prevent the potential direct production and delivery of sediment to private property, roadways, waterways, damage to vegetation that is part of the total sediment and erosion control plan, and the unnecessary destruction of trees that are selected for preservation. Temporary or interim stabilization of soil stockpiles shall be promptly instituted. The existence of critical slopes on stockpiles shall be avoided. Stockpiling in or immediately adjacent to diversion channels shall not be allowed. Structural practices shall be installed on large stockpiles and their design and implementation shall be accomplished by competent on-site personnel. If a stockpile is to remain for over thirty (30) days, it shall be stabilized by soil stabilizing chemicals, temporary vegetation, interim structures, or other special practices.

3.3.2 Temporary vegetative measures planned for implementation on stockpile area shall be established immediately after the stockpile operation is completed. Proper mulching and soil stabilization in conjunction with these seeding operations shall also be carried out.

## 3.4 EXCAVATION AND BACKFILL

3.4.1 Excavation shall be closely controlled. The material removed from the excavation shall be selectively stockpiled in areas where a minimum of sediment will be generated and where other damage will not result from the piled earth. Drainageways shall be protected at all times and the piling of soil in drainageways will not be allowed. Backfilling operations shall be performed in such a manner that remaining trees are not damaged. Temporary repaving shall be placed promptly after backfill operations are completed.

3.5 FINAL GRADING AND SEEDING

3.5.1 Finish grading, topsoiling, seeding and sodding shall be performed as specified in Section 02960, GRADING & SEEDING - DISTURBED AREAS.

3.6 EROSION CONTROL MATS

3.6.1 When final grading is completed between October 1 and April 1, or between June 1 and August 15, an erosion control mat shall be placed over all disturbed areas.

3.6.2 Erosion control mat shall be placed after final grading, placement of soil amendments and seed, and acceptance by Engineer.

3.6.3 Erosion control mat is not intended for use over unseeded areas.

3.7 MAINTENANCE

3.7.1 Sediment and erosion control practices shall be inspected daily. Accumulation of sediment, generated from stockpile runoff, shall be collected daily to prevent accumulation beyond the existing easement limits.

3.7.2 Most material stockpiles require work to restore them after each storm. This maintenance shall be performed to allow the structure to continue to perform the function for which it was designed.

3.7.3 The Developer shall sweep clean and collect all accumulation of soil and sediment which is deposited on roadways as a result of construction traffic. Roadway cleaning shall be completed on a daily basis at the conclusion of each working day.

3.7.4 The Developer's failure to comply with the requirements of erosion and sediment control shall be grounds for the Engineer to stop construction work. Construction work shall not resume until site conditions are in accordance with the requirements of the erosion and sediment control specifications. Work shall also stop if required by the Conservation District or any other regulatory agency with jurisdiction.

3.7.5 The Developer shall not be allowed any claims resulting from his failure to comply with the specifications and any directive to stop construction work by the Engineer.

\*\* END OF SECTION \*\*

## SECTION 02575

### PAVING AND RESURFACING

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

- A. The work of this section includes, but is not limited to:
  - 1 Temporary Paving
  - 2 Permanent Paving
  - 3 Shoulder Restoration
  - 4 Curb and Sidewalk Restoration
- B. Related work specified elsewhere.
  - 1. Developer is responsible to review Manual to coordinate the work of this section with the requirements of all associated sections.
- C. The Developer, Owner, and Engineer shall, prior to construction, make a visual reconnaissance, of all paved areas, determining the actual condition of the paving. Notes, photographs, etc., shall be made and kept on file at the Owner's office for possible future reference. Developer shall not disturb areas prior to the existing conditions being documented.
- D. Reference to PennDOT Specifications shall mean the latest revision of the publication.

##### 1.02 QUALITY ASSURANCE

- A. Referenced Standards:
  - 1. Pennsylvania Department of Transportation:
    - a. Publication 408 Specifications
    - b. Publication 27 -Specification for Bituminous Mixtures (Bulletin 27)
    - c. Publication 37 -Specification for Bituminous Materials (Bulletin 25)
    - d. Publication 203 -Work Zone Traffic Control

##### 1.03 SUBMITTALS

- A. Certificates:
  - 1. Submit certification from bituminous and aggregate suppliers attesting that materials conform to the State specifications.

## SECTION 02575

### PAVING AND RESURFACING

#### 1.04 JOB CONDITIONS

##### A. Control of Traffic:

- 1 Take measures to control traffic during repaving operations. Do not allow traffic on repaved areas until authorized by the Engineer.
- 2 Employ traffic control measures in accordance with Publication 203 "Work Zone Traffic Control" and the Drawings.
  - a. Unless otherwise noted on the plans, Developer shall submit details of all traffic control measures to be utilized. No traffic control measures may be used until Developer receives approval from the Engineer in writing.

- ##### B. Restore existing paving outside the limits of the work, that is damaged by the Developer's operations, to its original condition at the expense of the Developer.

#### PART 2 - PRODUCTS

##### 2.01 CONCRETE

- ##### A. The concrete materials for streets shall conform to the applicable provisions of Section 704, CEMENT CONCRETE AND READY MIX CEMENT CONCRETE, in Commonwealth of Pennsylvania, Department of Transportation Specifications, Form 408.
- ##### B. The concrete materials for walks, curbing and driveways shall be Class A, 3300 pounds per square inch (psi) concrete.

##### 2.02 CRUSHED STONE BASE COURSE

- ##### A. Crushed stone base course shall be PennDOT No. 2A Crushed Stone and shall be in accordance with Section 350 -Subbase of PennDOT Specifications, Publication No. 408, latest revision.
- ##### B. Crushed slag shall not be used for this material.

##### 2.03 BITUMINOUS CONCRETE BASE COURSE

- ##### A. Bituminous concrete base course shall conform to Section 305 of PennDOT Specifications, Publication No. 408, latest revision.

## SECTION 02575

### PAVING AND RESURFACING

#### 2.04 BITUMINOUS BINDER COURSE ID-2

- A. Bituminous binder course ID-2 shall conform to Section 421 of PennDOT Specifications, Publication No. 408.

#### 2.05 BITUMINOUS TACK COAT

- A. Bituminous tack coat shall conform to Section 460 of PennDOT Specifications, Publication No. 408.

#### 2.06 BITUMINOUS WEARING COURSE ID-2

- A. Bituminous wearing course ID-2 shall conform to Section 420 of PennDOT Specifications, Publication 408.

#### 2.07 MILLING OF BITUMINOUS PAVEMENT SURFACE

- A. Milling of bituminous pavement surface shall conform to Section 491 of PennDOT Specifications, Publication 408.

#### 2.08 JOINT SEALING

- A. Joint sealing shall conform to Section 401 of PennDOT Specifications, Publication No. 408.

#### 2.09 CRACK FILLING AND SEALING

- A. Crack filling and sealing shall conform to Section 469 of PennDOT Specifications, Publication No. 408.

#### 2.10 BITUMINOUS PAVED SHOULDERS TYPE 6 and TYPE 6I

- A. Paved shoulders Type 6 and Type 6I shall conform to Section 656 of PennDOT Specifications, Publication 408.

#### 2.11 CONCRETE SHOULDERS

- A. Concrete shoulders shall conform to Section 658 of PennDOT Specifications, Publication No. 408.

## SECTION 02575

### PAVING AND RESURFACING

#### 2.12 CEMENT CONCRETE SIDEWALKS

- A. Cement concrete sidewalks shall conform to Section 676 of PennDOT Specifications, Publication No. 408.

#### 2.13 EXPANSION JOINT MATERIAL

- A. Expansion joint material shall conform to Section 705 of PennDOT Specifications, Publication No. 408.

#### 2.14 WELD WIRE FABRIC

- A. Weld wire fabric shall conform to Section 709 of PennDOT Specifications, Publication No. 408.

#### 2.15 CONCRETE

- A. Concrete shall conform to Section 704 of PennDOT Specifications, Publication No. 408.

#### 2.16 LINE PAINTING

- A. Line painting shall conform to Section 962 of PennDOT Specifications, Publication No. 408.

#### 2.17 MANHOLE ADJUSTING RINGS

- A. For raising manhole covers an acceptable manhole raising device shall be provided. The device shall be a solid adjusting ring or an adjustable manhole extension device.

#### 2.18 RAISING MANHOLE COVERS AND VALVE BOXES

- A. Install the adjusting rings in all sewer manholes that require adjusting to meet the elevation of the repaving.
- B. Coordinate the raising of all valve boxes and/or manhole covers belonging to other utilities.
- C. The Developer shall be responsible to see that all such items as mentioned above are adjusted to the new paving elevation.

## SECTION 02575

### PAVING AND RESURFACING

#### PART 3 - EXECUTION

##### 3.01 MISCELLANEOUS

- A. All materials of construction shall conform to all applicable sections of PennDOT Specifications, Publication 408.
- B. Restore existing paving outside the limits of the work, that is damaged by the Developer's operation, to the original condition, to the satisfaction of the Owner, at the expense of the Developer.
- C. All finish paving shall be completed to match the finish grade of the adjacent existing pavement unless otherwise specified on the Drawings.
- D. The Developer shall seal all joints between new pavement and existing pavement, including roads, driveways, manholes, inlets, curbs, water boxes, etc. in accordance with Section 401 of the PennDOT Specifications, Publication 408. This work is incidental to the installation of the bituminous material.
- E. Upon completion of the paving, any stretch marks, cracks, open seams, etc. which allow the penetration of water and dirt shall be repaired in accordance with instruction by the Engineer.
- F. Final restoration shall be completed by the Developer within sixty (60) days of first disturbance in all paved areas. The only time extension which will be considered will be due to weather.
- G. All restored areas shall be maintained by the Developer until expiration of the maintenance bond period as required by the Owner.

##### 3.02 SURFACE PREPARATION

- A. The surface shall be prepared and cleaned by the Developer.
- B. The Developer shall apply a tack coat to the existing bituminous pavement prior to placing the new wearing course.
- C. The Developer shall cut joints at all paved road connections. This work is incidental to the wearing course installation.



## SECTION 02575

### PAVING AND RESURFACING

- D. All waste material removed from the roadway area shall be disposed of at a site provided by the Developer.
- E. The road surface shall not be muddy or otherwise unsatisfactory when the binder and/or wearing course is placed thereon. Proper site entrances from paved to non-paved areas must be installed per the Conservation District to reduce sediment on the roadways.

#### 3.03 TRAFFIC CONTROLS

- A. The Developer shall provide traffic controls as previously approved by the Owner. All traffic controls shall meet PennDOT criteria. The Owner shall be notified a minimum of three (3) days in advance of any construction in the roadway.

#### 3.04 ROADWAY EXCAVATION AND SUB-BASE PREPARATION

- A. The Developer shall smooth cut the existing pavement at all limits of work. This work is incidental to the excavation of the roadway.
- B. The Developer shall excavate and remove the existing road materials, rubble, stone and rock to the depth shown on the Drawings or suitable sub-grade. The length and width limits of excavation shall be as indicated on the Drawings.
- C. All waste material removed from the road excavation shall be disposed of at a site approved by the Engineer.
- D. The Developer shall re-compact the sub-grade using equipment and methods in accordance with PennDOT Specifications, Publication No. 408, Section 210 Sub-grade and approved by the Owner.
- E. The sub-grade shall not be muddy or otherwise unsatisfactory when the stone sub-base is placed thereon.
- F. The Developer shall construct a sub-base where indicated on the Drawings of approved aggregate to the depth and width shown on the Drawings. The trench for the installation of the stone shall have a minimum width of 36". The stone shall be compacted and brought to the grade as shown on the Drawings. The minimum size roller shall be a small vibrating trench roller approved by the Engineer. All materials and methods of construction shall conform to all applicable sections of PennDOT Specifications, Publication

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No. 408, latest revision.

#### 3.05 STONE ACCESS AND PARKING AREAS

- A. Stone parking areas shall be 10" of PennDOT No. 2A stone over Class 2 Type "A" Filter Fabric on approved and compacted sub-base as indicated on the Drawings.
- B. Parking areas shall extend to the limits as shown of the Drawings.

#### 3.06 DRIVEWAYS

- A. Driveways shall be restored to existing dimensions or reconstructed to the limits as shown on the Drawings as directed by the Owner.
  - 1. Bituminous Driveways
    - a. Bituminous driveways shall match existing, or be 2" of ID-2 wearing course over 2" of 19mm course and 6" of PennDOT No. 2A stone on approved and compacted sub-base, whichever is greater.
    - b. Seal all joints.
  - 2. Concrete Driveways
    - a. Concrete driveways shall be 6" of Class A, 3300 psi concrete with 6 x 6 Welded Wire Fabric (WWF) over 6" of PennDOT No. 2A stone on approved and compacted sub-base.
    - b. Provide performed expansion joint, where new concrete joins existing concrete and at intervals as directed by Engineer.
    - c. Form joints with a 1/4" radius edging tool.
    - d. Provide light broom finish.
  - 3. Stone Driveways
    - a. Stone driveways shall be 10" of PennDOT 2A stone over Class 2 Type "A" Filter Fabric on approved and compacted sub-base.
  - 4. Concrete Driveway Apron

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### PAVING AND RESURFACING

- a. Apron extends from depressed curb or joint with street to the furthest most point of the sidewalk.
- b. Concrete apron shall be 6" of Class F, 3300 psi Concrete with 6 x 6 WWF over 6" of PennDOT No. 2A on approved and compacted sub-base.
- c. Provide expansion joint where new concrete joins existing concrete and at intervals as directed by the Engineer.
- d. Form joints with a 1/4" radius edging tool.
- e. Provide light broom finish.

#### 3.07 SIDEWALKS

- A. Sidewalks shall be replaced to original limits or installed to the limits indicated in the Drawings, as directed by the Owner and Engineer.

1. Concrete Sidewalks

- a. Concrete sidewalks shall be 4" Class A, 3300 psi Concrete over 4" PennDOT #57 stone on approved and compacted sub-base.
- b. Provide a light broom finish.
- c. Form outside edges and joints with a 1/4" radius edging tool.
- d. Form joints at 5 feet intervals, approximately 1/8" mill and 1" deep.
- e. Provide full depth 1/2" thick pre-molded expansion joints at 20', and stagger with expansion joints in curbing.
- f. Sidewalks to be a minimum of 4' wide.

2. Bituminous Sidewalks

- a. Bituminous sidewalks shall be 1 1/2" of ID-2 wearing course over 6" of PennDOT No. 2A on approved and compacted sub-base.
- b. Seal all new or cut joints.
- c. Sidewalks to be a minimum 4' wide.

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3. Handicapped Ramps
  - a. Ramps shall comply with most recent Americans with Disability Act (ADA) approved standards and the following:
    1. Handicapped ramps shall be provided as indicated on the plans or directed by the Engineer.
    2. Handicapped ramps shall be a minimum of 6" Class A, 3300 psi Concrete over 6" PennDOT #57 stone on approved and compacted sub-base unless shown otherwise on the drawings.
    3. Provide a light broom finish, except where the proper ADA warning pad is installed.
    4. Form outside edged and joints with a 1/4" radius edging tool.
    5. Ramp to be a minimum of 36" wide and shall slope at 1:12.

#### 3.08 CONCRETE CURBING

- A. Curbs shall be replaced or installed to the limits indicated on the Drawings, as directed by the Owner and Engineer.
- B. New concrete curbing shall be 8" wide x 18" deep and shall have an 8" reveal. This reveal shall have a 1" offset making the top thickness 7".
- C. Provide 1/2" thick pre-molded expansion joints at 20' and stagger with expansion joints in sidewalk.
- D. Curbs shall be Class A, 3300 psi concrete.
- E. Place depressed curbs for drives or curb cuts where indicated or directed by Engineer.
- F. Curb depressions shall be provided with a smooth transition. This transition shall be over a minimum of 36".
- G. Existing concrete curbing damaged by construction shall be replaced to

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match existing.

- H. Reconstruct curbs to the first expansion joint on either side of damaged portion and install new expansion joint material.

#### 3.09 CONCRETE SWALES

- A. Concrete swales shall be replaced or installed to the limits indicated on the Drawings as directed by the Engineer.
- B. Existing swales which are removed shall be replaced with similar.
- C. Existing swales shall have saw cut straight joint lines parallel to the centerline of the swale.
- D. Reconstruct swales to the first expansion joint on either side of the area to be removed and install new expansion joint material.
- E. New concrete swales shall be a minimum of 36" wide and shall be 6" Class "A", 3300 psi concrete over 6" of PennDOT 2A on approved and compacted sub-base.
- F. Provide expansion joint where new concrete joins existing concrete.
- G. Provide 1/2" thick pre-molded expansion joints at 20'.

#### 3.10 BITUMINOUS SWALES

- A. Bituminous swales shall be replaced or installed to the limits indicated on the Drawings.
- B. Existing swales which are removed shall be replaced in kind.
- C. Existing swales shall have saw cut straight joint lines parallel to the centerline of the swale.
- D. New swales shall be 1 1/2" ID-2 wearing course over 6" PennDOT 2A on approved and compacted sub-base.
- E. All joints shall be sealed.

#### 3.11 RESTORATION TOWNSHIP ROADWAYS

- A. Roadways shall be reconstructed to the limits indicated on the Drawings as

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directed by the Engineer.

- B. Existing roadway shall have saw cut straight joint lines parallel to the centerline of the trench.
- C. All joints shall be sealed. Sealant shall be applied for a minimum width of 4".

#### 3.12 SHOULDER RESTORATION LOCAL ROAD

- A. Shoulders shall be reconstructed to the limits indicated on the Drawings as directed by the Owner.
- B. Existing shoulders and roadway shall have saw cut straight joint lines parallel to the centerline of the trench.
- C. Shoulder restoration shall be compacted suitable backfill.
- D. Seal all joints for a minimum width of 4-inches on each side of the joint.

#### 3.13 SWALES

- A. Swales shall be restored to the limits indicated on the Drawings as directed by the Engineer.
- B. Swales which are not paved shall be restored to the lines and grades that existed prior to construction. They shall be brought to within 12" of existing grade and lined with rip-rap minimum size to be R-4 for a minimum thickness of 12". The swale width shall be equal to the swale width prior to construction.
- C. Rip rap shall extend 3'-0" in either direction longitudinally beyond the disturbed area.
- D. If flows in swale exceed that which an R-4 can stabilize, the Owner or Engineer may direct Developer to utilize a larger rock within the swale.

#### 3.14 TEMPORARY PAVING

- A. Temporary paving shall be installed to the limits indicated on the Drawings as directed by the Engineer.
- B. Temporary paving shall be installed immediately after trench backfill is brought to needed grades in paved areas.

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- C. Shape and compact sub-grade material, then place and compact crushed stone base course to the required thickness.
- D. The temporary paving between March 1 and October 31 shall consist of hot-mixed, hot laid, bituminous concrete, and maintained for a minimum of forty-five (45) days.
- E. The temporary paving between November 1 and the end of February shall consist of bituminous stockpile patching material in accordance with PennDOT Bulletin 27, Section 484, or 485 of Form 408 placed on top of the compacted backfill, and maintained until trench is permanently restored.
- F. Place temporary paving material. Impact to required minimum thickness with trench roller having minimum 300 pounds per inch-width of compaction roll.
- G. Continuously maintain temporary paving to the satisfaction of the Engineer and the State and local road departments. Temporary paving on State roads must remain in place for a minimum of 45 days.

#### 3.15 TEMPORARY ACCESS ROADS NEEDED BY DEVELOPER

- A. Access roads shall be installed where needed by the Developer to perform the work of the Contract.
- B. Temporary access roads shall be AASHTO No. 1 rock a minimum of 8" over Class 2, Type A Filter Fabric.
- C. Access road shall be maintained until Developer has progressed sufficiently enough as to no longer need road.

#### 3.16 LINE PAINTING

- A. Line painting shall be in accordance with Section 962 of PennDOT Specifications, Publication No. 408.
- B. Line painting shall take place and be completed the same day as temporary paving and/or paving.
- C. Utilize Type I -Traffic Zone Paint, color to match existing.

#### 3.17 PROPERTY MARKERS

- A. Property markers which are removed as a result of construction activities

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shall be replaced in the same location by a Pennsylvania-licensed surveyor.

- B. Property markers shall be installed prior to substantial completion and shall be incidental to the cost of the project.

#### 3.18 DRIVEWAY STORMWATER PIPES

- A. Driveway stormwater pipes which are removed as a result of construction activities shall be replaced.
- B. Driveway stormwater pipes damaged by the Developer shall be replaced with concrete pipes of similar size. Minimum size of replacement pipe shall be 12".
- C. Swales adjacent to driveway pipes shall be restored, regraded and stabilized to provide smooth transition entering and exiting pipe.

#### 3.19 ROADWAY SIGNS

- A. All roadway signs which must be removed in order to perform construction activities shall be replaced with same in the same location.
- B. If needed, new signs shall be in accordance with Sections 1103 of PennDOT Specifications, Publication No. 408 and the latest revision of PennDOT Publication 68, Title 67, Chapter 211 -Official Traffic Control Devices.

#### 3.20 DELIVERY TICKET (PAVING MATERIALS)

- A. A delivery ticket indicating the quantities and types of paving material shall be submitted at the time of delivery. The complete delivery ticket shall be delivered to the Engineer. Failure to deliver such complete ticket to the Engineer will be cause for the Engineer to reject paving material.

#### 3.21 SURFACE IDENTIFICATION

- A. In accordance with "Occupancy of Highways by Utilities", Chapter 41, a mark of identification shall be placed at the nearest edge of the cut closest to the edge of the improved surface for each opening or impairment made within the improved surface of a State Highway.



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- B. The paint shall be of a durable wearing quality and shall be color coded as follows:
1. Blue -Water Lines
  2. Green -Sewer Lines
  3. Red -Electric Lines
  4. Yellow -Natural Gas Lines
- C. Developer to mark all pavement following permanent restoration.

\*\*\* END OF SECTION \*\*\*

## SECTION 02601

### MANHOLES

#### 1.0 GENERAL

##### 1.01 DESCRIPTION

- A. The work of this section includes, but is not limited to:
  - 1. Precast Concrete Manholes
  - 2. Concrete Manhole Bases
  - 3. Manhole Steps
  - 4. Manhole Covers and Frames
  
- B. Related Work Specified Elsewhere
  - 1. Developer is responsible to review Manual to coordinate the work of this section with the requirements of all associated sections.

##### 1.02 QUALITY ASSURANCE

- A. Reference Standards
  - 1. Pennsylvania Department of Transportation Pub. 408 Specifications.
  - 2. American Society for Testing and Materials (ASTM):
    - A48 Specification for Gray Iron Castings
    - C32 Specification for Sewer and Manhole Brick
    - C139 Specifications for Concrete Masonry Units for Construction of Catch Basins and Manholes
    - C150 Specifications for Type II Portland Cement
    - C270 Specifications for Mortar for Unit Masonry
    - C443 Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
    - C478 Specifications for Precast Reinforced Concrete Manhole Sections
    - C923 Specification for Resilient Connections Between Reinforced Concrete Manhole Structures and Pipes

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### MANHOLES

#### 1.03 SUBMITTALS

##### A. Certificates

1. Submit certification from material suppliers attesting that materials meet or exceed specification requirements.

##### B. Shop Drawings

1. Submit detailed shop drawings and specifications of manhole sections, precast bases if used, protective coatings and joint sealing systems.
2. Submit detailed shop drawings and specifications of manhole frames and covers.
3. Submit detailed shop drawings and specifications of manhole steps.
4. Submit manufacturers' descriptive literature for the pipe to manhole flexible connections, for new and existing manholes.
5. Submit detailed shop drawings and specifications of concrete leveling rings.
6. Submit buoyancy calculations for manholes which are to be installed at depths exceeding eight (8) feet.

#### 2.0 PRODUCTS

##### BASIC MATERIALS

##### A. Crushed Stone Sub-base

1. PennDOT NO. 2RC, Table C, Section 703.2, Publication 408 Specifications, 1996.

##### B. Manhole Brick: ASTM C32, grade MS, solid

##### C. Concrete Masonry Units: ASTM C139

##### D. Masonry Mortar: ASTM C270, Type N

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- E. Cement Concrete: Section 03300 Entitled "Concrete for Utility Construction" (Minimum compressive strength at 28 days of 4000 psi)
- F. Joint Sealant Compound: FS SS-S-00210, preformed, flexible, self-adhering, cold-applied.
- G. Rubber Gaskets: ASTM C443
- H. Resilient Pipe-to-Manhole Connection: ASTM C923
- I. Grout: ASTM C827, Non-shrink Grout, Masterflow 713 Grout, Non-shrink 5 Star Grout, or equal.
- J. Placement and stream curing of reinforced concrete: AWWA C302

### FABRICATED PRODUCTS

- A. Precast Concrete Manhole Sections: ASTM C478
  1. 5.5% +/-1% air-entrained cement concrete. (Minimum compressive strength of 4000 psi at 28 days)
  2. Eccentric cone or flat slab top sections; minimum 24" access opening unless otherwise indicated.
  3. Precast riser sections of length to suit.
  4. Precast bases of a design similar to the precast riser sections.
  5. The sections shall be a minimum of four (4) feet, inside diameter.
  6. Joints shall be sealed with a preformed flexible plastic gasket.
- B. Anchor Bolts
  1. Anchor bolts for bolting manhole frame to the precast or brick manholes shall be made of 3/4 inch diameter all-thread steel rods with a minimum 2-inch projection through the frame. The all-thread steel rods shall have a 5-inch hook for embedment when brick manholes are used. The all-thread steel rod, washer and nuts shall be galvanized.
  2. The concrete inserts for use in pre-cast manholes shall be in accordance

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with Federal Spec. WW-H-171C (Type 18).

#### C. Manhole Steps

1. Manhole steps shall be of aluminum as made by Alcoa Aluminum Company, No. 15785 alloy 6061-16, tensile 38,000 pounds per square inch (psi), yield 35,000 p.s.i., or approved equal. Manhole steps shall be installed in the reinforced concrete walls of the riser and eccentric top sections.
2. 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 apart of 12 inches. Steps shall be located the minimum distance from the ends of riser and top sections as shown on the Drawings. Each step shall be embedded in the riser section at least three-and one-half (3-½) inches but not more than four (4) inches.
3. The pewtor of the step cast in the concrete shall be coated with bituminous coating prior to casting.
4. Plastic-coated, deformed reinforcing bar encapsulated with injection molded propylene shall be an acceptable alternate. The step shall be provided with a separate serrated tread and end lugs to prevent feet from slipping off.

#### D. Manhole Frames and Covers

1. Domestic cast iron castings: ASTM A48, Class 35 gray iron or better; free of bubbles, sand and air holes, and other imperfections, designated for HS-20 loading as designated by ASSHTO.
2. Contact surfaces shall be continuously machined and matched to prevent rocking. Provide dovetail groove centered in lip seat and polyisoprene or neoprene rubber gasket (40 durometer) to seal cover to frame.
3. Cast cover inscription with pipeline service "SANITARY SEWER". Lettering shall be 2" high.
4. Manholes shall be equipped with cast iron manhole frames and self

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### MANHOLES

sealing covers unless otherwise indicated on the Drawings. All manhole frames and covers shall be manufactured by East Jordan Iron Works, or approved equal. The manhole cover shall be a solid lid with two (2) non-penetrating 5/8" diameter galvanized steel lifting rings cast in them with two (2) concealed pick holes. Frames shall be provided with four equally spaced 7/8 inch diameter holes to secure frame to manhole casting. All manhole frames and covers shall be coated with an asphalt base metal coating. Minimum combined weight of manhole frame and cover shall be 400 pounds.

5. Manholes at specific locations as designated on the Drawings shall be equipped with a watertight frame and cover. The manhole cover shall be a solid lid with two (2) non-penetrating 5/8" diameter galvanized steel lifting rings cast in them with two (2) concealed pick holes. Provide four (4) stainless steel bolts to tightly secure cover to frame. Frames shall be provided with four equally spaced 7/8 inch diameter holes to secure frame to manhole casting. All manhole frames and covers shall be coated with an asphalt base metal coating. Minimum combined weight of manhole frame and cover shall be 400 pounds.

#### E. Watertight Manhole Insert

1. Manholes at specific locations indicated on the Drawings shall each be equipped with a Deep Bowl Watertight Manhole Insert with ventilation holes as manufactured by Parson Environmental Products, Reading, PA 19606 (1-800-356-9023 or 610-582-6060), or approved equal.

#### F. Precast Manhole Bases

1. The bases shall be integrally wet cast reinforced concrete and shall consist of a manhole bottom and a wall which shall extend a minimum of 6 inches above the top of the highest inflowing 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 4 inches between the invert of the lowest outflowing sewer and floor of the precast base to provide for the construction of a formed invert and bench wall within the manhole. There shall be a drop of 0.2 feet between the invert of the primary inlet pipe and the invert of the outlet pipe. No more than two lift holes shall be cast in the bases.

- a. Manholes 4 feet in diameter shall have a bottom at least 8

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### MANHOLES

- inches thick and a wall at least 5-inches thick.
- b. Manholes 5 feet in diameter shall have a bottom at least 8-inches thick and a wall at least 6-inches thick.
  - c. 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.
- G. Precast Concrete Manhole Riser, Conical and Flat Slab Top Sections
1. The riser sections, conical and flat slab top sections shall be manufactured by the wet cast process. Concrete used in the manufacture of precast manhole riser and top sections and precast grade rings shall conform to the requirements specified in ASTM C478, and the cement used in the concrete shall be Type II Portland cement conforming to ASTM C150.
  2. Riser section joint shall be of the ship lap type with an equivalent lap of three (3) inches and a minimum wall thickness as shown on the Drawings. Top sections shall be of eccentric cone or design as required. Eccentric cone top sections shall have the same minimum wall thickness and area of circumferential steel reinforcement as the round riser sections. Flat slab tops shall have a minimum thickness as shown on the Detail Drawing and shall be reinforced with steel in accordance with the design requirements specified in ASTM C478. Top sections shall have a straight side cone section with a minimum opening at 24 inches, and shall have a top width of such design and dimensions as to properly support the required manhole frame and cover. The lower joint shall be the ship lap type with an equivalent lap of three (3) inches.
- H. Joint Material
1. Preformed Plastic Gaskets
    - a. Preformed flexible plastic gasket-type sealant for manhole joints shall be "PRO-STIK" Preformed Butyl Rubber Sealant as manufactured by Press-Seal Gasket Corporation of Fort Wayne, Indiana, or approved equal, as directed by the Engineer. Butyl rubber sealant shall meet the requirements of Federal Specification SS-S-210A (3.4 Adhesion & Hydrostatic

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Pressure) and shall conform with the applicable requirements specified in Section 5.7 of ASTM C361 and ASTM C-990. Joint Sealant Compound shall be manufactured of high quality butyl resin containing 98% non-volatile solids, which shall not harden, shrink or oxidize.

- 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, alkalis and saturated hydrogen sulfide) for a period of 30 days.
  - c. The sealing compound shall be supplied in extruded rope form of suitable cross-section. The size of the sealing compound shall be in accordance with the manufacturer's recommendations and sufficient to obtain squeeze-out of the material around the entire interior and exterior circumference when the joint is completed. The sealing compound shall be protected by a suitable removable two-piece wrapper. The two-piece wrapper shall be so designed that one-half may be removed longitudinally without disturbing the other half to facilitate application of the sealing compound. The sealing compound contained within the joint shall be the sole element utilized in sealing the joint from internal and external hydrostatic pressure. Joint surfaces shall be primed, sealing compound applied, and joint made in strict conformance with the written specifications of the sealing compound manufacturer.
2. Rubber O-Ring Gaskets for Manhole Joints
- a. Gaskets shall conform with the applicable requirements specified in ASTM C443 and in Section 5.7 and Section 4.10 respectively of ASTM C361. A rectangular groove shall be provided in the tongue end of each manhole section to receive the rubber gasket and to contain the deformed gasket on all four sides when the joint is completed. For joints sealed with rubber gaskets, the joint design and rubber



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#### I. Pipe Connections to Precast Manhole Bases and/or Sections

1. Openings for connection of sewer piping shall be of the size and shape required for the particular type and size of pipe and be preformed in the base at the time of manufacture. The type and method of the pipe connection to the manhole base or section shall be in accordance with one of the following methods.
  - a. All manhole pipe gaskets shall be integrally cast in the manhole wall and properly sized for the outside diameter of the pipe being used. Gaskets shall be all-rubber composition, flexible, pliable, and provide up to 15 degrees lateral, diagonal or vertical pipe deflection. Gaskets shall be leak-proof tested to 20 psi, and shall meet or exceed rubber quality standards of ASTM C443 and Test Performance Requirements ASTM C425 for compression joints.
  - b. Gaskets shall be A-LOK as manufactured by A-LOK Products Corp. or Star Seal as manufactured by Galaxy Sales Co.
  - c. In the event a hole has to be made into an existing manhole to receive a pipe, the hole shall be made only by core drilling. Annular space between sewer pipe and manhole wall, for connections to existing manholes, shall be sealed with modular mechanical type seal, consisting of interlocking synthetic rubber links, two pressure plates and stainless steel nuts and bolts. In order to assure a watertight joint between manhole wall and pipe, the installation and tightening shall be per manufacturer's recommendations. The modular mechanical type seal shall be "Linkseal" as manufactured by Thunderline Corporation, Belleville, Michigan, or approved equal.

#### J. Precast Concrete Manhole Grade Rings

1. Precast concrete manhole 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. Each grade ring shall have four holes cast therein at the manufacturer's plant for the manhole frame hold down bolts. Broken or cracked concrete grade rings will not

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be acceptable. Grade adjustment for a manhole shall not exceed nine (9) inches.

- K. Pre-formed Rubber Manhole Casting Grade Adjustment Riser
  - 1. Pre-formed rubber manhole casting grade adjustment riser for leveling cast iron frames shall be manufactured in compliance with the requirements of ASTM Designation C443; and shall be as thick as necessary to provide the required grade adjustment. Each grade ring shall be capable of having holes drilled through the riser for the manhole frame hold down bolts without cracking the riser. Broken or cracked grade adjustment risers will not be acceptable. Pre-formed rubber manhole casting grade adjustment riser shall be "Infra-Riser" as manufactured by GNR Technologies, Inc. of Quebec, Canada or approved equal, as directed by the Engineer. Grade adjustment for a manhole casting shall not exceed nine (9) inches.

### 3.0 EXECUTION

#### 3.01 EXCAVATION

- A. Perform excavation to the line and grade shown on the Drawings and as specified in the Manual.
- B. Location and depth of manholes as shown on the Drawings.
- C. Excavate around the circumference of an existing manhole to a depth sufficient to expose the top of the base section or four (4) feet from the lowest invert to prevent lateral soil pressure against the manhole.

#### 3.02 CONSTRUCTION

- A. Construct watertight manholes of precast concrete sections and of the type shown on the Drawings.
- B. Pipe and fittings used for making drop connections shall be of the same type as the pipe and fittings used to construct the sewer line from which the drop connection is made, unless approved otherwise. Inside drops shall be used unless approved otherwise. The minimum manhole size for an inside drop connection shall be five (5) feet inside diameter.

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- C. Construct connection of pipe to an existing manhole by core drilling manhole wall to the sufficient diameter to permit pipe and modular mechanical seal installation. The invert of the additional inlet shall provide a minimum 0.2 feet drop into the outlet. Modify existing bench to provide a smooth concrete channel which directs sewage to existing channel.
- D. Install a minimum of 6" of PennDOT No. 2RC coarse aggregate sub-base.
- E. Provide cast-in-place concrete or precast concrete bases.
  - 1. Construct cast-in-place bases as shown on the Drawings.
    - a. Cast-in-place bases may be constructed with a special form for a joint to match the manhole cylinder sections.
  - 2. Install precast bases as shown on the Drawings.
    - a. Set the precast base on a PennDOT No. 2RC coarse aggregate sub-base.
    - b. Provide a sealed, flexible resilient connection between pipe and precast base section.
- F. Form flow channels in manhole bases. Slope channels uniformly from influent invert to effluent invert; minimum 1 inch drop. Construct bends of the largest possible radius. Form channel sides and invert smooth and uniform; free of cracks, holes or protrusions.
  - 1. The minimum depth of flow channel shall be equal to  $\frac{3}{4}$  the diameter of the largest sewer pipe in the manhole to which it connects. The channel shall be graded to give a smooth, uninterrupted flow through the manhole.
  - 2. Bench walls shall be pitched a minimum of 1 inch per foot from the inside periphery of the manhole to the edge of the flow channel.
- G. Do not permit pipe to project more than 2" into the manhole.
- H. Seal joints between precast concrete manhole sections with preformed rubber gaskets or joint sealant compound.
  - 1. Place joint sealant compound on lower section to be squeezed by the

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weight of the upper section.

2. Place two rubber gaskets in grooves formed in spigot end. Equalize gasket tension. Gaskets shall remain in grooves for the entire circumference of the section upon assembly.

#### I. Protective Coatings

1. Prior to setting the precast sections in place each section shall have concrete surfaces blown free of all dirt and debris and brushed clean and then coated in accordance with manufacturers specifications.
2. The Developer shall provide a certification to the Engineer stating that he has installed the manhole coatings in accordance with the manufacturer's recommendations. Coating may be applied by the manhole supplier.
3. Exterior
  - a. The coating shall be Sealer SP Waterproofer No. 0028 as manufactured by Coopers Creek Chemical Corporation or equal. At least two (2) coats shall be applied giving a total dry film thickness of a minimum of 16.0 mils. After installation, damaged surfaces shall be recoated in accordance with the coating manufacturer's recommendation to give the required 16 mils dry film thickness.
  - b. As an alternate, the coating shall include 2 coats of epoxy-amine adduct, multi-mill, two component, catalyzed epoxy, with total solids volume of 49-51%, which is resistant to alkali, salt and ground water immersion, petroleum products and acids. Coating shall meet AWWA D102-78, paint system No. 1 standards and a minimum 12 mils dry film thickness. Color shall be green.
4. Interior
  - a. The coating shall include 2 coats of epoxy-amine adduct, multi-mill, two component, catalyzed epoxy, with total solids volume of 49-51%, which is resistant to alkali, salt and ground water immersion, petroleum products and acids. Coating shall meet

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AWWA D102-78, paint system No. 1 standards and a minimum 12 mils dry film thickness. Color shall be white.

- b. In areas where the potential for severe corrosion problems may occur, the use of "DURA Plate 100" interior PVC liner may be required by the Engineer.
  
- J. Install manhole sections with steps in contiguous, plumb vertical alignment.
  
- K. Use masonry or precast solid manhole rings to achieve elevation shown for frame and cover. Do not adjust elevation more than 9 inches with masonry or precast rings.
  
- L. Install manhole frames, covers and steps.
  - 1. Set top of frames at finished grade elevation or other elevation shown on the Drawings.
  - 2. Manhole frames and covers shall be brought to proper grade as previously noted, set in 1/4 inch bed of mastic, and anchored in place with the four (4) 3/4 inch diameter anchor bolts which shall be securely embedded in the top of the manhole.
  - 3. Seal joint between manhole frame and manhole with joint sealant compound.
  - 4. All lids which "rock" must be replaced by alternative lids.
  - 5. Build manhole steps into the precast concrete risers of the manholes. Build the uppermost step into the masonry not over 18 inches below the cast iron manhole frame and continue these steps downward along the interior vertical side of the manhole to a point no lower than the crown of the largest sewer. Build all steps into the precast concrete risers in a manner satisfactory to the Engineer, and spaced not more than 12 inches apart.
  
- M. Where new manholes are to be constructed in existing pipelines, carefully excavate around existing pipeline for placement of the new manhole base. Take all measures necessary to bypass flow around the section of pipe. Remove the required length of existing pipe to allow the placement of the new manhole base and installation of the couplings used on the ends of the

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existing pipe and on the pipe splicer sections installed between the couplings and through the gasketed preformed openings in the manhole base.

- N. The excavation to connect a pipe to an existing manhole shall extend around the manhole to a depth sufficient to prevent dislocation of the cone or barrel sections. At a minimum, the excavation around the manhole shall extend to the first barrel section above the manhole base section or 4 feet above the lowest invert. Damage to the existing manhole is the responsibility of the Developer to repair or replace to the satisfaction of the Owner.
- O. Design precast units for all dead loads and live loads as indicated and as required for compliance with applicable Building Code requirements. Walls shall be designed for water and soil pressure using water height at the grade elevation shown on the Plans. If hydrostatic uplift forces currently or potentially exist, the Designer (Fabricator) shall provide for necessary hold-down items. The Developer shall furnish and install hold-down items, if they are required.

#### 3.03 BACKFILLING

- A. Backfill and compact suitable backfill material only after examination of the manhole by the Engineer.
- B. Perform backfilling as specified in accordance with the Manual.

#### 3.04 TESTS

- A. General
  - 1. After the gravity sewers and manholes have been installed and backfilled. The manholes shall be tested for leakage.
- B. Test Procedure (Vacuum Test)
  - 1. The testing shall be done after assembly of the manhole and frame.
  - 2. All lift holes shall be plugged with a non-shrinking mortar, as approved by the Engineer.
  - 3. The seal between the manhole sections shall be in accordance with ASTM C923.

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4. The Developer shall plug the pipe openings, taking care to securely brace the plugs and the pipe.
5. With the vacuum tester set in place:
  - a. Inflate the compression band to affect a seal between the vacuum base and the manhole cast iron frame.
  - b. Connect the vacuum pump to the outlet port with the valve open.
  - c. Draw a vacuum to 10" of mercury (Hg.) and close the valve.
6. The test shall pass if the vacuum remains at 10" Hg. or does not decrease to less than to 9" Hg. in a time specified for the particular size manholes listed.

#### VACUUM TEST TABLE

<u>Manhole Diameter</u>	<u>Test Period</u>
48"	60 sec
60"	75 sec
72"	90 sec
Junction Box	120 sec

If the manhole fails the initial test, the Developer shall locate the leak and make proper repairs. Testing shall continue until the manhole passes the aforementioned criteria.

7. Testing of manholes by the Developer shall be performed in the presence of the Engineer or Project Inspector.

\*\*\* END OF SECTION \*\*\*

## SECTION 02610

### SANITARY SEWER PIPE

#### 1.0 PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. The work of this section includes, but is not limited to:
1. Sanitary sewer gravity pipelines
  2. Sanitary sewer pressure pipelines
  3. Laterals/service connections
- B. Related Work Specified Elsewhere
1. Developer is responsible to review Manual to coordinate the work of this section with the requirements of all associated sections.

##### 1.02 QUALITY ASSURANCE

A. Reference Standards

1. American National Standards Institute (ANSI):

A21.4 Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings.

A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for water or other liquids.

2. American Society for Testing and Materials (ASTM)

A139 Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and over).

F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

D1784 Standard Specifications for Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) compounds.



## SECTION 02610

### SANITARY SEWER PIPE

D2241 Standard Specification for Rigid Polyvinyl Chloride (PVC) Pressure Rated Pipe (SDR Series).

D3139 Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.

3. American Water Works Association (AWWA)

C900 Standard Specifications for Polyvinyl Chloride (PVC) Pressure Pipe (DR 18), 4" diameter through 12" diameter.

C905 Standard Specifications for Polyvinyl Chloride (PVC) Pressure Pipe (DR 25), 14" diameter through 30" diameter.

- B. Reject materials contaminated with gasoline, lubricating oil, liquid or gaseous fuel, aromatic compounds, paint solvent, paint thinner, or acid solder.

#### 1.03 SUBMITTALS

A. Certificates

1. Submit 2 copies of each manufacturer's certification attesting that the pipe, pipe fittings, joints, joint gaskets and lubricants meet or exceed specification requirements.

B. Test Reports

1. Tests of pipe shall be made by the pipe manufacturer in accordance with requirements of ASTM and/or AWWA.
2. Certified copies of the tests made by the manufacturer, or by a reliable commercial laboratory acceptable to the Owner, shall be submitted to the Owner prior to the first shipment of pipe.

#### 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery and Handling

1. Do not place materials on private property without written permission of the property owner.

## SECTION 02610

### SANITARY SEWER PIPE

2. During loading, transporting and unloading, exercise care to prevent damage to materials. Do not drop pipe or fittings. Avoid shock or damage at all times.
3. Take measures to prevent damage to the exterior surface or internal lining of the pipe.

#### B. Storage

1. Pipe may be strung along alignment where approved by the Owner.
2. Do not stack pipe higher than recommended by the pipe manufacturer.
3. Store gaskets for mechanical and push-on joints in a cool, dry location out of direct sunlight and not in contact with petroleum products.

## 2.0 PRODUCTS

### 2.01 DUCTILE IRON PIPE

#### A. Pipe

1. Ductile iron pipe shall be centrifugally cast, annealed ductile iron manufactured in accordance with ANSI A21.51. Gravity pipelines shall be Class 52 pipe. Pressure pipelines shall be Class 53 pipe.
2. Pipe joints shall be push-on or mechanical joint and shall conform to ANSI specification A21.11. Furnish joints with all required accessories.
3. Ductile iron pipe shall be made of ductile iron of good quality and of such character as shall make the metal castings strong, tough and of even grain and soft enough to satisfactorily permit drilling, tapping, and cutting. All piping shall be smooth, free from scale, lumps, blisters, and sand holes and defects of every nature, which make it unfit for the use intended. All piping shall be straight and shall be true circles in section with its inner and outer surfaces concentric. Piping shall be subject to inspection and approval by the Engineer upon delivery, and no broken, cracked, misshapen, or other wise damaged or unsatisfactorily piping will be accepted.

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### SANITARY SEWER PIPE

4. Each piece of pressure ductile iron pipe shall have the weight and class designation conspicuously painted on it as near as possible to the flange or bell end of the pipe and these designations shall be clearly legible.
5. Cement and mortar line all pipe and fittings in accordance with ANSI A21.4. The lining thickness shall be 1/8 inch minimum, tolerance of plus 1-8 inch. Paint seal coat in accordance with ANSI A21.4.
6. Tar coat the exterior of pipe and fittings.

#### B. Fittings

1. Furnish fittings in accordance with ANSI 21.10, 350 psi rating.
2. Joints shall be mechanical joint in accordance with ANSI A21.11. Furnish joints with all required accessories.
3. Ductile iron compact fittings meeting ANSI A21.53 requirements shall NOT be used.
4. Where restrained joints are required, use EBAA Iron, INC Megalug or equal glands.

#### C. Joints: ANSI A21.11

1. Where not specifically shown on the Drawings, joints shall be push-on joint, except fittings which shall be mechanical joints. Restrained type mechanical joints, in addition to the above requirements, shall be the Lock Type mechanical joint as manufactured by United States Pipe and Foundry Company, or approved equal.

D. Mechanical joint gaskets shall be of rubber of such quality that they will be unaffected by the liquid or gases with which they will come in contact. Gland bolts for mechanical joints shall be of high-strength, corrosion-resistant alloy with tee-head and hex nut. Rubber gaskets, Lubricants, Glands, Bolts and nuts shall conform to ANSI A21.11 standards.

E. Rubber gaskets, Lubricants, Glands, Bolts and nuts: ANSI A21.11

## SECTION 02610

### SANITARY SEWER PIPE

#### F. Pipe Couplings and Adapters

1. Pipe couplings used to join plain end pipe of like outside diameters shall be Ford Style FC2A cast coupling with stainless steel nuts and bolts. An alternate coupling shall be Ford Style FS1 or FS2 stainless steel repair clamp or approved equal. The clamp shall be rated for a minimum 150 psi working pressure.
2. Pipe couplings used to join plain end pipe of unlike outside diameters shall be Ford Style FC2A cast coupling with stainless steel nuts and bolts. An alternate coupling will be permitted if the Ford coupling is not suitable for use on either pipe O.D. The exact O.D. of both pipes must be known prior to the coupling being ordered.

#### 2.02 POLYVINYL CHLORIDE (PVC) SEWER PIPE

##### A. Sewer Pipe and Fittings

1. Pipe 4" and smaller: ASTM D-2241, Standard Dimension Ratio (SDR) 26/PR 160, Polyvinyl Chloride (PVC) Cell Classification 12454-B as defined under ASTM D1784.
2. Pipe 6" to 12" diameter: AWWA C900, DR 18 (min.), Class 150 Polyvinyl Chloride (PVC) Cell Classification 12454-B as defined under ASTM D1784.
3. Pipe 14" to 30" diameter: AWWA C905, DR 25 (min.), Class 165 PVC Cell Classification 12454-B as defined under ASTM D1784.
4. Flexible Elastomeric Seals: ASTM D3139 Seal Material: ASTM F477

##### B. Pressure Pipe and Fittings (4" through 12")

1. Outside Diameter Dimension Pipe: AWWA C900 Pressure Class 150 and conform to the requirements of DR 18.
2. Fittings: PVC Fittings, Pressure Class 150 and conform to the requirements of 18.

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### SANITARY SEWER PIPE

#### C. Pressure Pipe and Fittings (3" and Smaller)

1. Pipe: ASTM D2241 (SDR 26 -Class 160)
2. Gaskets: ASTM F477
3. Fittings: Pressure Class 160 conforming to Requirements of SDR 26.

#### 2.03 STEEL CASING PIPE

- A. Pipe: ASTM A139; Grade B, 35,000 psi minimum yield strength, asphalt coated.
1. Wall thickness as indicated on the Design Plans.
- B. Joints: Electric resistance welded.

#### 3.0 EXECUTION

##### 3.01 REPARATION

- A. Perform trench excavation to the line and grade indicated on the Drawings.
- B. Provide pipe bedding in accordance with the Drawings. Place aggregate in a manner to avoid segregation, and compact to the maximum practical density so that the pipe can be laid to the required tolerances.
- C. All pipe shall be carefully inspected for defects prior to laying. If any pipe is found to be defective, it shall be laid aside and replaced with acceptable pipe at no cost to the Owner.

##### 3.02 LAYING PIPE IN TRENCHES

- A. Give 48 hour (minimum) notice to the Owner in advance of pipe laying operations.
- B. A laser beam should be used for maintaining alignment of the pipe during the installation. Such control shall be available for check by the Owner, at all times at no additional costs. Where laser cannot be used, the Developer shall use double offset string line methods for vertical and horizontal control of the pipe installation when approved by the Owner.

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### SANITARY SEWER PIPE

- C. Lower pipe into trench using handling equipment designed for the purpose to assure safety of personnel and to avoid damage to pipe. Do not drop pipe.
- D. Lay pipe proceeding up-grade with the bell or groove pointing upstream.
- E. Lay pipe to a true uniform line with the barrel of the pipe resting solidly in bedding material throughout its length. Excavate recesses in bedding material to accommodate joints, fittings and appurtenances. Do not subject pipe to a blow or shock to achieve solid bearing or grade.
- F. Lay each section of pipe in such a manner as to form a close concentric joint with the adjoining section and to avoid offsets in the flow line.
- G. Clean and inspect each section of pipe before joining. Assemble to provide tight, flexible joints that permit movement caused by expansion, contraction, and ground movement. Use lubricant recommended by the pipe or fitting manufacturer for making joints. If unusual joining resistance is encountered or if the pipe cannot be fully inserted into the bell, disassemble joint, inspect for damage, re-clean joint components, and reassemble joint.
- H. Assemble joints in accordance with recommendations of the manufacturer.
  - 1. Push-on Joints
    - a. Clean the inside of the bell and the outside of the spigot. Insert rubber gasket into the bell recess.
    - b. Apply a thin film of gasket lubricant to either the inside of the gasket or the spigot end of the pipe, or both.
    - c. Insert the spigot end of the pipe into the socket using care to keep the joint from contacting the ground. Complete the joint by forcing the plain end to the bottom of the socket. Mark pipe that is not furnished with a depth mark before assembly to assure that the spigot is fully inserted.
  - 2. Mechanical Joints
    - a. Wash the socket and plain end. Apply a thin film of soapy water. Slip the gland and gasket over the plain end of the pipe. Apply soapy water to gasket.

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### SANITARY SEWER PIPE

- b. Insert the plain end of the pipe into the socket and seat the gasket evenly in the socket.
  - c. Slide the gland into position, insert bolts, and finger-tighten nuts.
  - d. Bring bolts to uniform tightness. Tighten bolts 180-degrees apart, alternately.
  - e. Jointing of mechanical joint pipe and fittings shall be done in accordance with the requirements of Section 9b of AWWA C600, and also in accordance with the "Notes on Method of Installation".
3. Coupled Joints
- a. Assemble in accordance with the manufacturer's recommendations.
- I. Disassemble and remake improperly assembled joints using a new gasket.
  - J. Check each pipe installed as to line and grade in place. Correct deviation from line and grade immediately. A deviation from the designed grade as shown on the drawings, or deflection of pipe joints, will be cause for rejection.
  - K. Place sufficient compacted backfill on each section of pipe, as it is laid, to hold firmly in place. Backfill shall be placed to insure proper backfilling under haunches.
  - L. Clean interior of the pipe as work progresses. Where cleaning after laying is difficult because of small pipe size, use a suitable swab or drag in the pipe and pull forward past each joint immediately after the jointing has been completed.
  - M. Keep trenches and excavations free of water during construction.
  - N. When the work is not in progress, and at the end of each work day, securely plug open ends of pipe and fittings to prevent trench water, earth, or other substances from entering the pipes or fittings.

## SECTION 02610

### SANITARY SEWER PIPE

#### O. Deflection

1. When it is necessary to deflect pressure sewer mains from a straight alignment horizontally or vertically, do not exceed the following limits:
  - a. Ductile Iron Pipe (DIP): Deflections shall not exceed 5 degrees.
  - b. PVC: Deflections shall not exceed 2.5 degrees.

#### 3.03 LATERAL WYE BRANCHES AND CAPS

- A. For new construction, install wye branches and 45° elbow at locations designated by the Engineer concurrent with pipe laying operations. Use standard fittings of the same material and joint type as the pipeline into which they are installed. Saddles shall not be installed in lieu of wyes for new pipelines.
- B. For taps into an existing sewer main, use a saddle tee with stainless steel band clamps as specified in Paragraph 3.11

#### 3.04 LATERALS

- A. Construct laterals from the wye branch to a terminal point as indicated on the drawings. A special adapter will be required where DIP joins cast-iron pipe or PVC pipe. Construct laterals at a minimum slope of 0.020. Terminate lateral with adapter fitting as specified in the Drawings.
- B. Where the depth of the main pipeline warrants, construct riser type laterals from the wye branch in accordance with Drawings. The determination as to the type of riser, slope, and depth of lateral pipe at the termination point shall be as directed by the Owner.
- C. Install an approved watertight-gasketed cap, braced to withstand pipeline test pressure thrust, at the termination of the lateral. Install a temporary 2" x 3" marker stake extending from the end of the lateral to 1-foot above finished grade. Indicate on stake the depth from finished grade to the lateral invert.
- D. Install 6" PVC adapter, which is properly sized to connect to an existing lateral sewer pipe utilizing a bell to spigot connection. Slip-on rubber with stainless steel band type adapters shall not be used for lateral reconnections.



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### SANITARY SEWER PIPE

- E. Connect new 6" PVC lateral, which is properly sized to connect to an existing lateral.
- 3.05 CAST-IN-PLACE CONCRETE CONSTRUCTION
- A. Class "A", 4,000 psi minimum.
- 3.06 CRADLES AND ENCASEMENT
- A. Provide concrete cradles and encasement for pipeline where indicated on the Drawings, or as directed by the Owner.
- 3.07 THRUST RESTRAINT
- A. Provide thrust blocking or restrained joints for pressure pipeline at all bends, tees, and changes in direction.
- 3.08 STREAM CROSSINGS
- A. Construct sanitary sewer pipeline stream crossings in accordance with the Stream Crossing Detail on the Drawings.
- 3.09 BACKFILLING TRENCHES
- A. Backfill pipeline trenches only after examination of pipe laying by the Engineer and/or Owner.
- 3.10 WATER AND SEWER LINE RELATIONSHIP
- A. All sewers shall be installed in accordance with PADEP regulations and guidelines relative to the separation distances (vertical and horizontal) between water mains and sanitary sewers.
- 3.11 TEE SADDLES
- A. When approved by the Engineer, a tee saddle may be used to connect a new lateral to an existing main.
  - B. The required hole in the sewer main shall equal the inside diameter of the lateral and shall be only made by core drilling. The maximum size holes allowed are 4" diameter in an 8" diameter sewer main, and 6" diameter in a 10" diameter sewer. If a 6" connection is required to be made in an 8" sewer

## SECTION 02610

### SANITARY SEWER PIPE

main, then a wye or tee fitting must be inserted in the sewer main using the coupling specified in the Drawings to join the piping.

- C. Core drilling of the hole and installation of the saddles shall be done in the presence of the Owner and/or Owner's representative.
- D. Body of Saddle to be of cast grey iron coated with a rust inhibitor paint and correctly contoured for the size and kind of pipe on which it is to be installed.
- E. The Saddle to contain an ASTM C-361-77, or equal, Rubber Tubular O-Ring Gasket cemented in place.
- F. The Saddle shall have an integral SDR-26 PVC spigot provided for connection to the lateral.
- G. A fabricated stainless steel strap, of at least 24 gage x 2.5" wide and containing two 0.375" stainless steel T-Bolts and Nuts, is to be supplied for clamping the Saddle to the pipe.
- H. The Saddle with gasket shall withstand at least 7 p.s.i. internal pressure when installed.
- I. The Saddle shall be Geneco Model 90H Sealtite Type DF or approved equal.

#### 3.12 TESTING

- A. All sewer pipelines shall be tested in accordance with the Owner's specifications.

\*\*\*\* END OF SECTION \*\*\*\*

## SECTION 02651

### SEWER PIPELINE TESTING

#### 1.0 GENERAL

##### 1.01 DESCRIPTION

- A. The Work of this section includes, but is not limited to:
  - 1. Testing Gravity Sewer Pipelines
    - a. Low-pressure air test
    - b. Mandrel test
  - 2. Testing Pressure Pipelines
    - a. Hydrostatic leakage test
- B. Related Work Specified Elsewhere
  - 1. Developer is responsible to review Manual to coordinate the work of this section with the requirements of all associated sections.

##### 1.02 QUALITY ASSURANCE

- A. Test Acceptance
  - 1. No test will be accepted until the results are less than the specified maximum limits.
  - 2. The Developer shall, at his own expense, determine and correct the causes of test failure and retest until successful test results are achieved.

##### 1.03 SUBMITTALS

- A. Testing procedures
- B. List of test equipment
- C. Testing sequence schedule
- D. Provisions for disposal of flushing and test water

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SEWER PIPELINE TESTING

E. Certificate of test gauge calibration

1.04 JOB CONDITIONS

- A. Do not allow personnel in manholes during pressure testing.
- B. Provide relief valves set at 10 psig to avoid accidentally over-pressurizing gravity sewer line during low pressure air testing.

2.0 PRODUCTS

2.01 AIR TEST EQUIPMENT

- Air compressor
- Air supply line
- Shut-off valve
- Pressure regulator
- Pressure relief valve
- Stop watch
- Plugs, braces
- Pressure gauge, calibrated to 0.1 lbs/sq.in.

2.02 DEFLECTION TEST EQUIPMENT

- Go, No-Go mandrels
- Pull/retrieval ropes

2.03 HYDROSTATIC TEST EQUIPMENT

- Hydro pump
- Pressure hose
- Water meter
- Test connections
- Pressure Gauge, calibrated to 0.1 lbs/sq.in.
- Pressure relief valve

## SECTION 02651

### SEWER PIPELINE TESTING

#### 3.0 EXECUTION

##### 3.01 PREPARATION

- A. Backfill trenches in accordance with the Drawings.
- B. Provide pressure pipeline with concrete reaction support blocking.
- C. Cleaning
  - 1. The cleaning shall be accomplished with high-velocity jet hydro cleaning equipment. No mechanical bucket machinery will be acceptable for the cleaning process.
  - 2. High-velocity jet hydro cleaning equipment shall be capable of producing flows from a fine spray to a solid stream and shall have a selection of two or more high pressure nozzles (Approximately 2,000 psi). The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.
  - 3. Satisfactory precautions shall be taken to protect the sewer lines at all times. Precautions shall be taken so that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. All workmen shall be experienced and skilled in the use of the equipment used.
  - 4. Sewer manhole reaches shall be cleaned using high velocity jet hydro cleaning equipment. The equipment and methods selected shall be in accordance with the National Association of Sewer Service Companies (NASSCO) Recommendations. The equipment shall be capable of removing dirt, grease, roots, rocks, sand, and other materials and obstructions from the sewer lines and manholes. If cleaning of an entire reach cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire manhole reach, the equipment should be checked for performance. If the equipment is found to

## SECTION 02651

### SEWER PIPELINE TESTING

perform to standards, it will be assumed that a major blockage exists and the cleaning effort shall be abandoned.

#### D. Lamping

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

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

### 3.02 TESTING GRAVITY SEWER PIPELINES

#### A. Low Pressure Air test

1. Test each newly installed section of gravity sewer line between manholes.
2. Slowly introduce air pressure to approximately 5.0 pounds per square inch gauge (psig) greater than groundwater pressure.
3. Allow pressure to stabilize for at least five (5) minutes. Adjust pressure back to 5.0 psig greater than groundwater pressure.
4. Test
  - a. The test shall pass if the air pressure remains at 5.0 psig for a period of five (5) minutes.
  - b. If the line fails, determine the source of the air leakage, make corrections and retest. The Developer has the option to test the section in incremental stages until the leaks are isolated. After the leaks are repaired, retest the entire section between manholes.

## SECTION 02651

### SEWER PIPELINE TESTING

#### B. Testing Pipe Over 36" Diameter

1. Pipe over 36" diameter shall be subjected to a visual interior inspection.

#### C. Mandrel Testing Procedures

1. Mandrel test shall be performed a minimum of thirty (30) days after sanitary sewer pipe is installed. Mandrel testing is not required for ductile iron pipe or DR-18 PVC pipe.
2. Use Go-No-Go device in accordance with pipe manufacturer's requirements. Method to be approved by Engineer prior to testing.
3. Repair and retest sections of sewer not meeting test requirements.

### 3.03 EXISTING PRESSURE SEWER PIPELINES

#### A. Hydrostatic Leakage Test

1. Test each newly laid pressure pipeline, including any valved section thereof, hydrostatically at 1.5 times the working pressure of the pipeline based on the elevation of the lowest point in the pipeline corrected to the elevation of the test gauge. Obtain test pressure from the Engineer.
2. Slowly fill the section to be tested with water, expelling air from the pipeline at the high points. Install corporation stops at high points if necessary. After all air is expelled, close air vents and corporation stops and raise the pressure to the specified test pressure.
3. Observe joints, fittings and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.
4. After visible deficiencies are corrected, continue testing at the same test pressure for an additional two hours to determine the leakage rate. Maintain pressure within plus or minus 5.0 psi of test pressure. Leakage is defined as the quantity of water supplied to the pipeline necessary to maintain test pressure during the period of the test.

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SEWER PIPELINE TESTING

5. Compute the maximum allowable leakage by the following formula:

$$L = \frac{(ND) P^{1/2}}{7,400}$$

Where:

L is the allowable leakage in gallons/hour

N is the number of joints in the section tested

D is the nominal diameter of the pipe in inches

P is the average test pressure in psig

6. If the line under test contains sections of various diameters, the allowable leakage shall be the sum of the computed leakage for each size.
7. If the test of the pipe indicates leakage greater than that allowed, locate the source of the leakage, make corrections and retest until leakage is within allowable limits. Correct visible leaks regardless of the amount of leakage.

\*\*\* END OF SECTION \*\*\*



## SECTION 02960

### GRADING AND SEEDING - DISTURBED AREAS

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. The work in this section includes, but is not limited to:
  - 1. Restoration of disturbed grass areas.
- B. Restore unpaved surfaces to a condition similar to or better than that prior to construction activities.
- C. Related Work Specified Elsewhere
  - 1. Developer is responsible to review Manual to coordinate the work of this section with the requirements of all associated sections.

##### 1.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging. Damaged or open packages are not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer. Damaged or open packages are not acceptable.

##### 1.03 EXISTING CONDITIONS

- A. Beginning work means acceptance of existing conditions.

#### PART 2 PRODUCTS

##### 2.01 SOIL SUPPLEMENTS

- A. Pulverized Agricultural Limestone
  - 1. Pulverized Agricultural Limestone shall be supplied in accordance with PennDOT Specifications Publication No. 408, 1990, Section 804.2(a).1.

## SECTION 02960

### GRADING AND SEEDING - DISTURBED AREAS

- B. Fertilizer
- C. Fertilizer shall be supplied in accordance with PennDOT Specifications Publication No. 408, 1990, Sections 804.2(a).2 and 804.2(a).3.
- D. A shop drawing shall be submitted for each supplement used.

#### 2.02 SEED

- A. Seed shall be supplied in accordance with Section 804.2.(b) PennDOT Specifications Publication No. 408, 1990.
- B. A shop drawing or supplier's specifications shall be submitted for each seed used.
- C. See attached Table 2.02-1 for seed formulas, rates, seeding dates and seeding locations.

#### 2.03 HERBICIDES

- A. Herbicides shall be in accordance with Section 804.2.(d) of PennDOT Specifications Publication No. 408, 1990.
- B. A shop drawing or supplier's specifications shall be submitted for each herbicide used.

#### 2.04 EXISTING TOPSOIL

- A. Existing topsoil shall be stripped and stockpiled in accordance with Section 801 of PennDOT Specifications Publication No. 408, 1996 and in conformance with all rules and regulations at the local conservation district having jurisdiction.

#### 2.05 NEW TOPSOIL

- A. Topsoil shall be a natural, fertile, friable soil, typical of productive soils in the vicinity, obtained from naturally well-drained areas, with pH values of between 6.0 and 7.0, containing no substances harmful to grass.
- B. New topsoil shall comply with Section 802 of PennDOT Specifications, Publication No. 408, 1996.

## SECTION 02960

### GRADING AND SEEDING - DISTURBED AREAS

- C. Topsoil shall be provided from an approved outside source and shall be accompanied by a grading analysis report showing the minimum percent passing through the specified sieve screens and the minimum and maximum percent of sand, silt and clay material passing the No. 10 sieve.
- D. A shop drawing shall or supplier's specifications be submitted for new topsoil.

#### 2.06 MULCHING MATERIALS

- A. Mulches for seeded materials shall be in accordance with Section 805.2 of PennDOT Specifications, Publication No. 408, 1996.
- B. Mulches for planting and other areas shall be in accordance with Section 805.2 of PennDOT Specifications, Publication No. 408, 1996.
- C. Mulch binders shall be in accordance with Section 805 of PennDOT Specifications, Publication No. 408, 1996.
- D. A shop drawing or supplier's specifications shall be submitted for each mulch used.

#### 2.07 PLANTS, PLANTING, AND TRANSPLANTING

- A. Plants and plantings shall be in accordance with Section 808 of PennDOT Specifications, Publication No. 408, 1996, and the most current edition of the "American Standard for Nursery Stock".
- B. Species and size shall be the same as damaged or removed by the Developer unless otherwise directed by the Owner in writing.
- C. Developer shall submit a shop drawing for each type of plant or planting supplied. Shop drawing should list age, size, species and nursery supplying planting, along with specific locations of planting. No planting shall be ordered until Developer receives acceptance from the Engineer in writing.
- D. Wetland plants shall be acclimated for growth in saturated soil conditions. Plantings shall be purchased from a registered wetland nursery.

## SECTION 02960

### GRADING AND SEEDING - DISTURBED AREAS

#### PART 3 EXECUTION

##### 3.01 PREPARATION

- A. Protect existing underground improvements from damage.
- B. Remove foreign materials, plants, roots, stones, and debris from site. Do not bury foreign material.

3.02 Existing topsoil should be stripped and stockpiled.

##### 3.03 TIME OF OPERATIONS

- A. Spring Seeding:
  - 1. Preliminary operations for seed bed preparation may commence as soon after March 1 as ground conditions permit, but shall end by May 30.
- B. Fall Seeding:
  - 1. Preliminary operations for seed bed preparation may commence after July 30, but shall end by October 1.
- C. All Other Period
  - 1. If construction is completed at times of the year other than noted above, temporary cover work shall be performed to provide interim soil coverage. The temporary cover work shall be followed by a second seeding in accordance with Drawings during the above noted time periods.

##### 3.04 PLACING OF SOIL SUPPLEMENTS

- A. Place soil supplements in accordance with Section 804 of PennDOT Specifications, Publication No. 408, 1996 and as follows:

Uniformly apply supplements to the areas to be seeded, except areas to be seeded with Formula E, in accordance with Drawings.

On topsoiled areas, blend the initial soil supplements into the soil at least 2" deep by disking or harrowing or by another acceptable method approved by the Engineer in writing. The blending of the supplements may be performed during tillage operations.

## SECTION 02960

### GRADING AND SEEDING - DISTURBED AREAS

Prior to project completion, apply slow-release, nitrogen fertilizer to the surface of Formula B, D, L and W seeded areas.

Apply soil supplements as follows: Pulverized Agricultural Limestone 800 lbs/1,000 square yards (sy) 10-20-20 Analysis Commercial Fertilizer 140 lbs/1,000 sy 38-0-0 Ureaform Fertilizer 50 lbs/1,000 sy.

Or 32-0-0 to 38-0-0 Sulfur Coated 50 to 59 lbs/1,000 sy Urea Fertilizer (as per Mfg. or recommended) 31-0-0 IBUDU Fertilizer 60 lbs/1,000 sy.

1. In wetlands areas utilize Osmocote 17-6-10 fertilizer and distribute evenly throughout the area in accordance with Manufacturer's recommendations.

#### 3.05 TILLAGE

- A. Perform tillage on topsoiled areas in accordance with Section 804 of PennDOT Specifications, Publication No. 408, 1996 and as follows:
  1. Correct surface irregularities by filling any depressions and leveling rough or uneven areas. Remove all metal objects, stones larger than 2 inches and any other debris detrimental to restoration operations.
  2. Topsoil areas 3:1 and flatter thoroughly loosen the surface to a depth of not less than 6 inches by utilizing a Tufline TW5 Series Tandem Disc Harrow, or equal and compact utilizing a P10 Series Single Gauge Pulverizer (Culti-Packer) as manufactured by Brillion Mfg., or equal.

#### 3.06 SEED APPLICATION

- A. Apply seed in accordance with Section 804.3 of PennDOT Specifications, Publication No. 408, 1996 and as follows:
  1. Spread seeds at the rates in accordance with Drawings, supplier's recommendations or Conservation District's requirements.
  2. Sow seeds uniformly on the prepared areas by the helicopter, hydraulic placement, broadcasting, drilling or hand-seeding wetlands in accordance with manufacturer's recommendations.

## SECTION 02960

### GRADING AND SEEDING - DISTURBED AREAS

3. Spread seeds within the following dates:
  - Formula A, D, L & S                      March 15 to June 1  
August 1 to October 15
  - Formula C                                      Ryegrass Portion; March 1 to  
October 15 Crownvetch Portion;  
Anytime except September and  
October
4. Upon completion of sowing, cover seed to an average depth of 1/4 inch by hand raking or approved mechanical methods.
5. On topsoiled areas, where temporary seeding or mulching has been applied, use tillage and soil supplements prior to permanent seeding.
6. On untilled areas, where temporary seeding or mulching has been applied, permanent seed and/or soil supplements may be applied without tilling.
7. After seeding, roll topsoiled areas with a roller, weighing not more than 65 lbs. per foot width, or through the utilization of a Culti-Packer attachment or by another method approved by the Engineer in writing.
8. Seeded area shall be watered with a fine spray in such a manner as not to wash out the seed area. Seeding operations shall be done on a still day.
9. Maintain grass areas within grading limits until the area has been accepted by the Owner. Mow as needed or directed. Control prohibited and noxious weed growth within the restored area.
10. Seed application in wetland areas.
  - a. The seeding of wetland areas shall take place immediately after the wetland soil has been placed and fertilized.
  - b. Seed will be sown, according to the grower's rate, on a calm day and preferably by machine, but if by hand, only by experienced workmen.
  - c. If there is a delay in seeding, during which weeds grow, the Developer will remove the weeds. The soil will be lightly raked

## SECTION 02960

### GRADING AND SEEDING - DISTURBED AREAS

immediately before seeding is begun.

- d. One half the seed will be sown in one direction and the other half at right angles.
- e. In the event of drought or extremely dry conditions, the Developer will supply a fine spray of water to the wetland area until uniform germination occurs over the entire area.

#### 3.07 APPLICATION OF HERBICIDES

- A. Apply herbicides in accordance with Section 804.3 of PennDOT Specifications, Publication No. 408, 1996 and as follows:
  - 1. Apply herbicides where weed growth is prominent. Application shall be by personnel certified by the Department of Agriculture and with equipment specifically designed for the spread of herbicides.
  - 2. No herbicides shall be utilized in or proximate to wetland areas.

#### 3.08 EXISTING TOPSOIL

- A. Stripping and Stockpiling
  - 1. Strip and stockpile existing topsoil in accordance with Section 801 of PennDOT Specifications, Publication No. 408, latest revision and as follows:
    - a. After clearing operations have been completed and prior to any other work activities, remove topsoil from area of construction operations and stockpile.
    - b. Provide soil erosion controls as indicated on the plans. Seed stockpiled topsoil in accordance with the County Conservation District requirements.
- B. Placing Stockpiled Topsoil
  - 1. Place stockpiled topsoil in accordance with Section 803 of PennDOT Specifications Publication No. 408, 1996 and as follows:
    - a. Remove topsoil from stockpiles using an acceptable method which does not mix topsoil with foreign materials.

## SECTION 02960

### GRADING AND SEEDING - DISTURBED AREAS

- b. After placing topsoil, provide tillage and soil supplements prior to commencing any seeding operations.

#### 3.09 PLACEMENT OF MULCH

- A. Place mulch in accordance with Section 805.3 of PennDOT Specifications, Publication No. 408, 1996 and as follows:
  - 1. Mulching seeded areas.
    - a. Place mulch immediately after seeding or within 48 hours of seeding completion. Place only straw or wood cellulose over topsoiled areas.
    - b. Place straw or hay uniformly, in a continuous blanket, at a rate of 1,200 lbs per 1,000 sy. Anchor straw or hay with acceptable materials at the following rates:
      - Emulsified Asphalt, not less than 31 gallons per 1,000 sy.
      - Wood Cellulose, 160 lbs per 1,000 sy.
      - Chemical mulch binders or a light covering of topsoil may be used for anchorage when the size of the area precludes the use of mechanical equipment.
    - c. Apply wood cellulose fiber hydraulically at a rate of 320 pounds per 1,000 sy.
      - 1. Incorporate as an integral part of the slurry after seed and soil supplements have been thoroughly mixed.
    - d. When mulch is applied to grass by blowing equipment, the use of cutters in the equipment will be permitted to the extent that a minimum of 95% of the mulch is 6" or greater in length.
  - 2. Mulching Planted Areas
    - a. Place mulch in accordance with Section 805.3 of PennDOT Specifications, Publication No. 408, 1996 and as follows:
      - i. Uniformly mulch entire plant pit basins, and shrub beds to a depth of not less than 3 inches. Do not mulch areas planted with Crownvetch.



## SECTION 02960

### GRADING AND SEEDING - DISTURBED AREAS

- ii. Place mulch by hand or with mechanical spreading equipment manufactured for this purpose.
- iii. Apply mulch within 48 hours after completion of each planting area.
- iv. Maintain mulched area until the entire project has been completed. Reapply mulch that has become dislodged as directed by Engineer.

#### 3.10 PLACEMENT OF EROSION PROTECTION

- A. Placement of erosion protection materials shall be in accordance with Section 806.3 of PennDOT Specifications, Publication No. 408, latest revision, and as follows:
  1. Place erosion control materials after the slope or swale has been dressed.
  2. Place erosion control materials to conform to the shape of the soil surface.
  3. Spread out materials evenly and smoothly.
  4. Unroll materials parallel to the flow direction.
  5. Drive all staples flush with the soil surface.
  6. Install upslope ends and overlap edges per the manufacturer's recommendations.
  7. In addition to all areas specified in PennDOT Specifications, Publication No. 408, Section 806.3, supply, place and maintain erosion control materials on all seeded areas with slopes greater than ten percent.

## SECTION 02960

## GRADING AND SEEDING - DISTURBED AREAS

TABLE 2.02-1

Formula and Species	Percent by Weight		Seeding Rates in lbs./1000 sq. feet	Recommended Seeding Dates	Recommended Planting Location
A - Perennial Ryegrass Creeping Red Fescue or Chewings Fescue Kentucky Bluegrass	20% 30% 50% %	TOTAL	3 LB.	Mar 15 to Jun 1 Aug 1 to Oct 15	Lawn Areas
C - Crownvetch Annual Ryegrass	45% 55%	TOTAL	2 LB.	Ryegrass Mar 1 to Oct 15 Crownvetch Nov 1 to Aug 31	E & S Control (Area not intended for mowing)
D - Tall Fescue Creeping Red Fescue or Chewings Fescue	70% 30%	TOTAL	3 LB.	Mar 15 to Jun 1 Aug 1 to Oct 15	High Traffic Areas (Durable/tall grass)
E - Annual Ryegrass	100%	TOTAL	2 LB.	Mar 15 to Oct 15 (2)	Temporary Seed (STABILIZATION)
L - Hard Fescue Mixture Creeping Red Fescue	60% 40%	TOTAL	3 LB.	Mar 15 to Jun 1 Aug 1 to Oct 15	Low Traffic Areas (Short grass shady areas)
W - Tall Fescue Birdsfoot Trefoil Redtop	70% 20% 10%	TOTAL	2 LB.	Apr 1 to Jun 15 Aug 16 to Sep 15	Embankments, Wetland Areas or (Areas where the natural vegetation is desired)
S - Tall Fescue Hard Chewings Perennial Ryegrass	50% 30% 20%	TOTAL	3 LB.	Mar 15 to Jun 1 Aug 1 to Oct 15	Shade Areas

## Recommended Mulch, Lime and Fertilizer Rates:

1. The recommended mulch application rate is 3 tons/acre.
2. The recommended fertilizer application rate is 1000 pounds/acre or 25 pounds/1000 square feet.

The recommended lime application rate is 3 tons ground limestone per acre or 137 pounds per 1000 square feet.

\*\*\* END OF SECTION \*\*\*

## SECTION 03300

### CONCRETE FOR UTILITY CONSTRUCTION

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. The Work of this Section includes, but is not limited to:
  - 1. Reaction and support blocking
  - 2. Cradles and encasement
  
- B. Related Work Specified Elsewhere
  - 1. Developer is responsible to review Manual to coordinate the work of this section with the requirements of all associated sections.

##### 1.02 QUALITY ASSURANCE

- A. Reference Standards
  - 1. Pennsylvania Department of Transportation: Publication 408 Specifications
  - 2. American Society for Testing and Materials (ASTM): C31 Making and Curing Concrete Test Specimens in the Field C39 Test for Compressive Strength of Cylindrical Concrete Specimens C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete C172 Sampling Fresh Concrete

##### 1.03 SUBMITTALS

- A. Certificates
  - 1. Submit certification from the concrete producer attesting that the cement concrete conforms to Section 704, Publication 408 Specifications for the class of concrete being used.
  - 2. Submit certified results of compressive strength tests performed by an independent testing laboratory.

## SECTION 03300

### CONCRETE FOR UTILITY CONSTRUCTION

#### B. Shop Drawings

1. Submit detailed shop drawings of reinforcing steel.

#### PART 2 PRODUCTS

##### 2.01 CEMENT CONCRETE

#### A. Ready-mixed, conforming to Section 704, Publication 408 Specifications.

1. Requirements for State approved batch plants, design computations and plant inspection shall not apply. The acceptability of concrete will be based on conformance with the Cement Concrete Criteria specified below and the results of the specified tests.

#### B. Cement Concrete Criteria

##### 1. Class A

- a. 28-day compressive strength: 3300 pounds per square inch (psi)
- b. Slump: 1 to 3 inches

##### 2. Class C

- a. 28-day compressive strength: 2000 psi
- b. Slump: 2 to 6 inches

##### 3. High-Early Strength

- a. 3-day compressive strength: 3000 psi
- b. Slump: 1 to 3 inches

4. Cement Factor and Maximum Water-Cement Ratio conforming to Table A, Section 704.1(b), Publication Specifications.

##### 2.02 REINFORCEMENT STEEL

#### A. Reinforcement Bars

1. New billet-steel conforming to Section 709.1, Publication 408 Specifications.
2. Deformed, Grade 40

## SECTION 03300

### CONCRETE FOR UTILITY CONSTRUCTION

#### B. Steel Wire Fabric

1. Conforming to Section 709.3, Publication 408 Specifications

#### 2.03 GROUTS

##### A. General

1. All grouting as indicated or noted on the Drawings, in other sections of the specification or obviously required to perform the work shall be non-shrink grout.
2. Grout in general shall be non-metallic type unless specifically noted on the Drawings or in other sections of the specifications to be a metallic type.
3. Grouting shall be in strict compliance with the directions contained in the manufacturer's current catalog or instructions provided with the product.
4. The grout manufacturer shall make available at no cost, upon 72 hours notification, the services of a qualified full-time field representative to aid in assuring proper use of the product under job conditions.

##### B. Non-metallic Type.

1. Non-metallic grout shall be Masterflow 713 Grout (pre-mixed) as manufactured by Master Builders or approved equal.

##### C. Epoxy Based Grouts shall be a 2 component, moisture insensitive epoxy adhesive, such as Sikadur 32 Hi-Mob by Sika Corporation or approved equal.

#### PART 3 EXECUTION

##### 3.01 CONSTRUCTION

- ##### A. Comply with Section 1001, Publication 408 Specifications for construction requirements including formwork, curing, protection and finishing of cement concrete.

## SECTION 03300

### CONCRETE FOR UTILITY CONSTRUCTION

- B. Excavate and shape trench bottoms and sides to accommodate thrust block forms, encasement, manhole bases, inlets and vaults.
- C. Support pipe, valves and fittings at the required elevation with brick or concrete block. Do not use earth, rock, wood, or organic material as supports.
- D. Construct manhole bases, reaction and support blocking, cradles, encasements, and miscellaneous mass concrete of Class C concrete.
- E. Provide spacers, chairs, bolsters, ties and other devices for properly placing, spacing, supporting and fastening reinforcement in place.
- F. Place concrete utilizing all possible care to prevent displacement of pipe or fittings. Return displaced pipe or fittings to line and grade immediately.
- G. Insure tie rods, nuts, bolts and flanges are free and clear of concrete.
- H. Do not backfill structures until concrete has achieved its initial set, forms are removed, and concrete work is inspected by the Engineer.
- I. Perform backfilling and compaction as specified in the Manual.

#### 3.02 FIELD TESTS OF CONCRETE DURING CONSTRUCTION

- A. Test each 50 cubic yards or fraction thereof of each class of concrete for compressive strength. Retain an independent testing laboratory to test cylinders.
  - 1. Sample concrete in accordance with ASTM C172
  - 2. Prepare and cure two test cylinders in accordance with ASTM C31.
  - 3. Test cylinders in accordance with ASTM C39
- B. If test cylinders fail to meet strength requirements, the Engineer may require additional core tests in accordance with ASTM C42 at the expense of the Developer.

\*\*\* END OF SECTION \*\*\*

## SECTION 11058

### BYPASS PUMPING SYSTEMS

#### PART 1 - GENERAL

##### 1.1 SCOPE

- 1.1.1 Developer is required to furnish all materials, labor, equipment, power, maintenance, etc. to implement a temporary pumping system for the purpose of diverting the existing flow around the work area for the duration of the project.
- 1.1.2 The design, installation and operation of the temporary pumping system shall be the Developer's responsibility. The Developer shall employ the services of a vendor who can demonstrate to the Engineer that specializes in the design and operation of temporary bypass pumping systems. The vendor shall provide at least five (5) references of projects of a similar size and complexity as this project performed by his firm within the past three (3) years. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

##### 1.2 REQUIREMENTS FOR SUBMITTING BIDS

- 1.2.1 The Developer shall prepare with the vendor a specific, detailed description of the proposed pumping system and submit it and the vendor's references. Projects without an acceptable detailed plan for the temporary bypass pumping system shall be rejected.
- 1.2.2 The Developer shall submit to the Engineer detailed plans and descriptions outlining all provisions and precautions to be taken by the Developer regarding the handling of existing average and peak flows. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these Documents. No construction shall begin until all provisions and requirements have been reviewed by the Engineer.

1.2.3 The plan shall include but not be limited to details of the following:

- A. Staging areas for pumps;
- B. Sewer plugging method and types of plugs;
- C. Number, size, material, location and method of installation of suction piping;
- D. Bypass pump sizes, capacity, number of each size to be on site and power requirements;
- E. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted);
- F. Standby power generator size, location;
- G. Downstream discharge plan;
- H. Method of protecting discharge manholes or structures from erosion and damage;
- I. Thrust and restraint block sizes and locations;
- J. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill;
- K. Method of noise control for each pump and/or generator;
- L. Any temporary pipe supports and anchoring required;
- M. Design plans and computation for access to bypass pumping locations indicated on the drawings;
- N. Calculations for selection of bypass pumping pipe size;
- O. Schedule for installation of and maintenance of bypass pumping lines;
- P. Plan indicating selection location of bypass pumping line locations.



### 1.3 EQUIPMENT

1.3.1 All pumps used shall be fully automatic self-priming units that do not require the use of foot-valves or vacuum pumps in the priming system. The pumps may be electric or diesel powered. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of effluent flows.

All pumps shall be Godwin 'Dri-Prime' critically silenced (less than or equal to 68 dB at 30-feet) automatic self-priming pumps (CD series) as manufactured by Godwin Pumps of America, Inc., (856) 467-3636, (609) 876-9188 or approved equal. Godwin Pumps of America, Inc., is the basis for the Bid.

1.3.2 The Developer shall provide the necessary stop/start controls for each pump.

1.3.3 The Developer shall include one stand-by pump of each size to be maintained on site.

A. Back-up pumps shall be on-line, isolated from the primary system by a check valve. Back-up pump shall be connected to a float. The float shall automatically start the second pump after a 2-ft. water level increase in manhole. Floats shall also activate an audible alarm and flashing light.

1.3.4 Discharge Piping –

A. In order to prevent the accidental spillage of flows all discharge systems shall be temporarily constructed of rigid pipe with positive, restrained joints. Under no circumstances will aluminum "irrigation" type piping or glued PVC pipe be allowed. Discharge hose will only be allowed in short sections and by specific permission from the engineer.

B. Allowable piping materials will be Godwin 'Quick Disconnect' Steel Pipe (Godwin Pumps of America, Inc.) or fused, high-density polyethylene pipe as manufactured by Phillips Driscopipe, Inc. or approved equal.

C. Bypass pipes placed across creeks shall be double-wall pipes or shall be placed in sealed containment pipes.

D. Developer shall maintain adequate road ramps at the site (minimum 4 at all times) to facilitate vehicle traffic over pipe(s). Stone or boards will not be acceptable.

## 1.4 SYSTEM DESCRIPTION

### 1.4.1 Design Requirements

- A. Bypass pumping systems shall have sufficient capacity to pump a peak flow indicated on the Drawings. The Developer shall provide all pipeline plugs, pumps of adequate size to handle peak flow, and temporary discharge piping to ensure that the total flow of the main can be safely diverted around the section to be repaired. Bypass pumping system will be required to be operated during the construction day only, with appropriate sound attenuation for a residential neighborhood, and with temporary pipe connections installed at the end of each workday.
- B. The Developer shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use via the float system in the event of primary pump failure.
- C. Bypass pumping system shall be capable of bypassing the flow around the work area and of releasing any amount of flow up to the full available flow into the work area as necessary for satisfactory performances of work.

### 1.4.2 Performance Requirements

- A. It is essential to the operation of the existing sewerage system that there be no interruption in the flow of sewage throughout the duration of the project. To this end, the Developer shall provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the sewage flow before it reaches the point where it would interfere with his work, carry it past his work and return it to the existing sewer downstream of his work.
- B. The design, installation and operation of the temporary pumping system shall be the Developer's responsibility. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.
- C. The Developer shall provide all necessary means to safely convey the sewage past the work area. The Developer will not

be permitted to stop or impede the main flows under any circumstances.

- D. The Developer shall maintain sewer flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers and that will protect public and private property from damage and flooding.
- E. The Developer shall protect water resources wetlands and other natural resources.
- F. All spill or overflow conditions shall be reported to the Owner when they occur.

## 1.5 FIELD QUALITY CONTROL AND MAINTENANCE

### 1.5.1 Test

- A. The Developer shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The Engineer will be given 24-hours notice prior to testing.

### 1.5.2 Inspection

- A. The Developer shall inspect bypass pumping system every two (2) hours to ensure that the system is working correctly.

### 1.5.3 Maintenance Service

- A. The Developer shall insure that the temporary pumping system is properly maintained and a responsible operator shall be on hand at all times when pumps are operating.
- B. Pump vendor must have 24-hour service to supply equipment and/or a technician if needed. Spare pumps of equal size or greater must be available.

### 1.5.4 Extra Materials

- A. Spare parts for pumps and piping shall be kept on site as required.
- B. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

## 1.6 PREPARATION

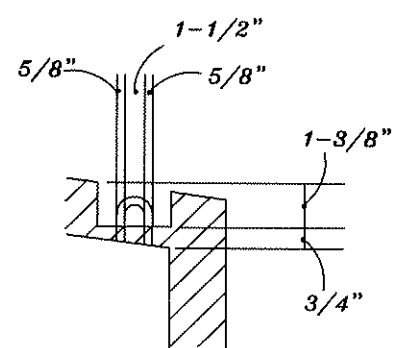
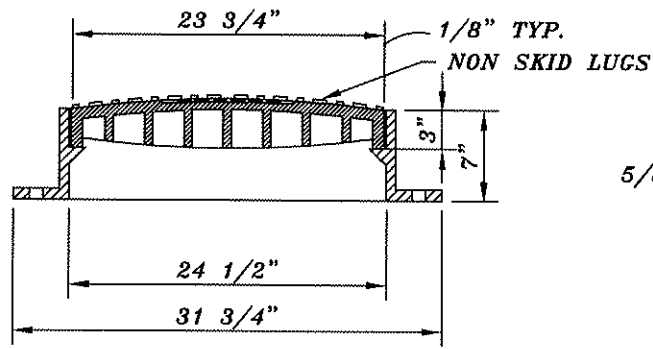
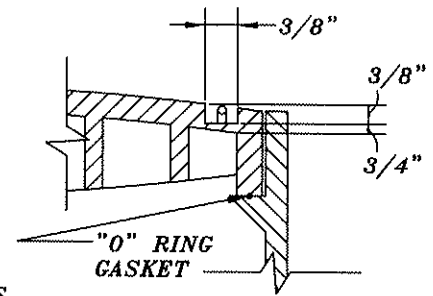
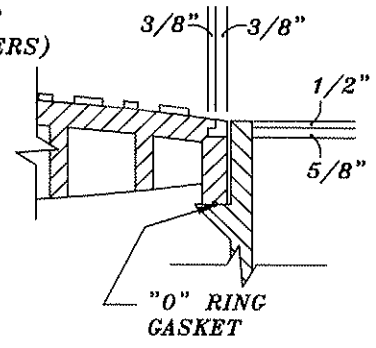
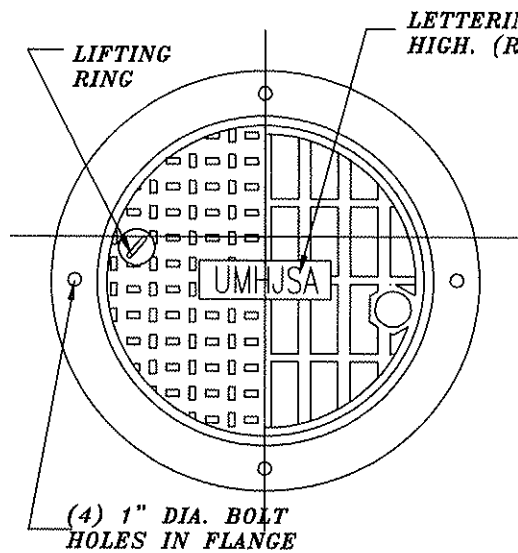
### 1.6.1 Precautions

- A. The Developer is responsible for locating any existing utilities in the area the Developer selects to locate the bypass pipelines. The Developer shall locate his bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the Owner and the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Developer.
  
- B. During all bypass pumping operations, the Developer shall protect the main and all local sewer lines from damage inflicted by any equipment. The Developer shall be responsible for all physical damage to the main and all local sewer lines caused by human or mechanical failure.

## 1.7 INSTALLATION AND REMOVAL

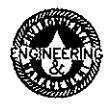
- 1.7.1 The Developer shall remove manhole sections or make connections to the existing sewer and construct temporary bypass pumping structures only at the access location indicated on the Drawings and as may be required to provide adequate suction conduit.
  
- 1.7.2 Plugging or blocking of sewage flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance or work, it is to be removed in a manner that permits the sewage flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.
  
- 1.7.3 When working inside manhole or force main, the Developer shall exercise caution and comply with OSHA requirements when working in the presence of sewer gases, combustible or oxygen-deficient atmospheres, and confined spaces.
  
- 1.7.4 The installation of the bypass pipelines is prohibited in all saltmarsh/wetland areas. The pipeline must be located off streets and sidewalks and on shoulders of the roads. When the bypass pipeline crosses local streets and private driveways, the Developer must place the bypass pipelines in trenches and cover with temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the engineer, the Developer shall remove all the piping, restore all property to pre-construction condition and permanently restore all pavement. The Developer is responsible for obtaining any approvals for placement of the temporary pipeline within public ways.

\*\* END OF SECTION \*\*



CASTINGS FOR MANHOLE FRAME  
AND COVERS SHALL CONFORM IN  
DESIGN TO NEENAH FOUNDRY  
MODEL R-1788-A WITH TWO (2)  
LIFTING RINGS AND TWO (2)  
PICKHOLES PER COVER.

DROP IN MANHOLE  
FRAME AND COVER  
N.T.S.



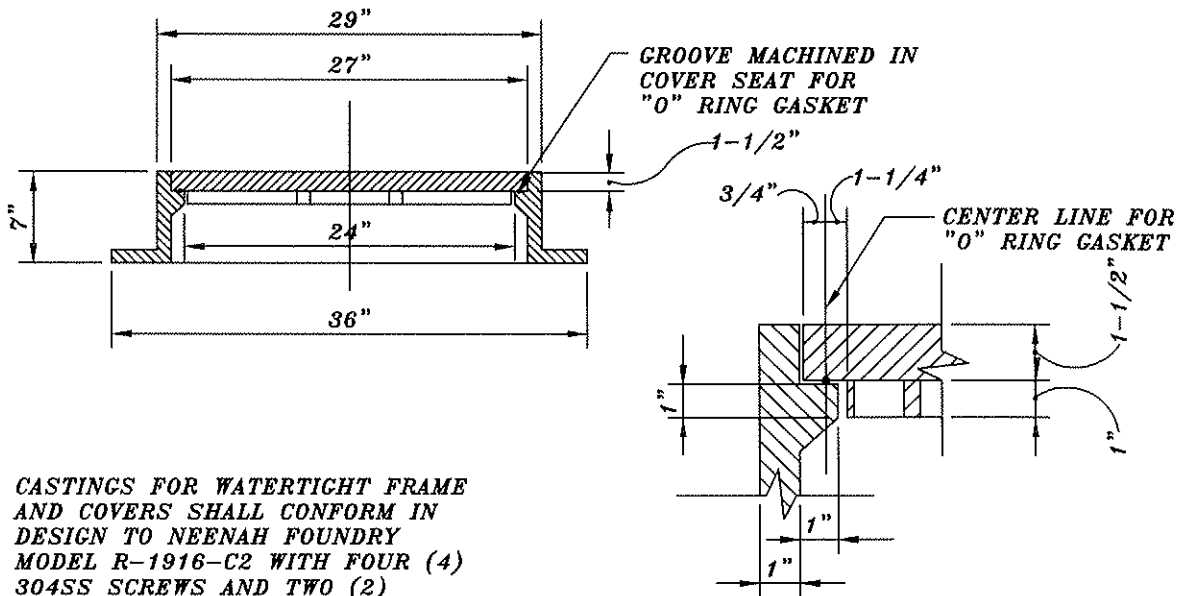
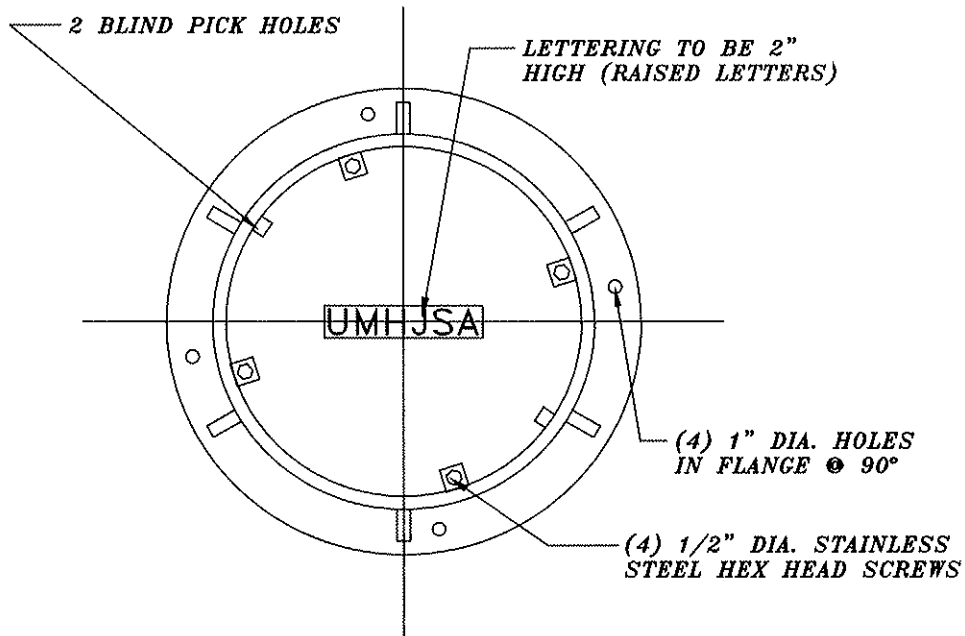
ENVIRONMENTAL ENGINEERING  
&  
MANAGEMENT ASSOCIATES INC.  
P.O. BOX 232 KULPSMILLE, PA. 19443 (215) 368-3375

JOB TITLE:  
UMHUSA-- STANDARD DETAILS

DATE:  
6/10/11

DWG TITLE:  
DWG 001 - MANHOLE FRAME, COVER & SANITARY NOTES - SHEET 1 OF 3

INT:  
A.L.P.



**CASTINGS FOR WATERTIGHT FRAME AND COVERS SHALL CONFORM IN DESIGN TO NEENAH FOUNDRY MODEL R-1916-C2 WITH FOUR (4) 304SS SCREWS AND TWO (2) PICKHOLES PER COVER.**

**WATERTIGHT, BOLT DOWN MANHOLE FRAME AND COVER**  
N.T.S.



**ENVIRONMENTAL ENGINEERING & MANAGEMENT ASSOCIATES INC.**  
P.O. BOX 232 KULPSVILLE, PA. 19443 (215) 368-3375

JOB TITLE:  
UMHJSA- STANDARD DETAILS

DATE:  
6/10/11

DWG TITLE:  
DWG 001 - MANHOLE FRAME, COVER & SANITARY NOTES - SHEET 2 OF 3

INT:  
A.L.P.

NOTES:

1. PRECAST CONCRETE MANHOLES SHALL CONFORM TO A.S.T.M. C-478.
2. RUBBER GASKETS SHALL CONFORM TO A.S.T.M. C-443
3. USE FLAT SLAB TOPS ON MANHOLES FOR CONNECTING SEWER LINES HAVING LESS THAN 9' DEPTH OF COVER OVER DEEPEST PIPE.
4. WHERE A LATERAL ENTERS A MANHOLE, THE INVERT OF THE LATERAL SHALL BE WITHIN 6 INCHES OF THE SEWER INVERT.
5. CASTINGS FOR DROP-IN MANHOLE FRAME AND COVERS SHALL CONFORM IN DESIGN TO NEENAH FOUNDRY MODEL R-1788-A WITH TWO (2) LIFTING RINGS AND TWO (2) PICKHOLES PER COVER. PROVIDE EXTRA O-RING FOR EACH FRAME.
6. CASTINGS FOR WATERTIGHT FRAME AND COVERS SHALL CONFORM IN DESIGN TO NEENAH FOUNDRY MODEL R-1916-C2 WITH FOUR (4) 304SS SCREWS AND TWO (2) PICKHOLES PER COVER. PROVIDE EXTRA O-RING FOR EACH FRAME.
7. ALL FRAMES AND COVERS SHALL BE WATERTIGHT, BOLT DOWN TYPE, EXCEPT IN PAVED AREAS.
8. ALL MANHOLES SHALL BE CONSTRUCTED FOR ANTI-FLOTATION WHEN COMPLETELY SUBMERGED.
9. CONNECTION FROM NEW D.I.P. TO EXISTING VCP SHALL BE WITH STEEL FLANGED REPAIR CLAMP, COMPLETELY ENCASED WITH CONCRETE.
10. SHALLOW MANHOLES MAY HAVE PRECAST BOTTOMS.
11. UNLESS OTHERWISE NOTED, ALL PIPE PENETRATIONS IN MANHOLES SHALL HAVE RUBBER GASKETS INTEGRALLY CAST IN THE MANHOLE WALL.  
RUBBER SHALL MEET A.S.T.M. C-923.



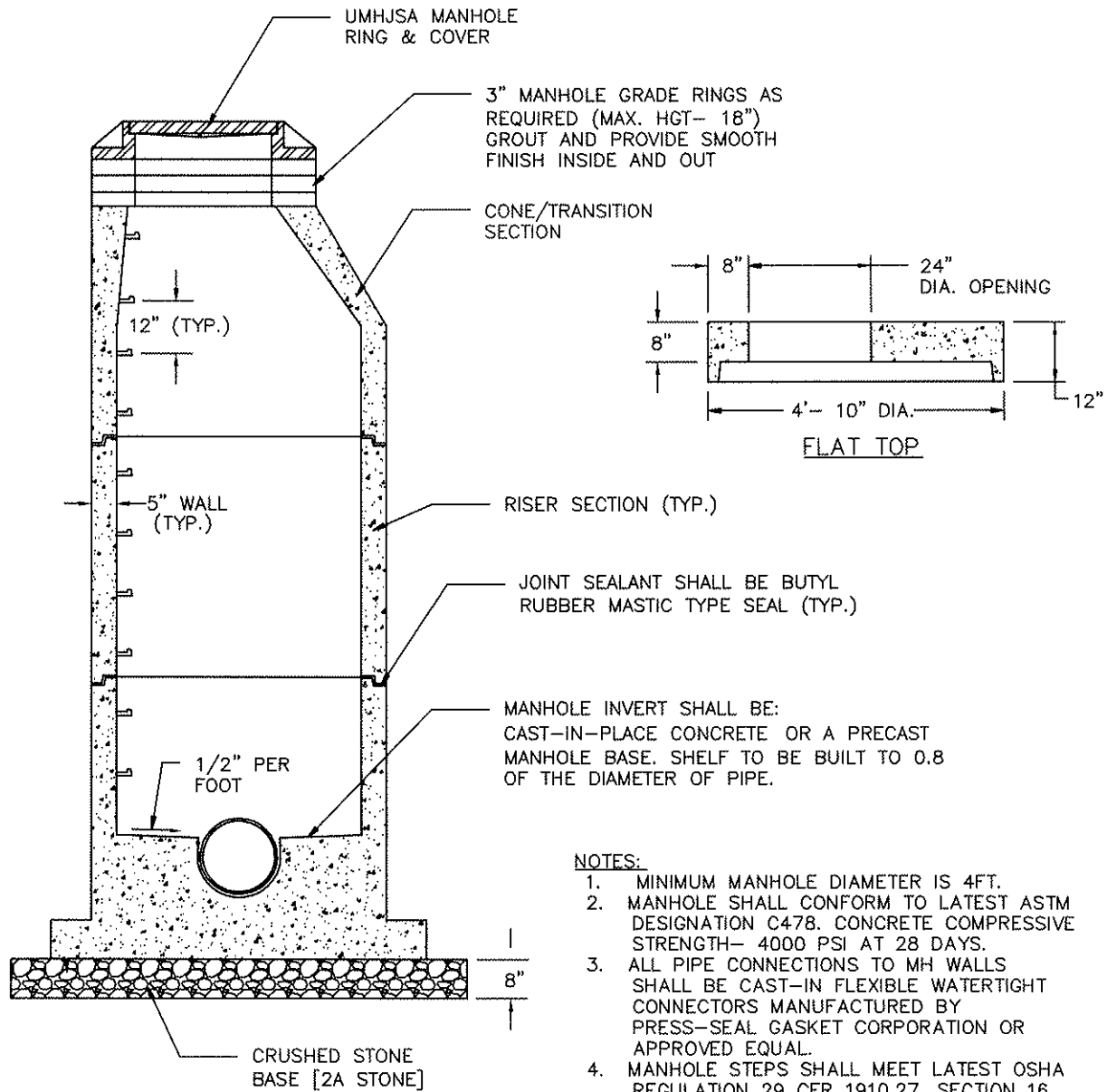
ENVIRONMENTAL ENGINEERING  
&  
MANAGEMENT ASSOCIATES INC.  
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JOB TITLE:  
UMHJSA-- STANDARD DETAILS

DATE:  
6/10/11


DWG TITLE:  
DWG 001 -- MANHOLE FRAME, COVER & SANITARY NOTES -- SHEET 3 OF 3

INT:  
A.L.P.

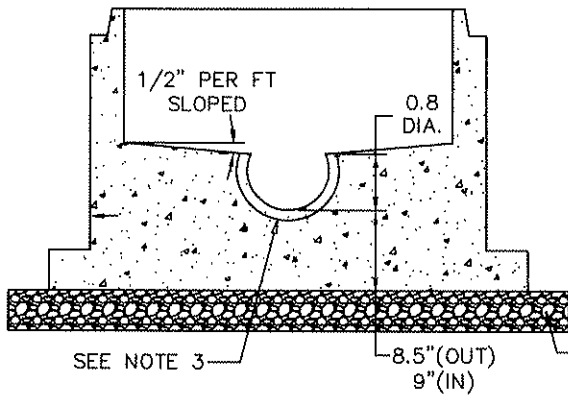


- NOTES:**
1. MINIMUM MANHOLE DIAMETER IS 4FT.
  2. MANHOLE SHALL CONFORM TO LATEST ASTM DESIGNATION C478. CONCRETE COMPRESSIVE STRENGTH- 4000 PSI AT 28 DAYS.
  3. ALL PIPE CONNECTIONS TO MH WALLS SHALL BE CAST-IN FLEXIBLE WATERTIGHT CONNECTORS MANUFACTURED BY PRESS-SEAL GASKET CORPORATION OR APPROVED EQUAL.
  4. MANHOLE STEPS SHALL MEET LATEST OSHA REGULATION 29 CFR 1910.27, SECTION 16 OF ASTM SPECIFICATION C478 AND SECTION 10 ASTM SPECIFICATION C497.
  5. MANHOLES SHALL BE BITUMASTIC COATED.

PRECAST SANITARY SEWER MANHOLE  
NTS

 <p>ENVIRONMENTAL ENGINEERING &amp; MANAGEMENT ASSOCIATES INC. P.O. BOX 232 KULPSVILLE, PA. 19443 (215) 368-3375</p>	<p>JOB TITLE: UMHJSA- STANDARD DETAILS</p>	<p>DATE: 6/10/11</p>
	<p>DWG TITLE: DWG 002 - PRECAST SANITARY SEWER MANHOLE</p>	<p>INT: A.L.P.</p>





MANHOLE DESIGN SPECIFICATION SHALL CONFORM TO LATEST ASTM DESIGNATION C478

**NOTES:**

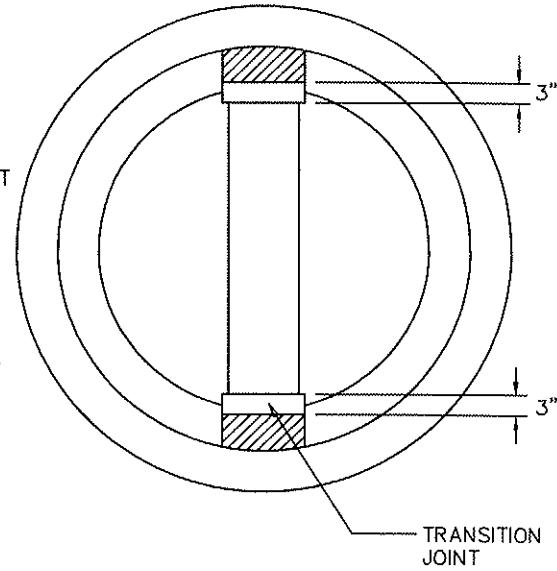
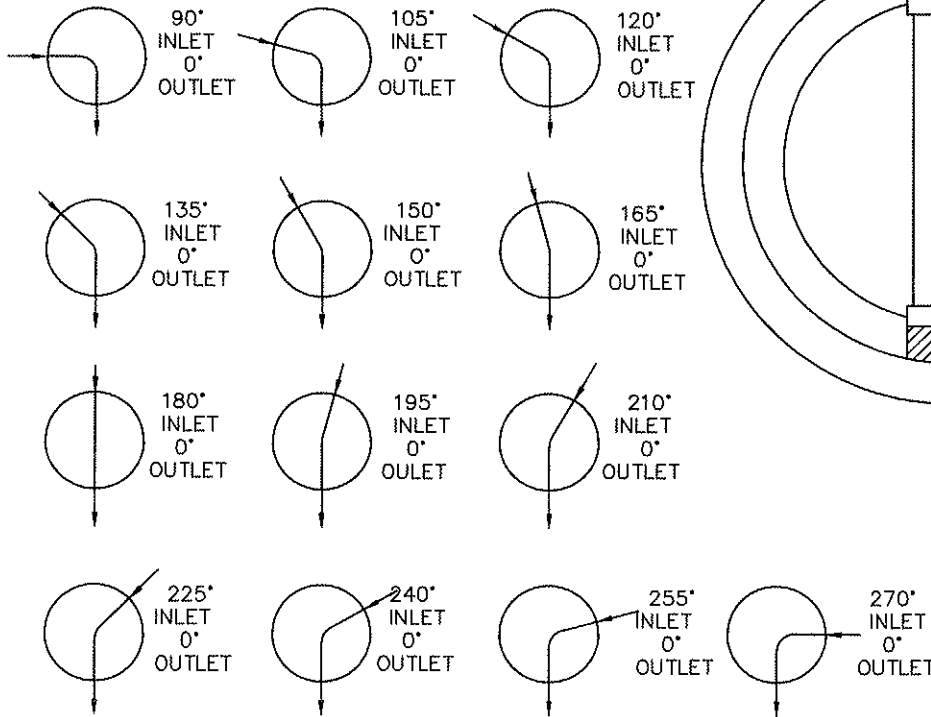
1. CONCRETE COMPRESSIVE STRENGTH-- 4000 PSI AT 28 DAYS.
2. PRECAST BASE SECTION IS MONOLITHIC.
3. DASHED LINE INDICATES MORTAR TRANSITION JOINT ON STANDARD INVERT BASES AT INLET AND OUTLET.
4. PRECAST INVERT TO BE BUILT TO 0.8 OF THE DIAMETER OF PIPE.

SEE NOTE 3

8.5" (OUT)  
9" (IN)

CRUSHED  
STONE  
[2A]

TYPICAL STANDARD CAST IN PLACE INVERTS:



MANHOLE BASE  
WITH PRECAST INVERT  
NTS



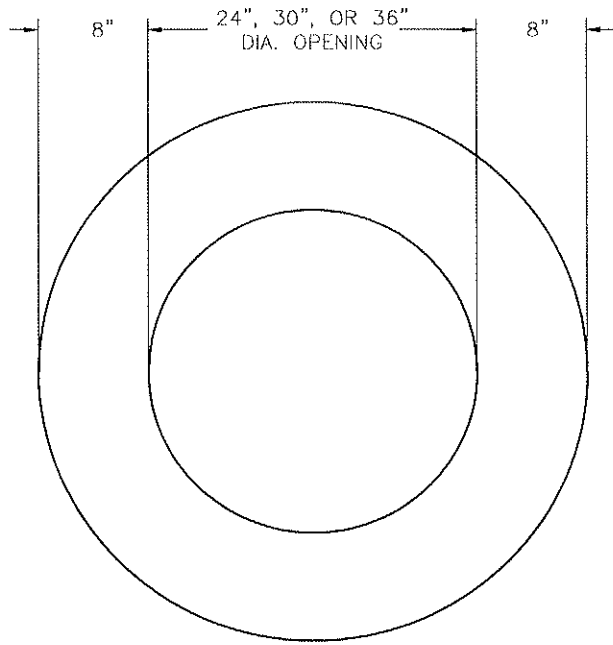
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JOB TITLE:  
UMHUSA- STANDARD DETAILS

DATE:  
6/28/11

DWG TITLE:  
DWG 003 - PRECAST MANHOLE BASE

INT:  
A.L.P.

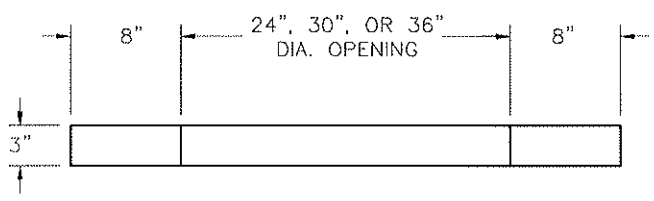


GRADE RING PLAN VIEW

MANHOLE DESIGN SPECIFICATION CONFORMS TO LATEST ASTM DESIGNATION C478

DESIGN NOTES:

1. REINFORCING STEEL WELDED WIRE FABRIC CONFORMS TO LATEST ASTM SPECIFICATION A185.
2. REINFORCING STEEL DEFORMED BARS CONFORM TO LATEST ASTM SPECIFICATION A615.
3. CONCRETE COMPRESSIVE STRENGTH— 4000 PSI AT 28 DAYS.



GRADE RING ELEVATION VIEW

MANHOLE GRADE RING  
NTS



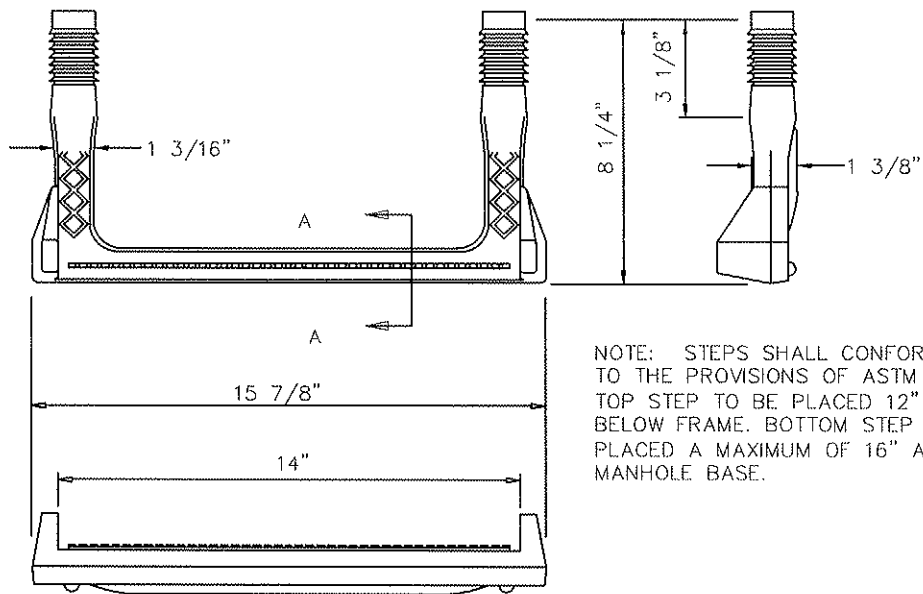
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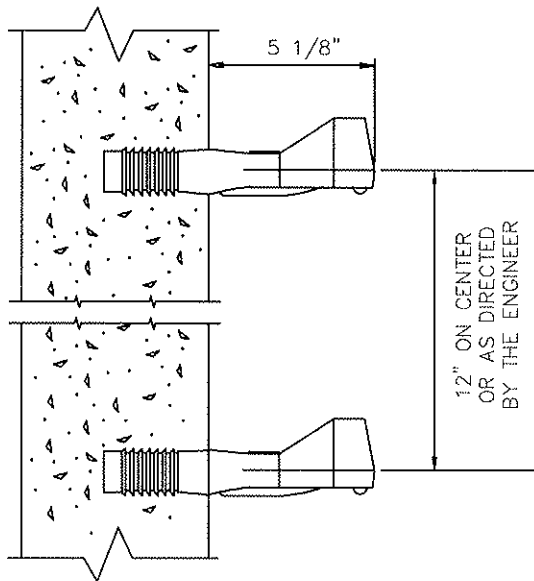
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6/28/11

DWG TITLE:  
DWG 004 - MANHOLE GRADE RING

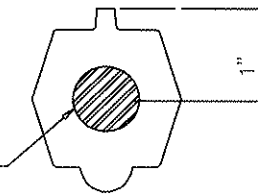
INT:  
A.L.P.



NOTE: STEPS SHALL CONFORM TO THE PROVISIONS OF ASTM C478. TOP STEP TO BE PLACED 12" BELOW FRAME. BOTTOM STEP TO BE PLACED A MAXIMUM OF 16" ABOVE MANHOLE BASE.



1/2" GRADE 60 STEEL REINFORCEMENT



SECTION A-A

COPOLYMER POLYPROPYLENE PLASTIC  
STEEL REINFORCED MANHOLE STEP

NTS



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JOB TITLE:  
UMHJSA- STANDARD DETAILS

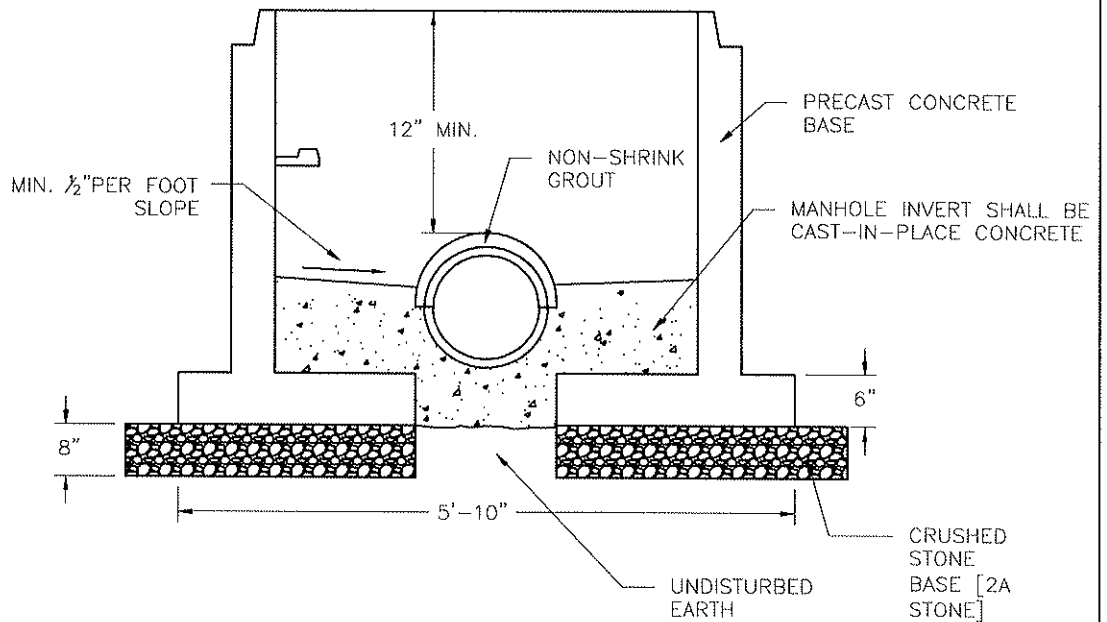
DATE:  
6/28/11

DWG TITLE:  
DWG 005 -- MANHOLE STEP

INT:  
A.L.P.

NOTES:

1. MINIMUM 4' DIAMETER MANHOLE. SEE PRECAST SEWER MANHOLE DETAIL FOR REMAINDER OF MH DETAILS.
2. DOGHOUSE OPENING MAY ONLY BE USED WHEN PLACING A NEW MANHOLE OVER AN EXISTING LINE; OTHERWISE, THE OPENING MUST BE CAST.
3. OPENINGS IN PRECAST UNITS ARE TO BE 4" MINIMUM TO 8" MAXIMUM LARGER THAN THE OUTSIDE DIAMETER OF THE EXISTING PIPE.
4. TOP HALF OF EXISTING PIPE TO BE REMOVED FOR FULL LENGTH EXPOSED INSIDE MANHOLE. EXISTING MAIN TO BE NEATLY CUT ALONG THE SPRING LINE OF THE PIPE.
5. SEE CONNECTION TO EXISTING MANHOLE DETAIL FOR ADDITIONAL INFORMATION.



DOGHOUSE MANHOLE BASE  
NTS



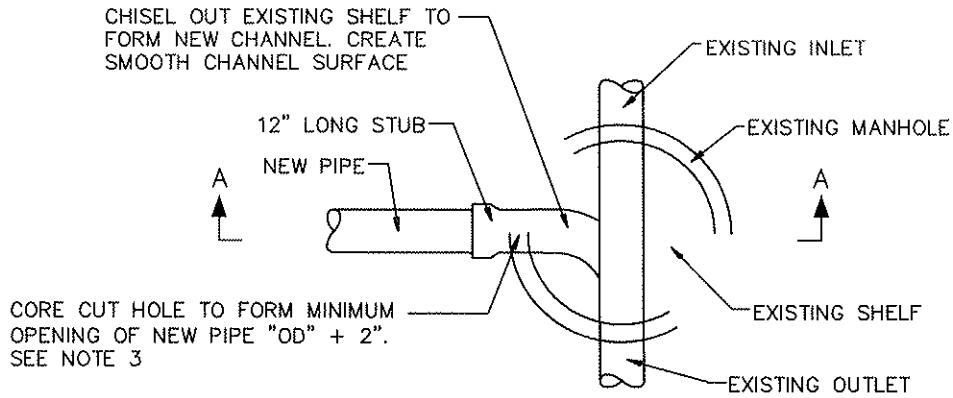
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UMHJSA- STANDARD DETAILS

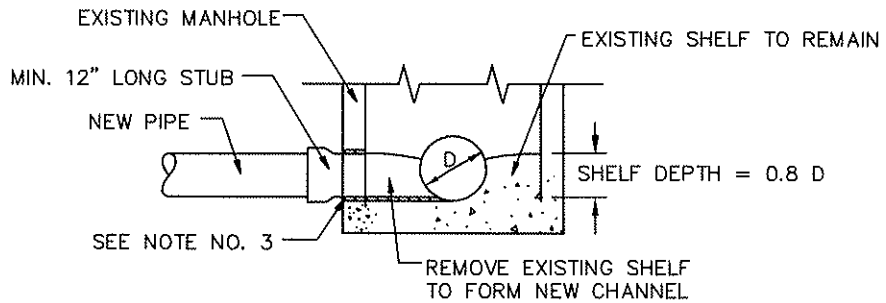
DWG TITLE:  
DWG 006 -- DOGHOUSE MANHOLE

DATE:  
6/10/11

INT:  
A.L.P.



PLAN



SECTION A-A

NOTES:

1. INVERT ELEVATION OF 12" LONG STUB AT THE INSIDE FACE OF MANHOLE TO BE 1 1/4" (MIN.) HIGHER THAN EXISTING OUTLET INVERT ELEVATION.
2. THE CORE CUT HOLE SHALL BE MADE WITH EQUIPMENT SPECIALLY DESIGNED TO CUT A SMOOTH HOLE WITHOUT SPALLING OR DAMAGE TO THE SHELL OR STRUCTURE.
3. PIPE CONNECTIONS THROUGH MH WALLS SHALL BE MADE W/ GROUTING RING (WS WATERSTOP) AS MANUFACTURED BY PRESS-SEAL GASKET CORPORATION, LINK-SEAL OR APPROVED EQUAL AND NON-SHRINK GROUT.
4. MH INVERT SHELF TO BE BUILT TO 0.8 OF THE DIAMETER OF PIPE EXITING THE MH.

CONNECTION TO EXISTING  
MANHOLE  
NTS



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DATE:

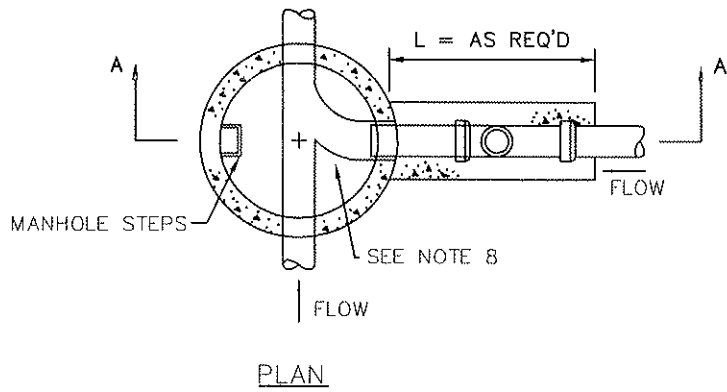
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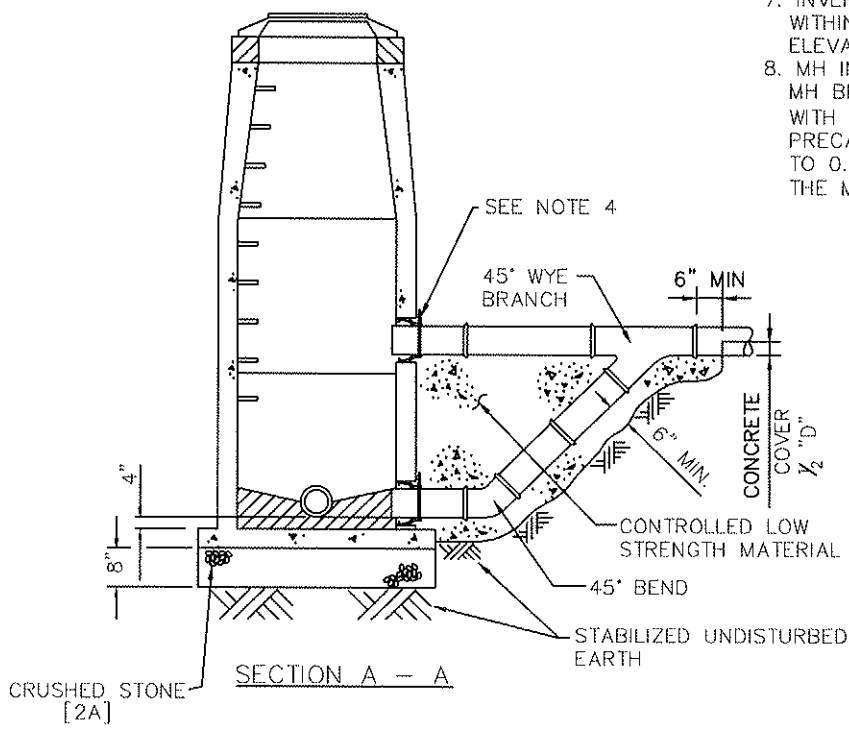
DWG 007 - CONNECTION TO EXISTING MANHOLE

INT:


A.L.P.

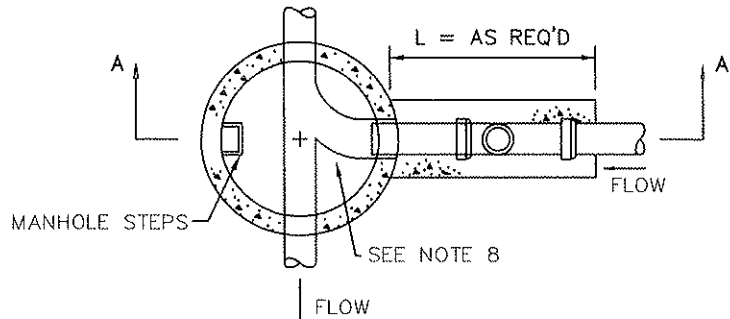


- NOTES:
1. 4FT MH DIAMETER (MIN)
  2. DROP PIPE TO BE THE SAME DIAMETER AS THE SEWER MAIN.
  3. PIPE CONNECTIONS THROUGH EXISTING MH WALLS SHALL BE MADE W/ GROUTING RING (WS WATERSTOP) AS MANUFACTURED BY PRESS-SEAL GASKET CORPORATION OR APPROVED EQUAL AND NON-SHRINK GROUT.
  4. ALL PIPE CONNECTIONS TO NEW MH WALLS SHALL BE CAST-IN FLEXIBLE WATERTIGHT CONNECTORS MANUFACTURED BY PRESS-SEAL GASKET CORPORATION, LINK-SEAL OR APPROVED EQUAL.
  5. PIPES FOR MH DROPS SHALL BE DIP OR AS DIRECTED BY THE ENGINEER.
  6. ALL MH CONNECTIONS SHALL BE CORED WITH A CONCRETE CORING MACHINE.
  7. INVERT ELEVATION OF DROP SHALL BE WITHIN 2FT. OF MAINLINE INVERT ELEVATION.
  8. MH INVERT SHALL BE: FORMED OUT OF MH BRICK, OR CAST-IN-PLACE CONCRETE WITH MH BRICK SHELF/CHANNEL, OR A PRECAST MH BASE. SHELF TO BE BUILT TO 0.8 OF THE DIAMETER OF PIPE EXITING THE MH.



**DROP SANITARY MANHOLE**  
**2 FT. - 5 FT. DROP**  
 NTS

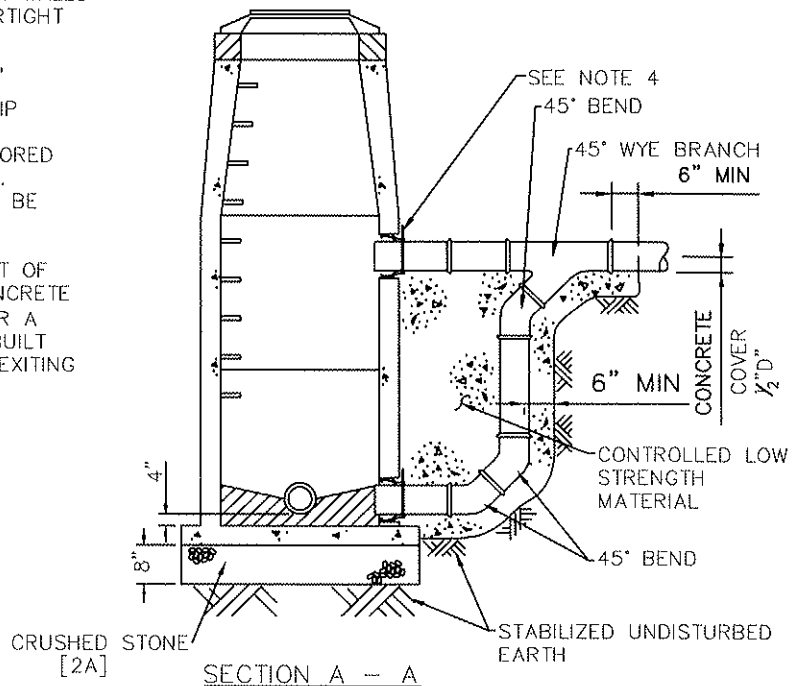
 <p>ENVIRONMENTAL ENGINEERING &amp; MANAGEMENT ASSOCIATES INC. P.O. BOX 232 KULPSVILLE, PA. 19443 (215) 368-3375</p>	JOB TITLE: UMHJSA- STANDARD DETAILS	DATE: 6/28/11
	DWG TITLE: DWG 008 -- DROP MANHOLE -- 2 TO 5 FEET	INT: A.L.P.



PLAN

NOTES:

1. 4FT MH DIAMETER (MIN)
2. DROP PIPE TO BE THE SAME DIAMETER AS THE SEWER MAIN.
3. PIPE CONNECTIONS THROUGH EXISTING MH WALLS SHALL BE MADE W/ GROUTING RING (WS WATERSTOP) AS MANUFACTURED BY PRESS-SEAL GASKET CORPORATION OR APPROVED EQUAL AND NON-SHRINK GROUT.
4. ALL PIPE CONNECTIONS TO NEW MH WALLS SHALL BE CAST-IN FLEXIBLE WATERTIGHT CONNECTORS MANUFACTURED BY PRESS-SEAL GASKET CORPORATION, LINK-SEAL OR APPROVED EQUAL.
5. PIPES FOR MH DROPS SHALL BE DIP OR AS DIRECTED BY THE ENGINEER.
6. ALL MH CONNECTIONS SHALL BE CORED WITH A CONCRETE CORING MACHINE.
7. INVERT ELEVATION OF DROP SHALL BE WITHIN 2FT. OF MAINLINE INVERT ELEVATION.
8. MH INVERT SHALL BE: FORMED OUT OF MH BRICK, OR CAST-IN-PLACE CONCRETE WITH MH BRICK SHELF/CHANNEL, OR A PRECAST MH BASE. SHELF TO BE BUILT TO 0.8 OF THE DIAMETER OF PIPE EXITING THE MH.



SECTION A - A

DROP SANITARY MANHOLE  
OVER 5 FT. DROP  
 NTS



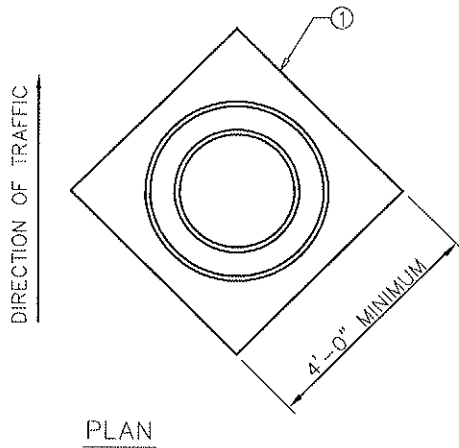
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JOB TITLE:  
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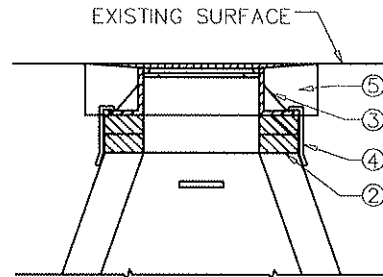
DATE:  
 6/28/11

DWG TITLE:  
 DWG 009 -- DROP MANHOLE -- OVER 5 FEET

INT:  
 A.L.P.



PLAN



SECTION

NOTES:

1. CUT AND REMOVE EXISTING PAVEMENT TO NEAT LINES AS SHOWN OR AS DIRECTED. REMOVE BITUMINOUS CONCRETE FROM MANHOLE FRAME AND COVERS. CIRCULAR PAVEMENT CUT AROUND MANHOLE COVER ALSO ACCEPTABLE.
2. REMOVE AND REPLACE EXISTING MORTAR AND MASONRY WHICH IS LOOSE, DETERIORATED OR UNSOUND AS DIRECTED BY THE ENGINEER.
3. SET MANHOLE FRAME TO REQUIRED GRADE WITH MANHOLE GRADE RINGS OR AS DIRECTED BY UMHJSA. MANHOLE FRAMES ARE TO BE SET IN FULL MORTAR BEDS.
4. INSTALL EXTERNAL BANDED FLEXIBLE ELASTOMERIC SEAL, CRETEX OR APPROVED EQUAL.
5. REPLACE PAVEMENT WITH 3" BITUMINOUS CONCRETE CLASS 1 LAID IN TWO COURSES ON 4" BITUMINOUS CONCRETE CLASS 4 LAID ON TAMPED SUBBASE. SEAL PAVEMENT JOINT WITH ASPHALT.
6. CONTRACTOR TO FURNISH NEW MANHOLE FRAME AND COVER AS REQUIRED.
7. EXISTING MANHOLE FRAME AND COVER TO BE DISPOSED OF AS DIRECTED BY UMHJSA.

TYPICAL MANHOLE COVER RAISING  
NTS



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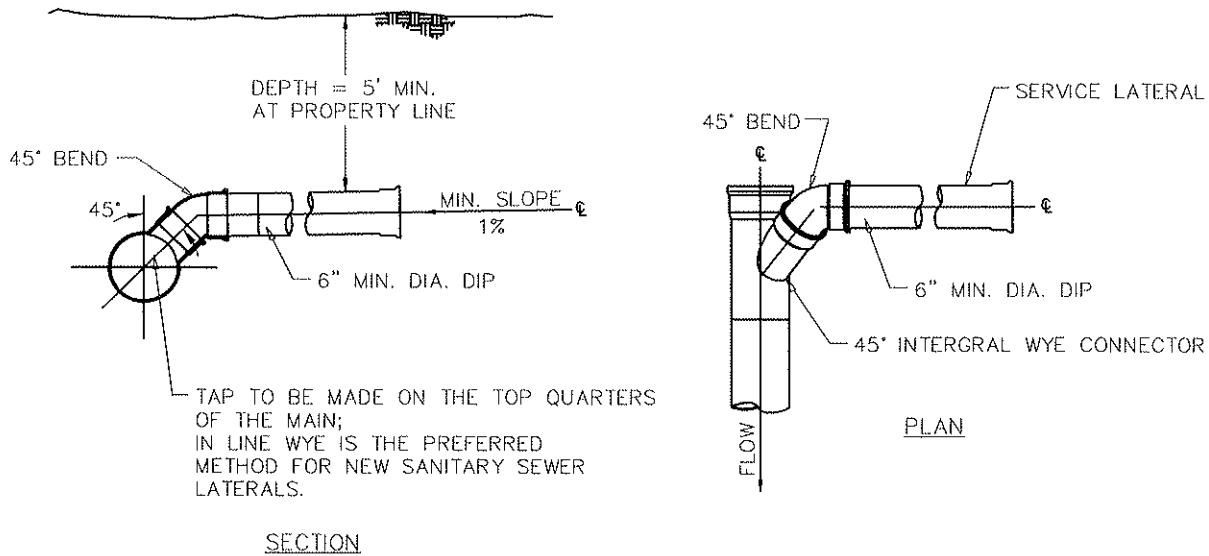
JOB TITLE:  
UMHJSA- STANDARD DETAILS

DATE:  
6/28/11

DWG TITLE:  
DWG 010 - MANHOLE COVER RISERS

INT:  
A.L.P.





NOTES:

1. SANITARY SEWER LATERALS SHALL NOT BE RE-USED.
2. ALL PIPING SHALL BE LAID WITH CARE IN ACCORDANCE WITH UMHJSA STANDARD SPECIFICATIONS, AS AMENDED.
3. APPROPRIATE BEDDING AND BACKFILL SHALL BE AS RECOMMENDED BY UMHJSA.
4. GRANULAR FILL AND BEDDING MATERIAL SHALL CONFORM TO UMHJSA STANDARD SPECIFICATIONS.
5. SHIELDED COUPLINGS ARE REQUIRED ON ALL DISSIMILAR PIPE TRANSITIONS, COUPLING SHALL BE FULL-SLEEVE MECHANICAL COUPLINGS, OR APPROVED EQUAL.
6. NEW LATERALS SHALL BE CONSTRUCTED WITH INTEGRAL WYES. NEW CONNECTION TO EXISTING SEWER MAINS SHALL BE CORED. DRILL CORE SHALL BE PROPER SIZE PER INSERT MANUFACTURER'S RECOMMENDATION. PIPE INSERTS AND SADDLES SHALL BE MANUFACTURED BY INSERTA TEE OR GENERAL ENGINEERING COMPANY GENENGGCO'S "SEALTITE TYPE U".
7. IN NEW SUBDIVISIONS AND OTHER CONSTRUCTION INVOLVING NEW ROADS, INSTALL LATERALS TO 6 FEET BEHIND PROPERTY LINE AT A MINIMUM DEPTH OF 5 FEET FOR SEWERS IN STREET RIGHT-OF-WAY.

STANDARD SEWER LATERAL CONNECTION

NTS



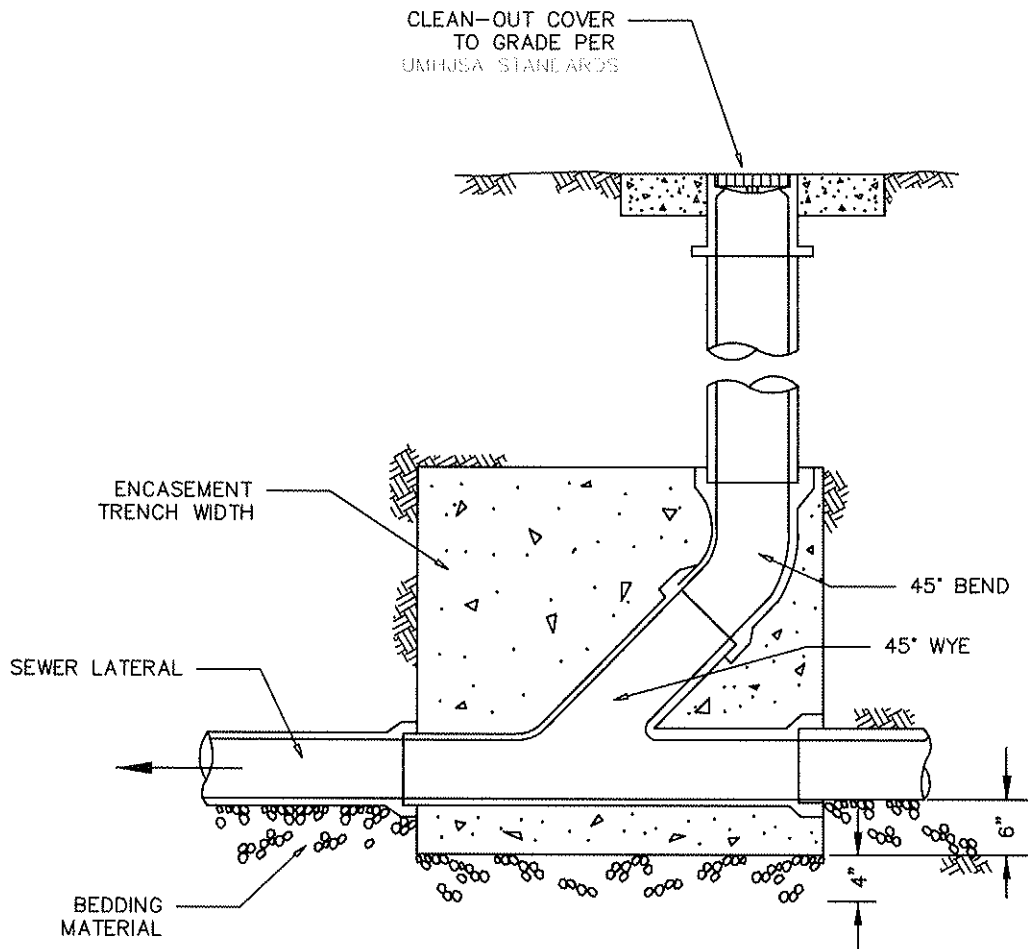
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JOB TITLE:  
UMHJSA- STANDARD DETAILS

DATE:  
6/28/11

DWG TITLE:  
DWG 011 - STANDARD LATERAL

INT:  
A.L.P.



NOTES:

1. CLEAN-OUT PIPE SIZE SHALL MATCH EXISTING LATERAL.
2. NEW SEWER LATERALS AND CLEAN-OUTS SHALL BE 6-INCH OR AS APPROVED BY THE UMHJSA.
3. ENTIRE WYE SECTION TO BE ENCASED IN CONTROLLED LOW STRENGTH MATERIAL OR GRANULAR FILL, AS DIRECTED BY UMHJSA.

STANDARD CLEAN-OUT  
NTS



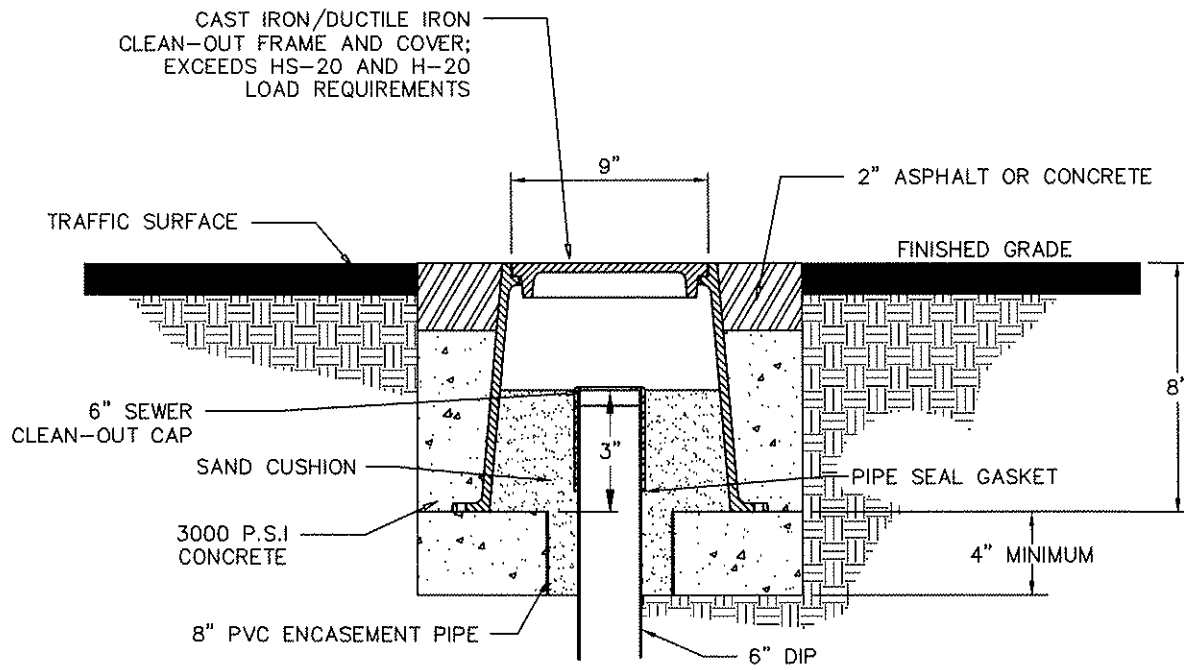
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JOB TITLE:  
UMHJSA- STANDARD DETAILS

DWG TITLE:  
DWG 012 - CLEANOUT

DATE:  
6/28/11

INT:  
A.L.P.



CLEANOUT FRAME & COVER  
PAVED AREAS  
NTS



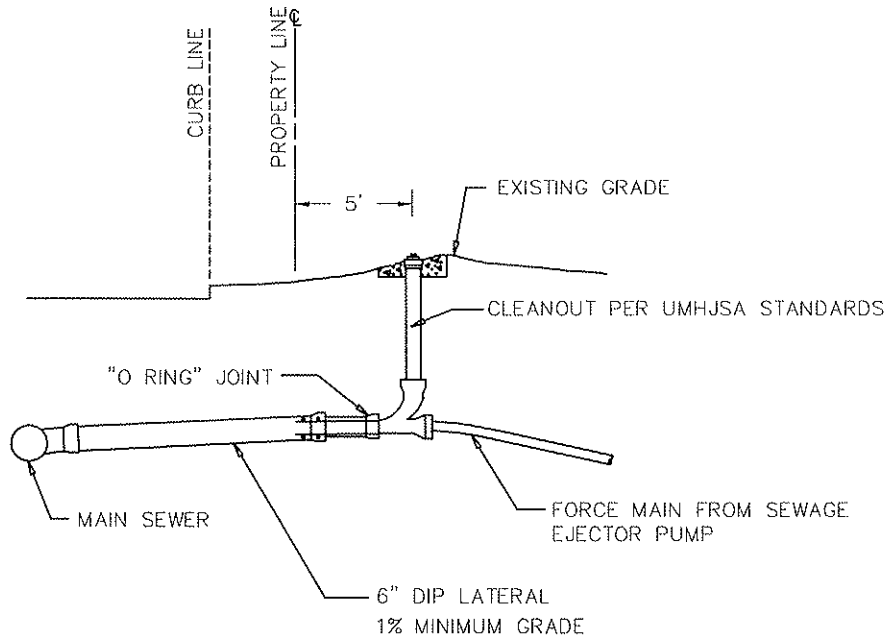
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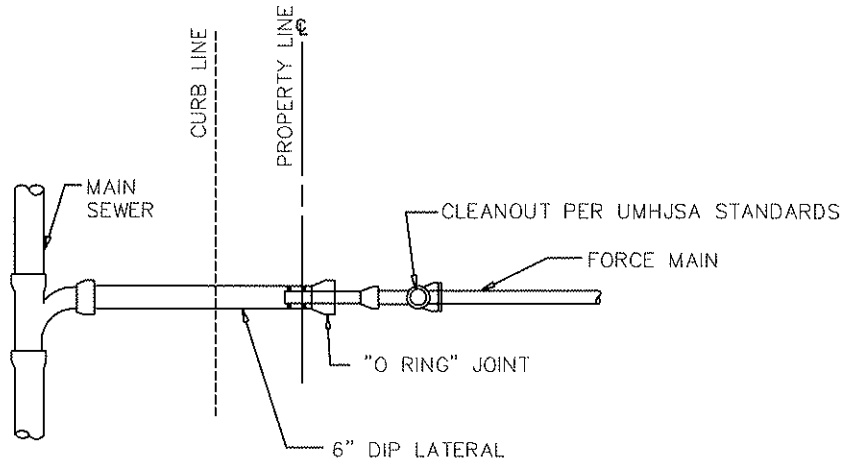
DATE:  
6/28/11

DWG TITLE:  
DWG 013 -- CLEANOUT IN PAVED AREA

INT:  
A.L.P.



PROFILE



PLAN

SANITARY SEWER  
CONNECTION FROM SEWER EJECTOR  
PUMP FORCE MAIN  
 NTS



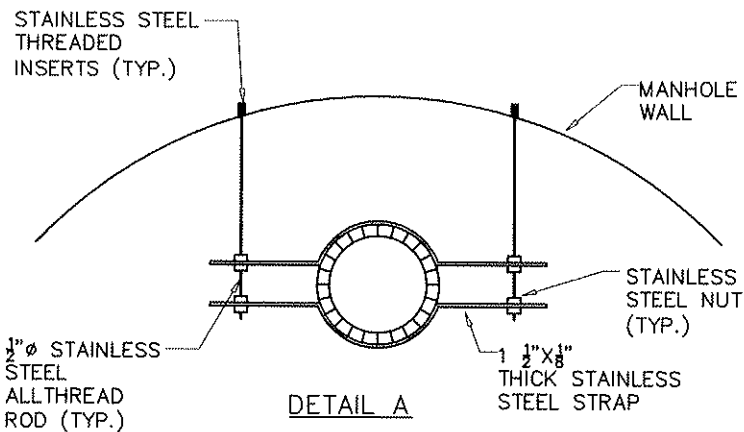
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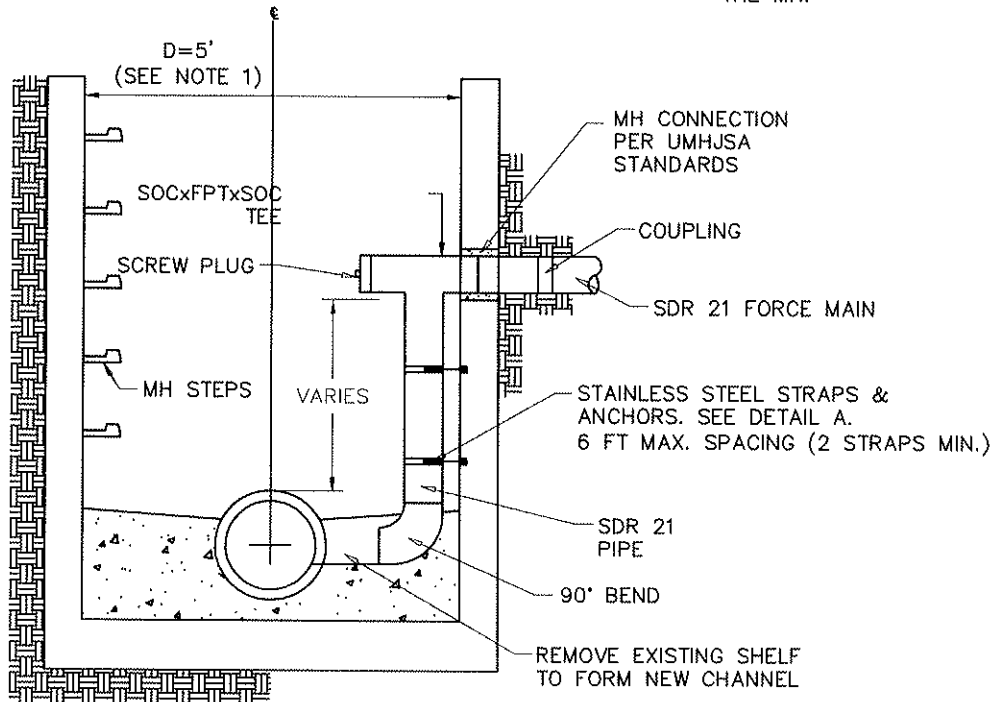
DWG TITLE:  
 DWG 014 - SEWER CONNECTION FROM GRINDER PUMP

INT:  
 A.L.P.



NOTES:

1. THE MINIMUM DIAMETER WILL BE 5' FOR A 2"-6" SEWER. FOR PIPE SIZES GREATER THAN 6", THE MANHOLE DIAMETER WILL NEED TO BE APPROVED BY UMHJSA ENGINEER.
2. THE CORE CUT HOLE SHALL BE MADE WITH EQUIPMENT SPECIALLY DESIGNED TO CUT A SMOOTH HOLE WITHOUT SPALLING OR DAMAGE TO THE SHELL OR STRUCTURE.
3. PIPE CONNECTIONS THROUGH MH WALLS SHALL BE MADE W/ NON-SHRINK GROUT W/ BENTONITE FOR BRICK AND MORTAR STRUCTURES AND PRESS-SEAL FLEXIBLE PIPE BOOT (OR APPROVED EQUAL) FOR PRECAST STRUCTURES.
4. MH INVERT SHALL BE FORMED OUT OF MH BRICK. SHELF TO BE BUILT TO 0.8 OF THE DIAMETER THE OF PIPE EXITING THE MH.



TYPICAL FORCE MAIN  
CONNECTION TO EXISTING MANHOLE  
NTS



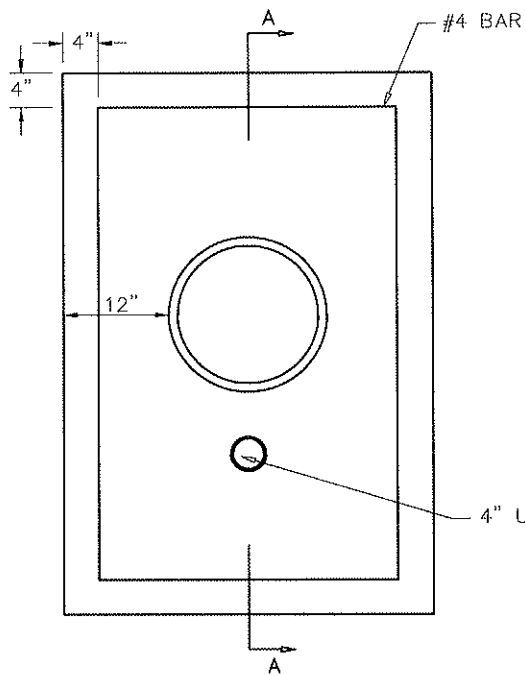
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JOB TITLE:  
UMHJSA-- STANDARD DETAILS

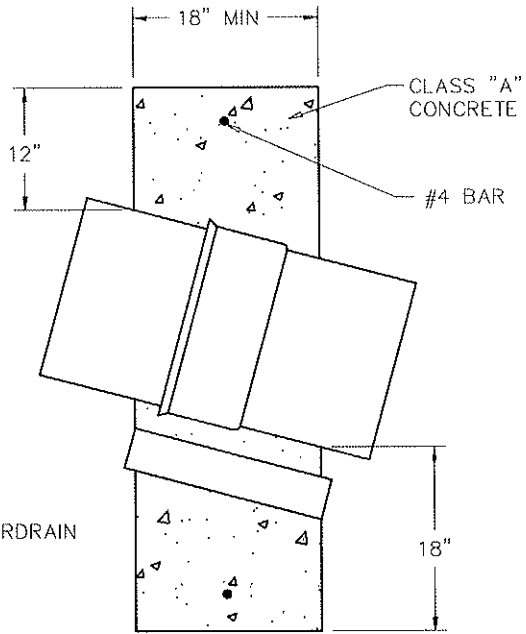
DATE:  
6/28/11

DWG TITLE:  
DWG 015 - FORCE MAIN CONNECTION TO MANHOLE

INT:  
A.L.P.



ELEVATION



SECTION A-A

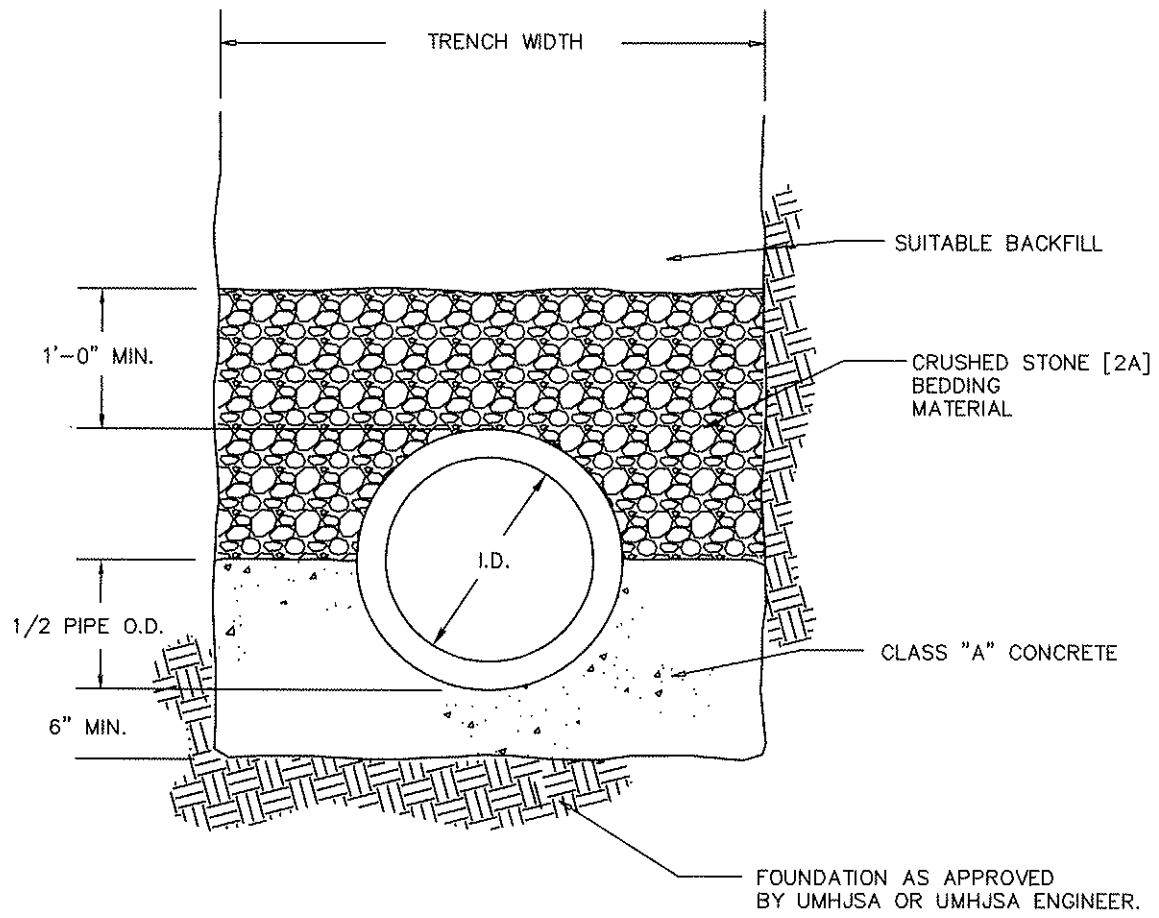
- NOTE:
1. ANCHORS SHALL BE PLACED AT JOINTS
  2. SEWERS ON 20 PERCENT SLOPES OR GREATER SHALL BE ANCHORED SECURELY WITH CONCRETE ANCHORS SPACED AS FOLLOWS:
    - a. NOT GREATER THAN 36 FEET CENTER TO CENTER ON GRADES 21% TO 35%;
    - b. NOT GREATER THAN 24 FEET CENTER TO CENTER ON GRADES 35% TO 50%;
    - c. NOT GREATER THAN 16 FEET CENTER TO CENTER ON GRADES 50% AND OVER.

CONCRETE ANCHORS  
FOR STEEPLY SLOPED PIPES  
NTS



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JOB TITLE:	UMHJSA- STANDARD DETAILS	DATE:	6/28/11
DWG TITLE:	DWG 016 - CONCRETE ANCHORS FOR STEEPLY-SLOPED PIPE	INT:	A.L.P.



CONCRETE CRADLE  
NTS



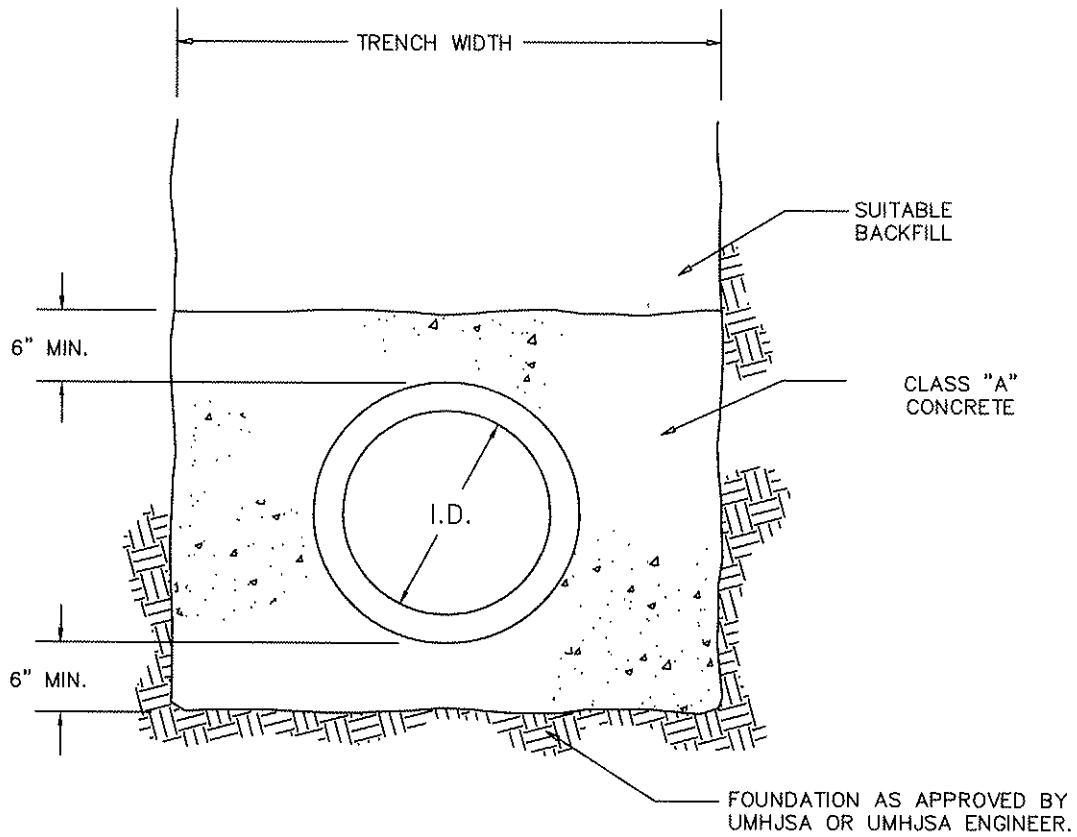
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JOB TITLE:  
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DWG TITLE:  
DWG 017 -- CONCRETE CRADLE

DATE:  
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INT:  
A.L.P.



CONCRETE ENCASEMENT

NTS



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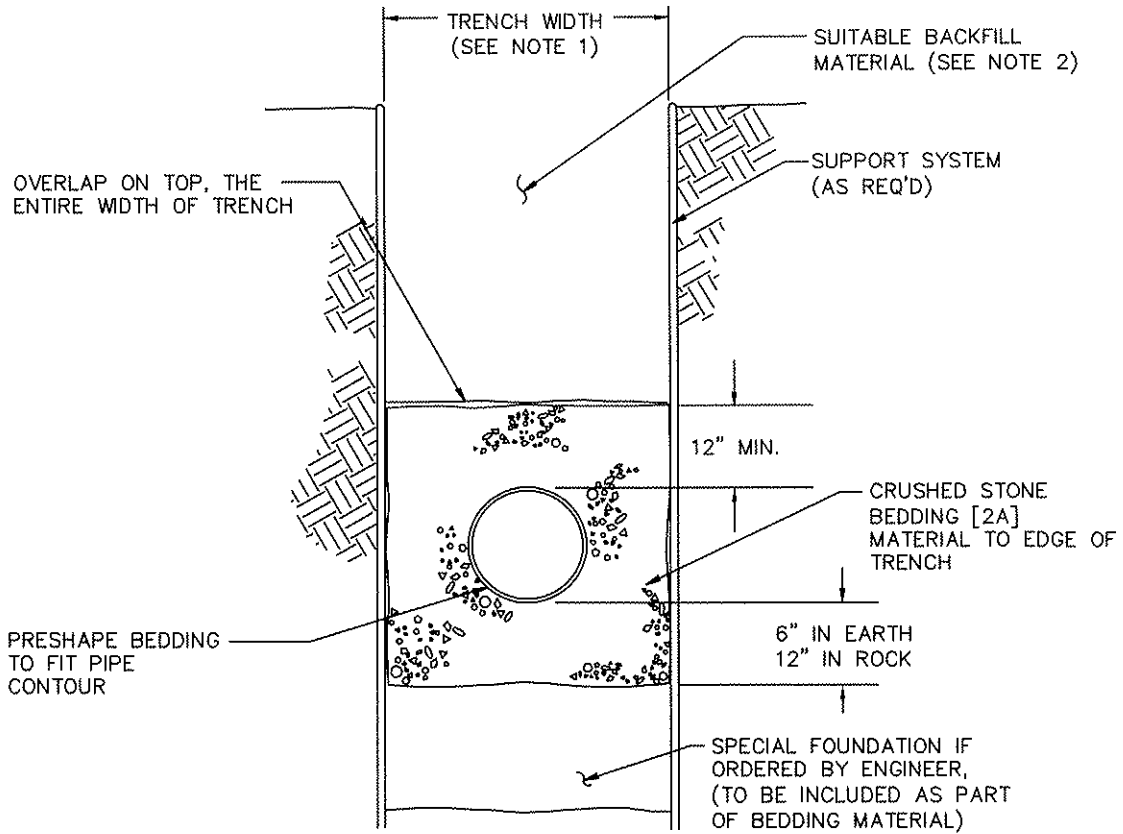
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DATE:  
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INT:  
A.L.P.



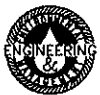


NOTES:

1. BEDDING AND BACKFILL MATERIAL SHALL BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY.
2. BACKFILL IN PAVED AREAS SHALL BE A FULL STONE TRENCH.

SANITARY SEWER MAIN  
TRENCH SECTION

N.T.S.



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JOB TITLE:

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DATE:

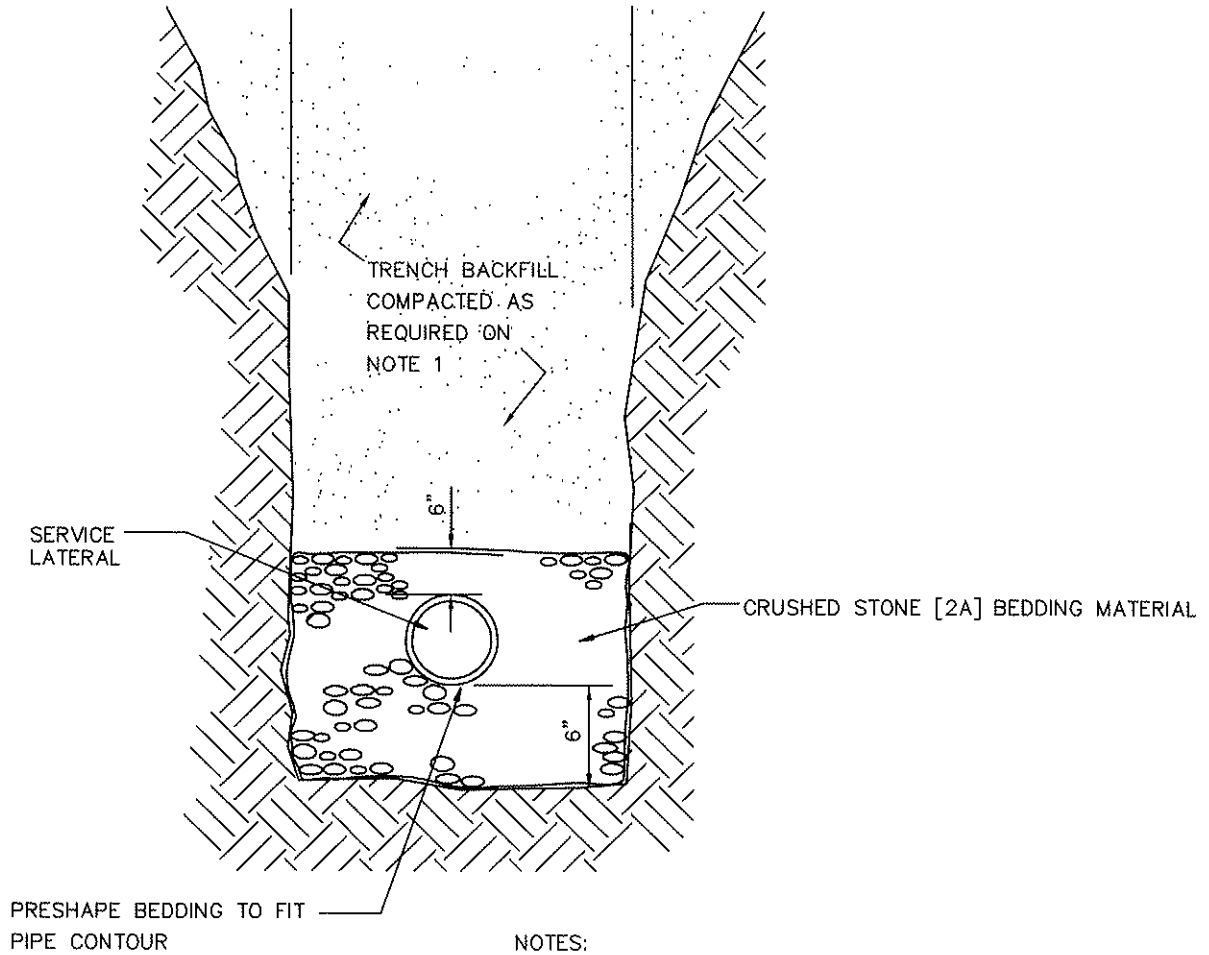
6/10/11

DWG TITLE:

DWG 019 -- SANITARY SEWER MAIN-- TRENCH SECTION

INT:

A.L.P.



NOTES:

1. BEDDING AND BACKFILL MATERIAL SHALL BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY.

SANITARY SEWER LATERAL  
TRENCH SECTION

N.T.S.



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JOB TITLE:

UMHJSA- STANDARD DETAILS

DATE:

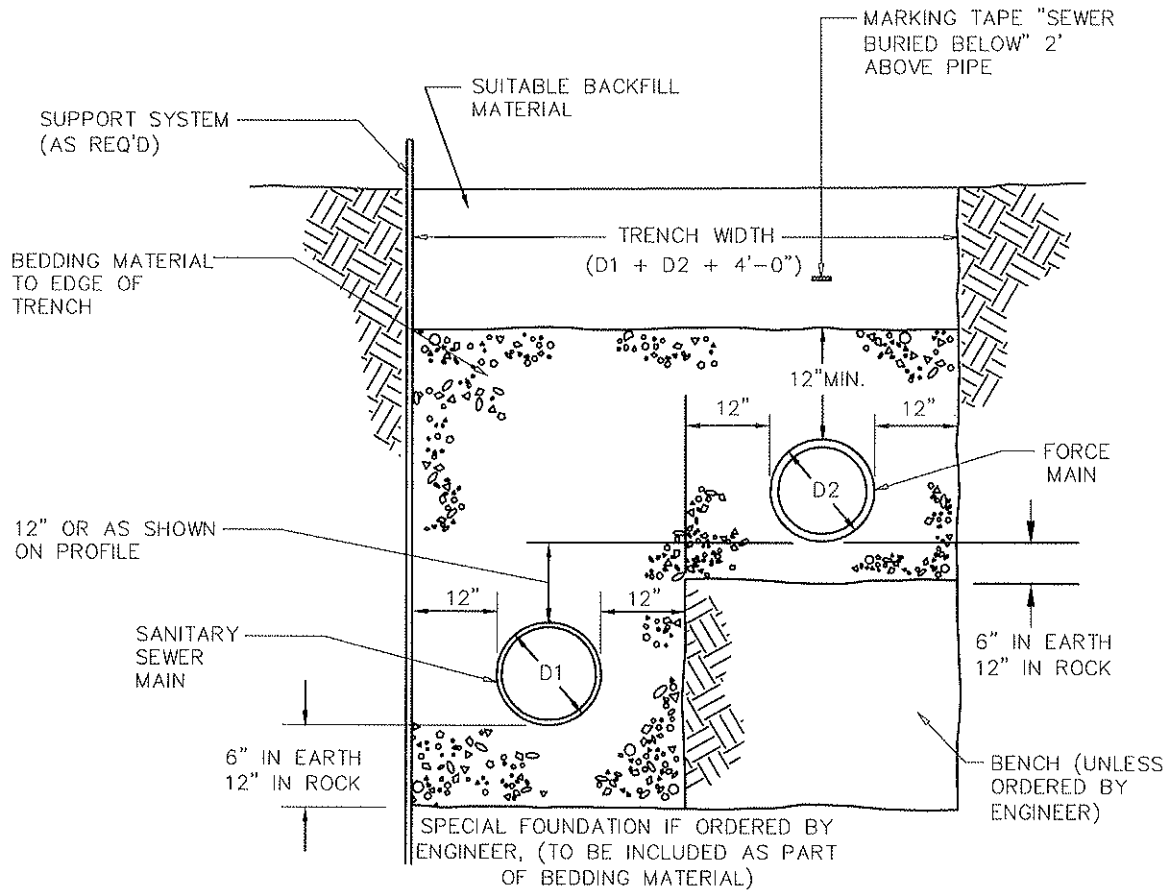
6/10/11

DWG TITLE:

DWG 020 -- SANITARY SEWER LATERAL -- TRENCH SECTION

INT:


A.L.P.



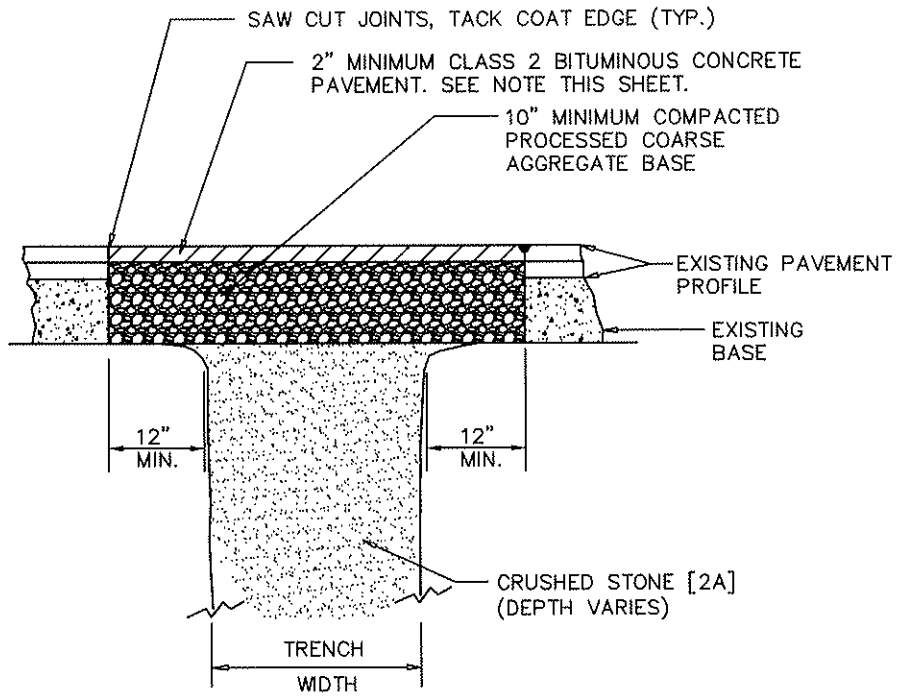
NOTES:

1. BEDDING AND BACKFILL MATERIAL SHALL BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY.

FORCE MAIN & SANITARY SEWER  
IN SAME TRENCH  
NTS

 <p>ENVIRONMENTAL ENGINEERING &amp; MANAGEMENT ASSOCIATES INC. P.O. BOX 232 KULPSVILLE, PA. 19443 (215) 368-3375</p>	JOB TITLE: UMHJSA-- STANDARD DETAILS	DATE: 6/28/11
	DWG TITLE: DWG 021 - SANITARY SEWER MAIN & FORCE MAIN - TRENCH SECTION	INT: A.L.P.

NOTE: AFTER NOVEMBER 15TH, CLASS 5 MIX SHALL BE USED INSTEAD OF CLASS 2



TEMPORARY PAVEMENT REPAIR  
NTS



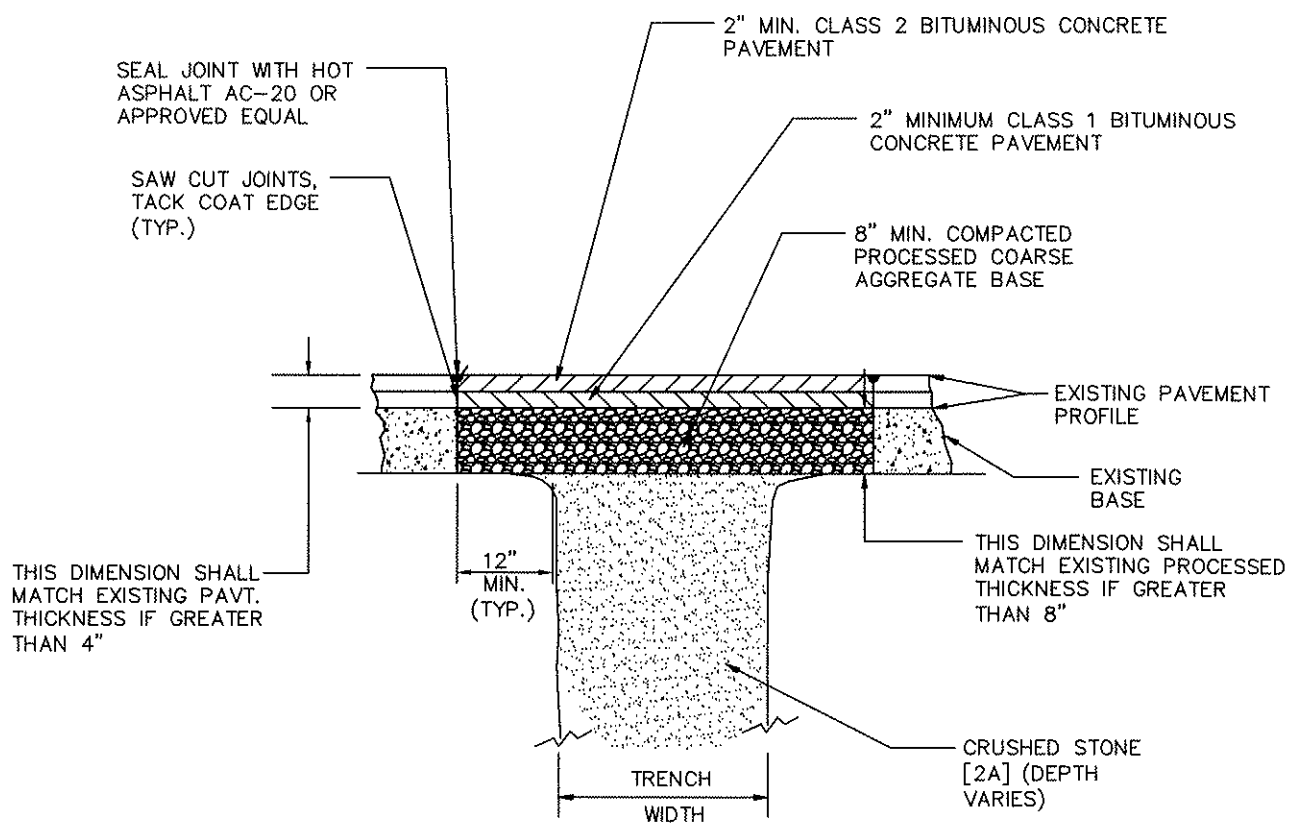
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JOB TITLE:  
UMHJSA- STANDARD DETAILS


DATE:  
6/28/11

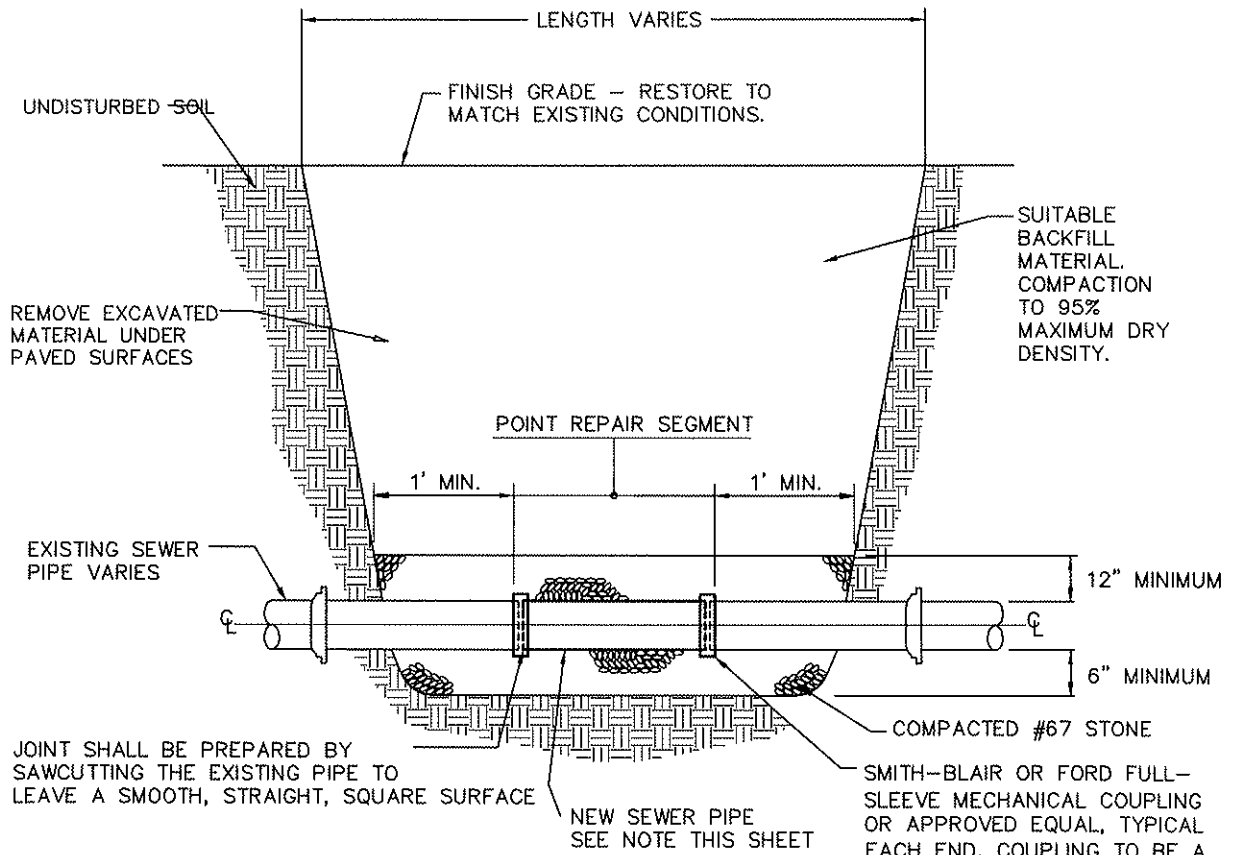
DWG TITLE:  
DWG 022 - TEMPORARY PAVEMENT REPAIR

INT:  
A.L.P.



PERMANENT PAVEMENT REPAIR  
NTS

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	<p>DWG TITLE: DWG 023 -- PERMANENT PAVEMENT REPAIR</p>	<p>INT: A.L.P.</p>



JOINT SHALL BE PREPARED BY SAWCUTTING THE EXISTING PIPE TO LEAVE A SMOOTH, STRAIGHT, SQUARE SURFACE

NEW SEWER PIPE  
SEE NOTE THIS SHEET

SMITH-BLAIR OR FORD FULL-SLEEVE MECHANICAL COUPLING OR APPROVED EQUAL, TYPICAL EACH END, COUPLING TO BE A MINIMUM 8 INCHES WIDE.

NOTE:  
NEW SEWER PIPE LENGTH & TYPE TO BE DEFINED BY UMHJSA OR UMHJSA ENGINEER.

STANDARD TYPICAL SEWER  
POINT REPAIR  
NTS



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JOB TITLE:  
UMHJSA-- STANDARD DETAILS

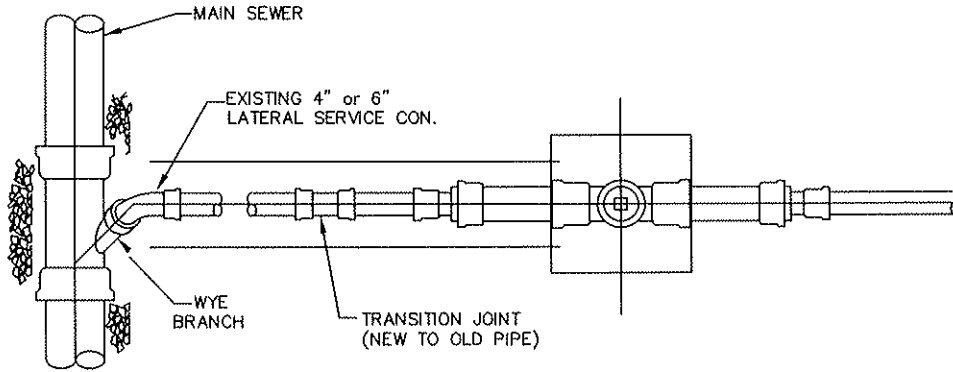
DATE:  
6/28/11

DWG TITLE:  
DWG 024 -- STANDARD POINT REPAIR

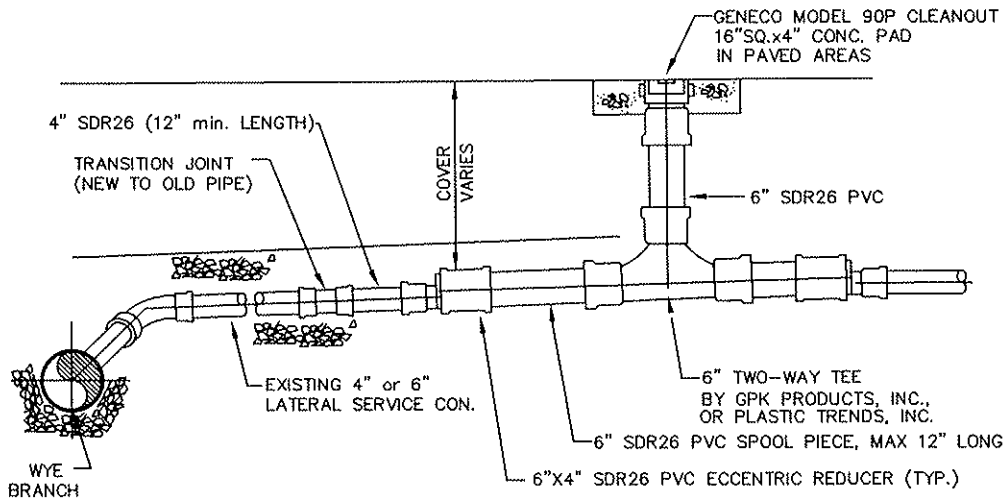
INT:  
A.L.P.

NOTE:

1. CLEANOUT IN NON-PAVED AREAS SHALL BE EAST JORDAN #1574, NEENAH FOUNDRY R-1975-A2, OR APPROVED EQUAL. CLEANOUT CAP PROTECTION CASTING SHALL HAVE A MIN. OF 2-INCH OF SEPARATION BETWEEN CLEANOUT THREADED PLUG AND CASTING.



PLAN



SECTION

LATERAL CONNECTION, TWO WAY CLEAN-OUT  
WITH THREADED PLUG, EXISTING LATERAL



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JOB TITLE:  
UMHUSA- STANDARD DETAILS

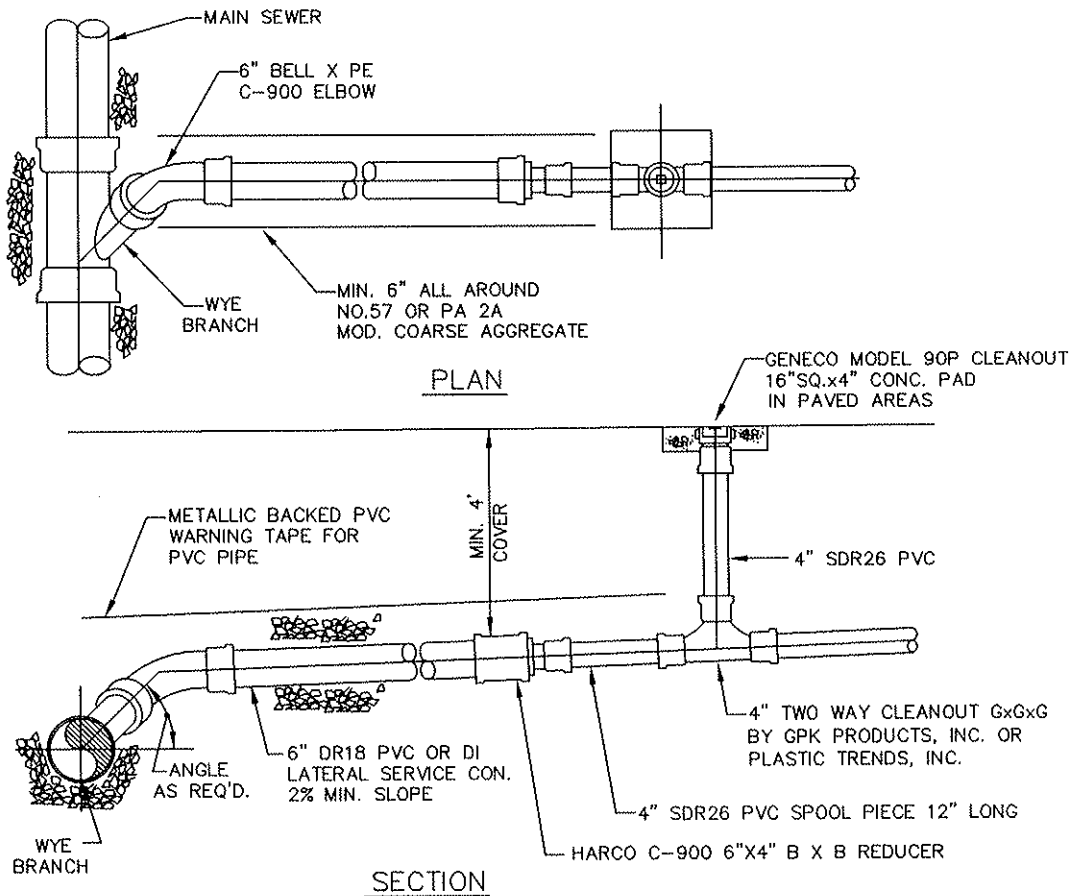
DWG TITLE:  
DWG 025 - LATERAL CONNECTION, EXISTING

DATE:  
2/2/17

INT:  
A.L.P.

NOTES:

1. IF CURBING OR PAVING DOES NOT EXIST, LATERAL SHALL BE 10 FEET IN LENGTH OR FOUR (4') FEET PAST THE EDGE OF THE RIGHT-OF-WAY, WHICHEVER IS GREATER.
2. CONNECTION FROM SERVICE LATERAL TO STRUCTURE SHALL BE IN ACCORDANCE WITH TOWNSHIP PLUMBING CODE.
3. PROVIDE STAKE (2"X3") AT END OF LATERAL EXTENDING 1 FT. ABOVE FINISH GRADE.
4. CLEANOUT IN NON-PAVED AREAS SHALL BE EAST JORDAN #1574, NEENAH FOUNDRY R-1975-A2, OR APPROVED EQUAL. CLEANOUT CAP PROTECTION CASTING SHALL HAVE A MIN. OF 2-INCH OF SEPARATION BETWEEN CLEANOUT THREADED PLUG AND CASTING.



LATERAL CONNECTION, TWO WAY CLEAN-OUT  
WITH THREADED PLUG



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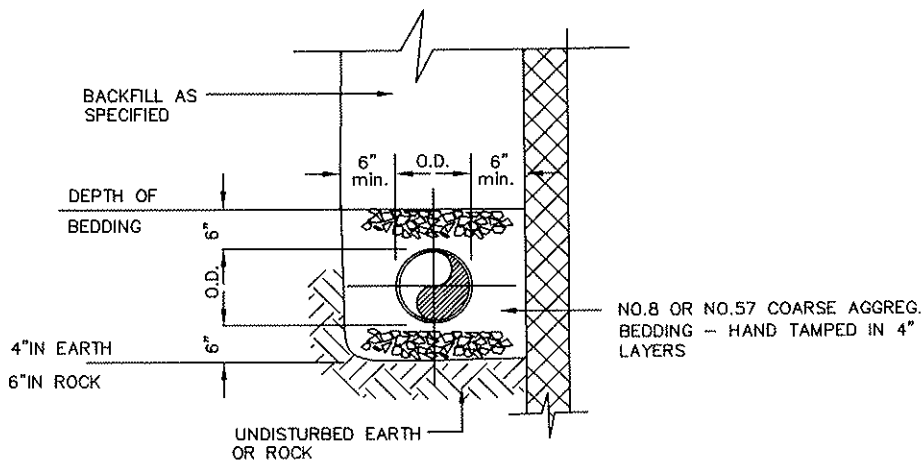
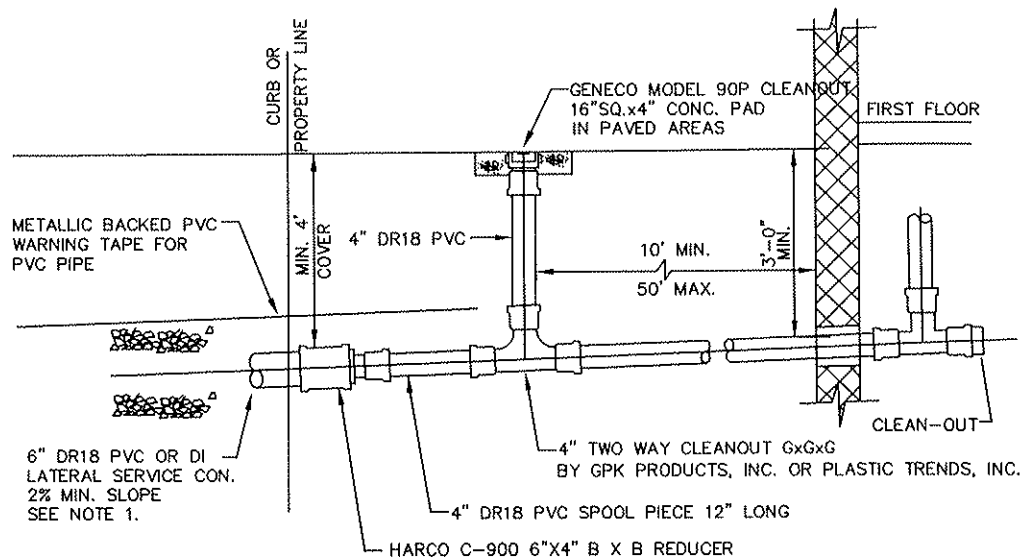
JOB TITLE:  
UMHJSA- STANDARD DETAILS

DATE:  
2/2/17

DWG TITLE:  
DWG 026 -- LATERAL CONNECTION, NEW

INT:  
A.L.P.





- NOTES: 1. ALL BUILDING SEWER TO BE TESTED PER TOWNSHIP CODE  
 2. CLEAN-OUT REQUIRED ONE PER 50 FEET OF PIPE AND AT EVERY BEND  
 \* SCH 40 PVC-DWV  
 3. CLEANOUT IN NON-PAVED AREAS SHALL BE EAST JORDAN #1574, NEENAH FOUNDRY R-1975-A2, OR APPROVED EQUAL. CLEANOUT CAP PROTECTION CASTING SHALL HAVE A MIN. OF 2-INCH OF SEPARATION BETWEEN CLEANOUT THREADED PLUG AND CASTING.

BUILDING SEWER CONNECTION  
 (SINGLE CLEAN-OUT, NO TRAP)



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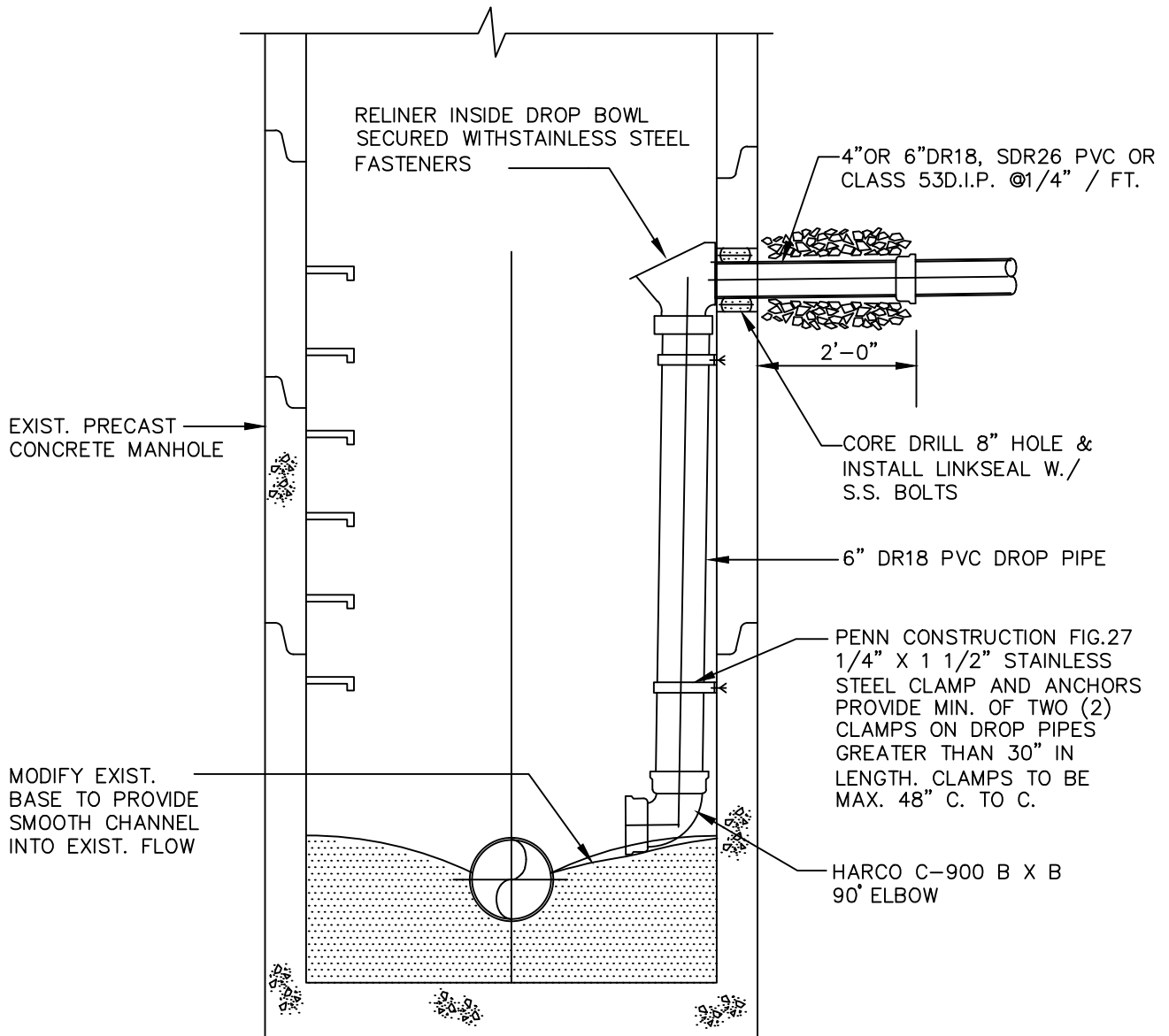
JOB TITLE:  
 UMHUSA- STANDARD DETAILS

DATE:  
 2/2/17

DWG TITLE:  
 DWG 027 - BUILDING SEWER CONNECTION

INT:  
 A.L.P.

NOTE: INSIDE DROP PIPES NOT REQUIRED WHEN THE DISTANCE BETWEEN THE INVERT OF THE LATERAL AND THE CROWN OF THE EXISTING SEWER IS LESS THAN 15".



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JOB TITLE:  
UMHJSA- STANDARD DETAILS

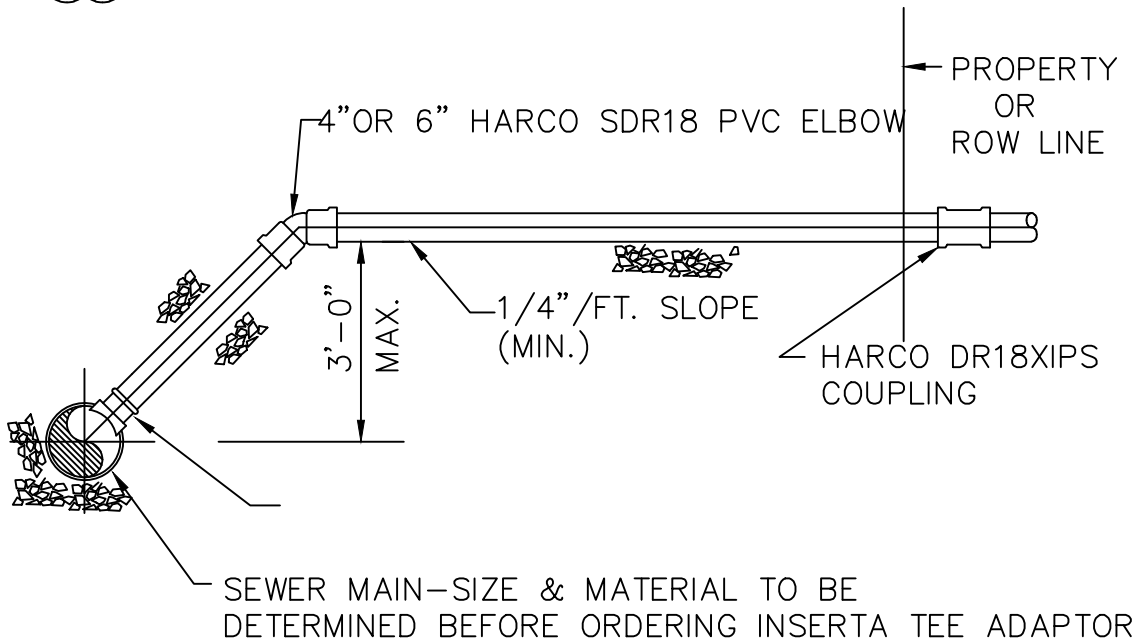
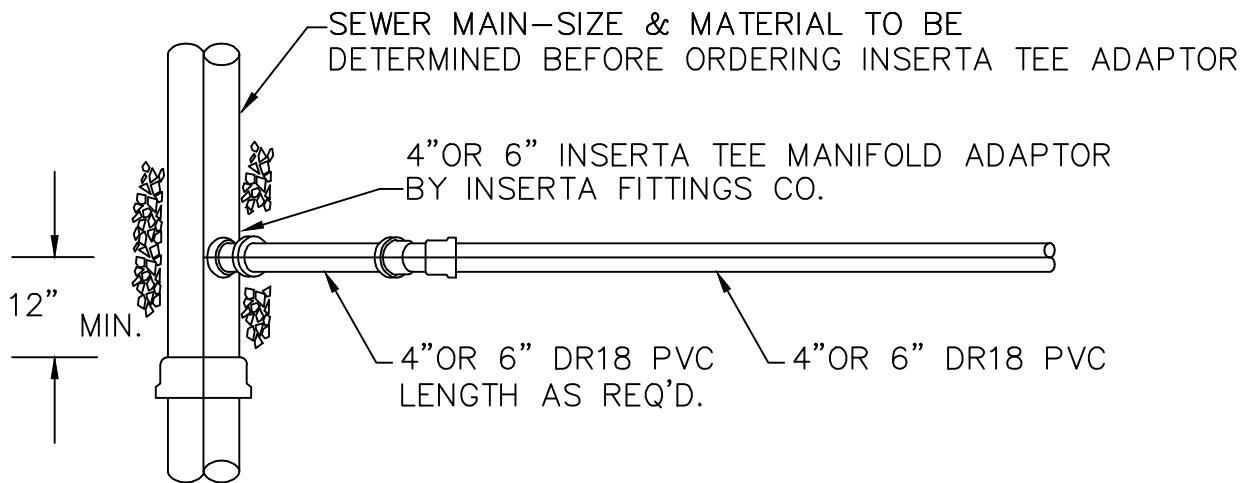
DATE:  
5/1/17

DWG TITLE:  
DWG 028 - EXISTING MANHOLE, INTERIOR DROP CONNECTION

INT:  
A.L.P.

NOTE:

INSERTA TEE IS A THREE PIECE SERVICE CONNECTION CONSISTING OF A PVC HUB, RUBBER SLEEVE AND STAINLESS STEEL BAND. INSERTA TEE IS COMPRESSION FIT INTO THE CORED WALL OF A MAINLINE. INSTALL STRICTLY PER MANUFACTURER'S RECOMMENDATIONS.



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JOB TITLE:  
UMHJSA- STANDARD DETAILS

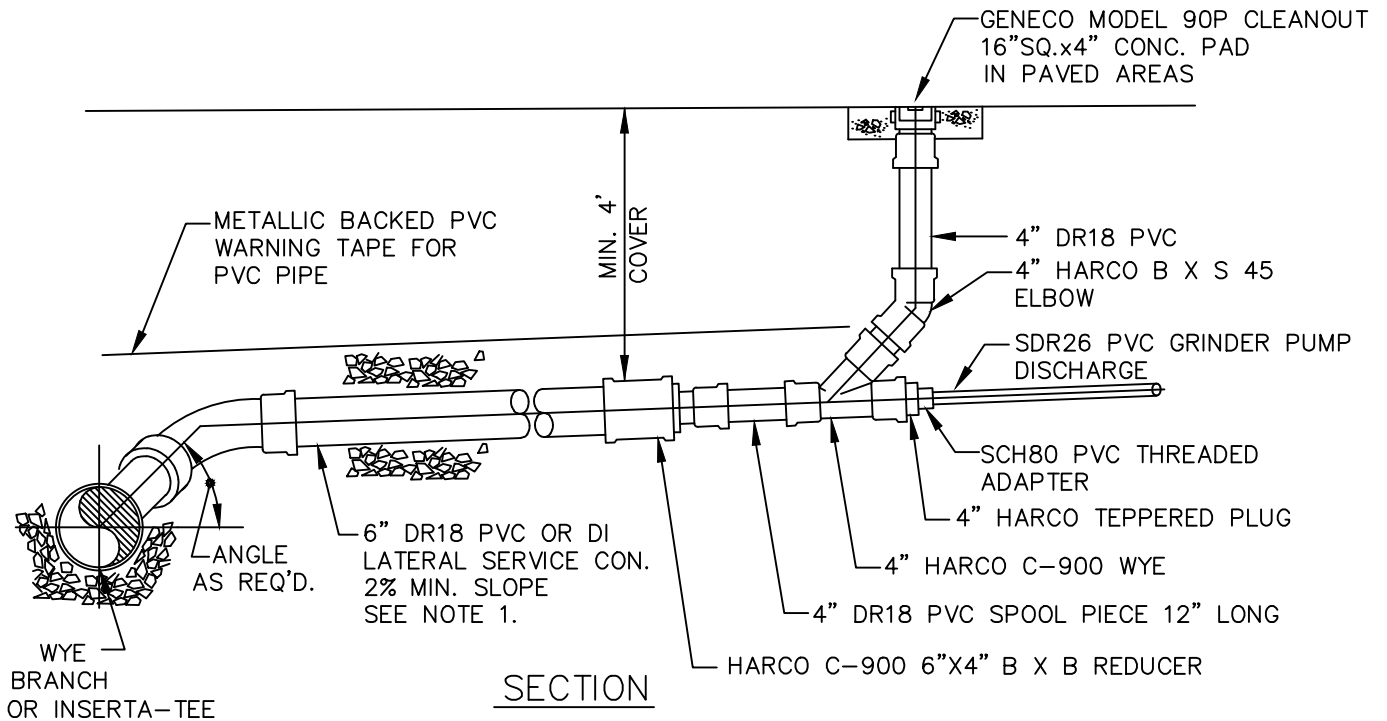
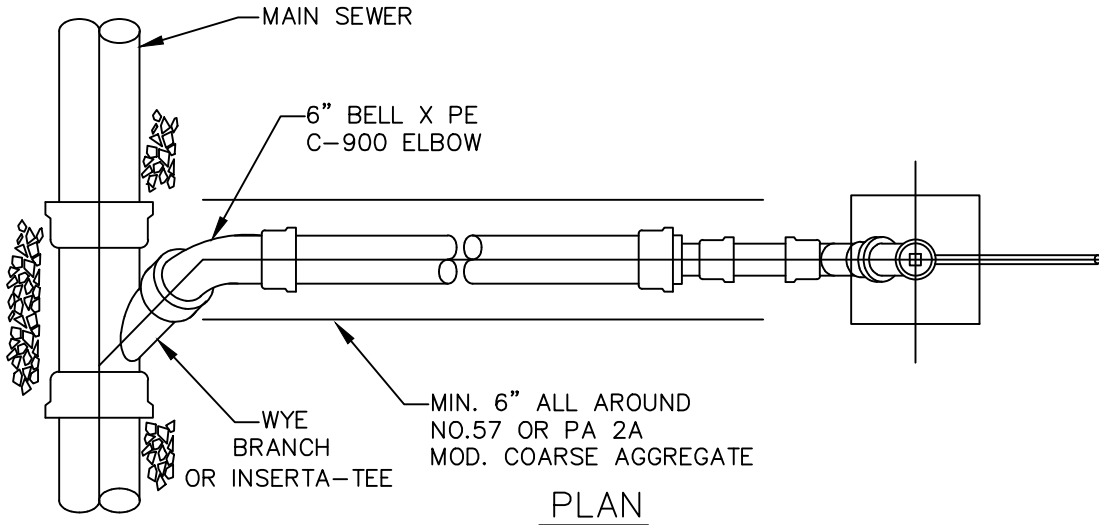
DATE:  
5/1/17

DWG TITLE:  
DWG 029 - LATERAL CONNECTION INTO EXISTING MAIN WITH INSERTA TEE ADAPTER

INT:  
A.L.P.

NOTES:

1. IF THE SEWER MAIN IS 8" AND A FITTING IS REQUIRED FOR THE CONNECTION, THE LATERAL PIPE SIZE SHALL BE REDUCED TO 4".
2. IF CURBING OR PAVING DOES NOT EXIST, LATERAL SHALL BE 10 FEET IN LENGTH OR FOUR (4') FEET PAST THE EDGE OF THE RIGHT-OF-WAY, WHICHEVER IS GREATER.
3. CLEANOUT IN NON-PAVED AREAS SHALL BE EAST JORDAN #1574, NEENAH FOUNDRY R-1975-A2, OR APPROVED EQUAL. CLEANOUT CAP PROTECTION CASTING SHALL HAVE A MIN. OF 2-INCH OF SEPARATION BETWEEN CLEANOUT THREADED PLUG AND CASTING.



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JOB TITLE:  
UMHJSA- STANDARD DETAILS

DWG TITLE:  
DWG 030 - GRINDER PUMP DISCHARGE CONNECTION TO SEWER MAIN

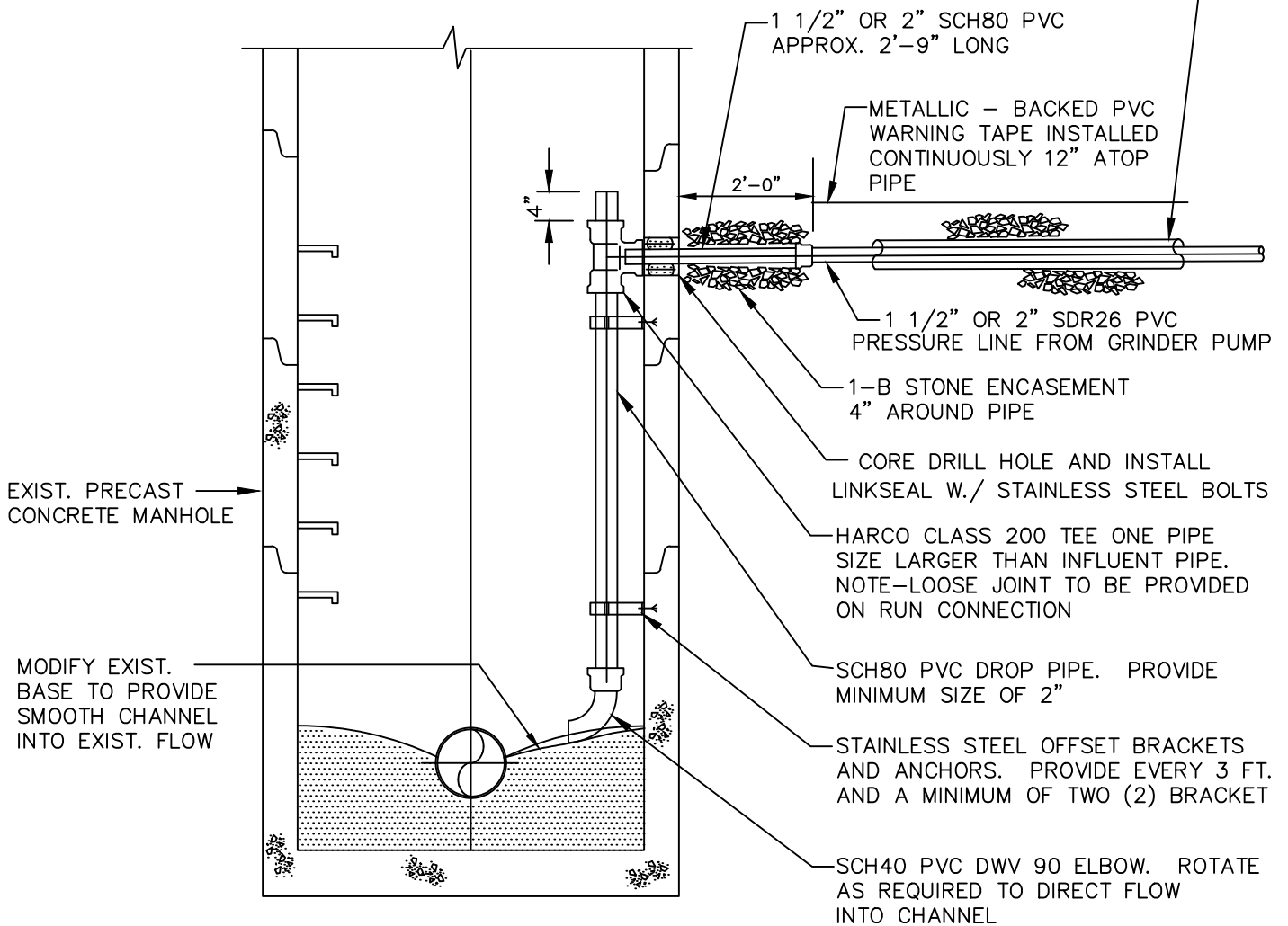
DATE:  
1/19/18

INT:  
A.L.P.

NOTES:

1. AN INSIDE DROP CONNECTION WILL NOT BE REQUIRED IF THE INVERT OF THE PRESSURE PIPE IS WITHIN 4" OF THE TOP OF THE EXISTING BENCHING. PROVIDE AN ELBOW INSIDE MANHOLE AS REQUIRED TO MINIMIZE SPLASHING AND A SMOOTH CHANNEL INTO EXISTING FLOW.

CAST IRON CASING IN PAVED AREA TO BE EVALUATED ON CASE BY CASE BASIS. SLEEVE TO PENETRATE MANHOLE WALL. HOLE TO BE COREDRILLED AND LINKSEAL PROVIDED. SUPPORT CARRIER PIPE EVERY 6 FT. WITH LINKSEAL



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JOB TITLE:  
UMHJSA- STANDARD DETAILS

DATE:  
1/19/18

DWG TITLE:  
DWG 031 - GRINDER PUMP DISCHARGE CONNECTION TO MANHOLE

INT:  
A.L.P.