

NEW HOLLAND BOROUGH

NEW HOLLAND BOROUGH
LANCASTER COUNTY
PENNSYLVANIA

SPECIFICATIONS
FOR CONSTRUCTION OF
WATER FACILITIES

JUNE 2017

Prepared by:



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New Holland Borough
Lancaster County, Pennsylvania

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ADMINISTRATIVE PROCEDURES

ADMINISTRATIVE PROCEDURES

I. INTRODUCTION

The following Administrative Procedures and Standard Specifications for Construction of Water Facilities are in accordance with, and subject to Ordinance No. 581 and Resolution 490 (and subsequent amendments) as adopted by the New Holland Borough, hereinafter referred to as the Borough. A copy of this information may be purchased at the Borough office.

II. ADMINISTRATIVE PROCEDURES

A. APPLICATION PROCEDURE FOR EXTENSION AND/OR CONNECTION OF WATER SYSTEM

1. Any person or persons desiring extension and/or connection of the water facilities shall make preliminary application in writing to the Borough. This application shall be accompanied by the sufficient data and/or plans to allow the Borough to review and determine the extent to the proposed activity. All submissions shall include a minimum of three (3) sets of plans for review. The Borough will retain all three (3) sets of review plans. The required plans shall be in accordance with the Borough's Standard Specifications for Construction of Water Facilities. The application and supporting data shall be submitted prior to, or at the time the preliminary subdivision plan is submitted. The requesting party shall bear all costs incident to the application, design, review, construction and inspection of said extension and/or connection.
2. Coincident with the submission of the preliminary application an escrow amount (To be specified by the Borough) shall be submitted for reimbursement of (1) the Borough Engineer's cost in review of the plans, shop drawings, observation of the improvements and record drawing review and, (2) the Borough Solicitor's cost in review of right-

of-way plats and deeds and preparation of an extension agreement, and (3) anticipated observation costs, if required. Should the actual costs of these services exceed the escrowed amount, the person(s) desiring the extension shall be liable for the additional costs and shall pay an additional escrow amount when and as determined by the Borough. Any unused portion of the escrowed amount will be returned to the applicant.

3. Upon receipt of the preliminary application and required supplemental data, the Borough will submit the same to the Borough Engineer for review and comment. Upon receipt of the Borough Engineer's recommendations, the Borough will review the preliminary application and advise the requesting party of the results of the review.
4. The Borough may, at its discretion, require the applicant to prepare and deposit, with the Borough, an improvement construction guarantee, which shall be computed as provided hereinafter, sufficient to cover the construction costs of the extension and/or connections to the water systems. If the improvements are to be subject to such improvement construction guarantee, the applicant shall be advised of the requirement at the time of submission of capacity application. Such guarantees shall be equal to one hundred ten percent (110%) of the costs as estimated by bonafide bids from contractors selected by the party posting security or, in the absence of such bids, an estimate prepared by a registered Pennsylvania Professional Engineer and reviewed/approved by the Borough Engineer. The following forms of guarantees shall be acceptable to the Borough provided, however, that the final form thereof shall be approved by the Borough's Solicitor:

- a. A letter of credit provided by the developer from a Federal or Commonwealth chartered financial institution or other reputable institution.
 - b. A deposit of cash either with the Borough or in an escrow or restrictive account held in trust by a lending institution until released by the Borough.
5. The requesting party may then undertake the construction of the extension and/or connection in accordance with the Borough's Standard Specifications for Construction of Water Facilities. The Borough Engineer or Resident Representative of the Borough will conduct periodic observations during the construction of the improvements as necessary.
6. The applicant posting security for improvement construction guarantee may request release of funds as improvements are completed. In such a case, the Borough may have the Borough Engineer report on the status of completion. The Borough shall release ninety percent (90%) of the estimated cost of partial improvements, retaining the remainder until final inspection and acceptance by the Borough.
7. Upon completion of construction, the requesting party shall immediately notify the Borough in writing by certified or registered mail of the completion of the improvements and shall send a copy to the Borough Engineer.
8. Upon completion of construction, and prior to dedication of the facilities to the Borough, the requesting party shall submit one set of record drawings to the Borough Engineer for review. After the Borough Engineer reviews and approves the submitted Record Drawings, two print sets, and two digital copies of the Record Drawings (1 CAD and 1 PDF) shall be submitted to the Borough.

The Borough will not accept dedication of the facilities until the appropriate copies of the approved Record Drawings are submitted.

9. The Borough shall, within 10 days after receipt of such notification, direct the Borough Engineer or Resident Representative of the Borough to conduct a final inspection of the improvements. The Borough Engineer or Resident Representative of the Borough will, within 30 days of receipt of the Borough's above notification, file a report with the Borough concerning the findings of such final inspection.
10. The Borough may, at its discretion, require the applicant to submit a maintenance guarantee in order to guarantee the integrity and proper functioning of the improvements. If the improvements are to be subject to a maintenance guarantee, the applicant shall be advised of the requirement at the time of submission of the capacity request. Financial security shall not exceed fifteen percent (15%) of the installation costs and shall be in one of the forms permitted in Paragraph 8 above and be subject to the approval of the Borough's Solicitor. The terms of a maintenance guarantee shall not exceed eighteen (18) months.
11. Water: Immediately upon the recording of any applicable deeds of dedication and final approval and acceptance of ownership, all pipes, fittings, connections, and appurtenances located within rights-of-way or streets, along with the connections to the curb stop, shall become the property of the Borough. All permanent rights-of-way across private property shall be approved by the Borough's Solicitor and shall be a minimum of 30 feet width and shall be transferred to the Borough reciting all details and right to enter thereon for any purpose appropriate to the inspection, repair or maintenance of the Borough's water system.

12. All subsequent resolutions affecting water facilities owned by the Borough shall be binding upon the requesting party, his successor, heirs, assignees or agents.
13. Upon completion of the construction and acceptance by the Borough, the requesting party may apply for connection permits and shall be subject to all current rates and charges attendant to the facility.

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DEFINITIONS AND SPECIAL CONDITIONS

DEFINITIONS AND SPECIAL CONDITIONS

I. GENERAL:

It is the intent of these Specifications to govern the Developer/Contractor in furnishing all labor and materials, and performing all work necessary for construction of extensions to the New Holland Borough water system.

II. DEFINITIONS:

"Application" shall mean a form available at the Borough office containing a checklist of plan requirements and other general information used for administrative purposes to aid in the review of the subdivision, land development plan, or improvements.

"Borough" shall mean the New Holland Borough, its agents (including New Holland Borough), or any person or persons authorized by the New Holland Borough to act on behalf of the New Holland Borough.

"Borough Engineer" shall mean the special or regular individual or entity appointed by and representing the Borough with respect to engineering matters described in these specifications.

"Contract" shall mean the written agreement executed by and between the developer and contractor, covering the performance of the work and the furnishing of labor, materials, and service in construction of improvements.

"Developer/Contractor" shall mean the party or parties constructing the sanitary sewer extension.

"Easement" shall mean a right-of-way granted for limited use of land for public, quasi-public, or private purpose.

"Inspection/Observation" shall mean the examination of the work performed by the contractor to ascertain its conformity with these specifications.

"Right-of-Way" shall mean a strip of land granted for public or private use.

"Public Water Service" shall mean the supplying of safe, palatable, and potable water in sufficient quantities for the proposed use, including fire protection. Said water to be supplied by, and only by, a municipality or municipal Borough.

"Solicitor" shall mean the special or regular individual or entity appointed by and representing the Borough with respect to legal matters described in these specifications.

III. BASIS OF DESIGN:

All water system extensions shall extend to the limits of the subject property being developed.

The Developer/Contractor shall also comply with all applicable local, state, and federal requirements. All plans submitted to the Borough shall be sealed by a registered professional engineer licensed to practice in the Commonwealth of Pennsylvania, and shall be at a scale of 1" = 50' horizontal and 1" = 10' vertical. All water design plans shall be oriented so that the design plan view is located above the corresponding design profile for all sanitary sewer facilities.

IV. SPECIAL CONDITIONS:

The Borough reserves the right to make any corrections, additions, or deductions to these Specifications at any time without prior notification.

The Borough reserves the right to request additional work and/or materials, where, in its opinion, conditions warrant such work and materials.

Any design of facilities such as metering chambers, etc. which are not covered in these Specifications, shall be reviewed by the Borough on a case by case basis.

V. INSURANCE:

CONTRACTOR'S LIABILITY INSURANCE

The limits of liability insurance shall provide coverage for not less than the following amounts or greater where required by laws and regulations:

Commercial General Liability:

1) Each Occurrence:	\$1,000,000
2) Damage to Rented Premises (Ea. Occurrence):	\$100,000
3) Medical Expenses:	\$10,000
4) Personal & Adv. Injury:	\$1,000,000
5) General Aggregate:	\$2,000,000
6) Products:	\$2,000,000

Automobile Liability:

1) Combined Single Limit:	\$1,000,000
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Umbrella Liability:

1) Each Occurrence:	\$1,000,000
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Workers Compensation and Employer's Liability:

1) Each Accident:	\$100,000
2) Each Employee:	\$100,000
3) Policy Limit:	\$500,000

CONTRACTOR's Liability Insurance Policies shall name the New Holland Borough Borough, Borough Engineer, Borough Solicitor and New Holland Borough as additional insured parties.

PROPERTY INSURANCE

CONTRACTOR shall purchase and maintain until final payment property insurance upon the Work at the site to the full insurable value thereof (subject to such deductible amounts as may be provided in these Special Conditions or required by laws and regulations). This insurance shall include the interests of the Borough, New Holland Borough, Contractor, Subcontractors, Borough Engineer, Solicitor and Borough Engineer's Consultants in the Work (all of whom shall be listed as insured or additional insured parties), This insurance shall insure against the perils of fire and extended coverage, shall include "all-risk" insurance for physical loss and damage including theft, vandalism and malicious mischief, collapse and water damage, and such other perils as may be provided in these Special Conditions, and shall include damages, losses and expenses arising out of or resulting from any insured loss or incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers, architects, attorneys and other professionals). If not covered under the "all-risk" insurance or otherwise provided in these Special Conditions, Contractor shall purchase and maintain similar property insurance on portions of the Work stored on and off the site or in transit.

DEDUCTIBLES

The maximum deductible amount for all property insurance to be provided by Contractor as required for this contract shall be \$10,000 or such limit as may be acceptable to the Borough. Approval of a deductible limit higher than \$10,000 shall be requested in writing and shall be accompanied by a copy of the insurance policy.

SPECIAL INSURANCE

Contractor shall, at its discretion, purchase any special property insurance as necessary and such additional coverage may be a part of the required property insurance policy.

ACCEPTANCE OF INSURANCE

If the Borough has any objection to the coverage afforded by or other provisions of the insurance required to be purchased and maintained by Contractor, the Borough shall notify Contractor in writing thereof within ten (10) days of the date of delivery of such certificates. Contractor shall provide to the Borough such additional information in respect to insurance provided as the Borough may reasonably request. Failure by the Borough to give any such notice of objection

within the time provided shall constitute acceptance of such insurance purchased by the Contractor.

At the request of the Borough, Contractor shall provide a copy of the insurance policy under which the coverage for the contract is provided.

The Borough shall review insurance coverage or will assign, at its discretion, a qualified party to review all insurance coverages to be provided. Upon completion of review, Contractor and Contractor's property insurer or insurers may be required to sign an Insured Claim Waiver, or Contractor, if required, shall secure similar signatures on such forms from all subcontractors and their property insurers.

The Borough Engineer shall have no responsibilities regarding the advising, requiring, or obtaining of any form of insurance.

INSURANCE COMPANY RATING

All Property and Liability Insurance to be purchased by Contractor shall be placed with insurance companies which carry a rating of A- or better from A.M. Best and Company Insurance Rating Service and are admitted to do business in the Commonwealth of Pennsylvania.

UTILITY EASEMENTS

UTILITY EASEMENTS

I. GENERAL

1. Easements shall be required for all water facilities intended for dedication to the Borough that are constructed outside the limits of a public street right-of-way. This includes, without limitation, water facilities installed within private streets and yard areas. In addition, easements may be required for water facilities constructed within a public street right-of-way if the existing right-of-way does not provide sufficient room for access or maintenance of the water facility.
2. Easements shall be a minimum of 30 feet wide and shall be, in general, centered over the water facilities unless otherwise approved by the Borough. Additional easement width may be required by the Borough on a case by case basis. Easements shall be for the exclusive use of water facilities owned or proposed to be dedicated to the New Holland Borough. All other utilities shall remain outside the limits of the Borough's easement unless otherwise specifically approved by the Borough.
3. The Borough and its agents, contractors, or employees shall have free ingress, egress and regress on, over, and through the easement at all times and seasons, with reasonable prior notice except in the case of an emergency, in order to inspect, monitor, maintain, reconstruct, enlarge, repair, remove, relocate, or related functions any water main or mains, manholes, connection fittings or other appurtenances as the Borough deems necessary in its sole discretion.
4. No building, fence, lighting fixture, pond, swimming pool, driveway, parking lot or other permanent structure shall be erected or located within the water easement. No vehicles, campers, trailers, boats or other large equipment or facilities shall be stored within the easement on a long-term basis. No trees, shrubbery or bushes shall be planted within the boundaries of the easement. In the event that the Borough is not able to access the easement due to any of the foregoing, the Borough shall have the right, but not the obligation, to remove such obstruction at the owner's expense.
5. Property owners shall not be due compensation from the Borough for damage to or loss of permanent or temporary structures, vehicles, equipment, or trees, shrubbery or bushes resulting from work performed by the Borough and its agents, contractors or employees that occurs to such items that are placed within the easement following execution of an easement agreement.
6. Property owners shall not alter the grade or construct landscaping features within the easement that would impair access by the Borough.

II. REQUIREMENTS FOR DEVELOPERS/EXTENDORS

1. Individual plot plans and legal descriptions shall be provided for all easements.
 - a. When an easement crossing multiple parcels is proposed by a developer, a single plot plan (at a legible scale) and legal description shall be acceptable only if the developer owns all parcels impacted by the easement at the time when the easement is offered for dedication. Otherwise, individual plot plans and legal description shall be required for all parcels containing a portion of the easement.
 - b. The developer, at its sole cost and expense, shall be responsible for securing all easements from private property owners when facilities are constructed across private property to serve the developer's property. Those easements shall be assigned to the Borough following review and approval of Record Drawings and prior to dedication of the newly constructed water facilities.
 - c. The developer, at its sole cost and expense, shall provide evidence that proposed water easements are incorporated into the deeds for individual properties within the development.
2. Dedication of easements shall occur following review and approval of Record Drawings and prior to dedication of the newly constructed water facilities.

SECTION 01300

SUBMITTALS

SECTION 01300 - SUBMITTALS

PART 1 - GENERAL

1.1 SUBMITTAL PROCEDURES:

- A. All submittals shall be delivered to the Borough at the New Holland Borough Office.
- B. Each transmittal shall be numbered in sequence. Identify project, Contractor, subcontractor, major supplier; identify any and all deviations from Borough Specifications. Provide space for Contractor and Borough Engineer review stamps.
- C. Submit three (3) copies of drawings not larger than 24" X 36" and drawn to a scale no smaller than fifty (50) feet to the inch. Scale shall be clearly noted on the drawings.
- D. All drawings showing water plans and profiles shall be oriented so that the plan view is located above the corresponding profile on the same drawing sheet.
- E. Stationing for water mains shall be from the centerline of the road.
- F. Apply Contractor's stamp, signed and dated certifying that review, verification of products required, field dimensions adjacent to construction work, and coordination of information is in accordance with the requirements of the work and Borough Specifications.
- G. Comply with progress schedule for submittals related to work progress. Coordinate submittal of related items.
- H. After Borough Engineer's review of submittal, revise and resubmit as required, identifying changes made since previous submittal.
- I. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.
- J. Upon completion of construction, and prior to dedication of the facilities to the Borough, the requesting party shall submit one set of record drawings to the Borough Engineer for review. After the Borough Engineer reviews and approves the submitted Record Drawings, two print sets and two digital copies of the Record Drawings (1 CAD and 1 PDF) shall be submitted to the Borough. The Borough will not accept dedication of the facilities until the appropriate copies of the approved Record Drawings are submitted.
- K. Provide Manufacturer's Safety Data Sheets (MSDS) for all products and materials.
- L. Faxes shall not be accepted as shop drawing submittals.

1.2 CONSTRUCTION PROGRESS SCHEDULES:

- A. Submit initial progress schedules and schedule of values in duplicate along with the initial shop drawing submittal. After review by Borough Engineer, revise and resubmit as required. Submit revised schedules on a monthly basis, reflecting changes since previous submittal. Show projected percentage of completion for each item of work.
- B. Show submittal dates required for shop drawings, product data and samples, and product delivery dates.

1.3 SCHEDULE OF WORK:

- A. Submit typed schedule on 8-1/2" x 11" paper; Contractor's standard form or media-driven printout will be considered on request.
- B. Format: The Table of Contents of this document. Identify each line item with number and title of the major specification sections.

1.4 SHOP DRAWINGS:

- A. When required, five (5) copies of the shop drawings shall be submitted by the Contractor with such promptness as to avoid delay in the work. After review of these drawings by the Borough Engineer, the shop drawings will be stamped: 1) "Reviewed"; 2) "Furnish as Corrected"; 3) "Revise and Resubmit"; 4) "Rejected"; 5) "Not Required for Review". If the shop drawings are stamped "Revise and Resubmit", the Contractor shall make the required correction and resubmit five copies of the corrected shop drawings to the Borough, and such other copies as may be needed for proper prosecution of the work. If the shop drawings are "Rejected", the Contractor shall prepare a new shop drawing submission. The Borough Engineer's review of shop drawings shall not relieve the Contractor from responsibility for errors or discrepancies in such drawings. All shop drawings shall be identified with the name of the Contractor, and numbered in consecutive order. Two copies of all shop drawings shall be retained by the Borough Engineer. One additional copy shall be retained by the Borough. E-mailed pdf file submittals will be accepted as long as the submittals are not larger than 11 x 17 and do not exceed twenty (20) pages. If large submissions are required, the Contractor shall provide five (5) copies to the Borough Engineer for review. All shop drawings shall be reviewed by the contractor prior to submission to the Borough Engineer. All submittals shall be stamped and signed by the Contractor noting the submittal meets the Borough Specifications for Construction of Water Facilities.

1.5 PRODUCT DATA:

- A. Mark each copy to identify applicable products, models, options and other data; supplement manufacturers' standard data to provide information unique to this project.

1.6 SAMPLES:

- A. Submit full range of manufacturers' standard colors, textures and patterns for Borough's selection. Allow four weeks for selection of finishes from time of submission.
- B. Submit samples to illustrate functional characteristics of the product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.
- C. Include identification on each sample with full project information.
- D. Submit the number of samples specified in respective specification section; one will be retained by the Borough. Review samples which may be used in the work are indicated in the specification section.

1.7 FIELD SAMPLES:

- A. Provide field samples of finishes at project as required by individual specifications section. Install sample complete and finished. Acceptable samples in place may be retained in completed work.

1.8 MANUFACTURERS' INSTRUCTIONS:

- A. When required in individual specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation start up, adjusting and finishing in quantities specified for product data. In addition, operation and maintenance manuals shall be submitted at the end of the project.
- B. Identify conflicts between manufacturers' instructions and Borough Specifications.

PART 2 - MATERIALS

Not used.

PART 3 - CONSTRUCTION

Not used.

END OF SECTION

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SECTION 02201

TRENCH EXCAVATION AND BACKFILL

SECTION 02201 - TRENCH EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 RELATED SECTIONS:

Section 02665 – Water Mains and Appurtenances

1.2 DESCRIPTION OF WORK:

- A. The work within this section includes, but is not limited to, the furnishing of all equipment, labor and materials and performing all operations necessary to excavate, protect and backfill all trenches in accordance with the Borough Specifications.
- B. The Contractor shall perform all excavation of every description and of whatever substance encountered to the depths required, as specified herein. In performing the work as specified in this section, the Contractor shall conform to the current regulations of the Pennsylvania Department of Labor and Industry and applicable Federal Regulations for Excavations and Construction. All excavated materials not required for backfill shall be removed and wasted or otherwise disposed of as required or specified.
- C. The Contractor shall allow a minimum of 90 days settlement for all trenches prior to final restoration. Final restoration shall be in accordance with the appropriate specification sections and details.

1.3 QUALITY ASSURANCE:

- A. Referenced standards shall be the following:
 - 1) Pennsylvania Department of Transportation (PennDOT) Publication 408 Specifications and its revisions.
 - 2) Pennsylvania Department of Transportation (PennDOT) Publication 213.
 - 3) American Society for Testing and Materials (ASTM)

PART 2 - MATERIALS

2.1 CLASSIFICATION OF MATERIALS:

- A. Class 1 - This material shall consist of 2A coarse aggregate or 2RC stone free of slag, except in wet or unstable areas where the bedding may be No. 8 or No. 57 coarse aggregate. All materials shall conform to PennDOT Publication 408, Section 703.3.

- B. Class 1S - This material shall consist of No. 8 coarse aggregate free of slag, except in wet or unstable areas where the bedding may be No. 8 or No. 57 coarse aggregate. All materials shall conform to PennDOT Publication 408, Section 703.3.
- C. Class 2 - This material shall consist of excavated material free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks no larger than four (4) inches in dimension, stone or other material which in the opinion of the Engineer is unsuitable.

PART 3- CONSTRUCTION

3.1 REMOVAL AND PROTECTION OF PAVEMENT:

- A. The Contractor shall clear the surface and remove all surface materials, of whatever nature, over the line of the trench; and shall properly separate and classify the material removed; and store, guard and preserve said material as may be required for use in backfilling, resurfacing, repaving or for other purposes. All rock, earth, sand, curbing, gutter and flagstones, and all sectional paving units which may be removed, together with all materials taken from the trenches, shall be stored in such parts of the street or roadway, or such other suitable place, and in such manner as accepted by the Borough. The Contractor shall be responsible for any loss of or any damage to paving materials through his own or his employee's careless removal or neglectful or waste storage, disposal or use of same.
- B. Pavement shall be cut to neat lines equidistant from the centerline of the trench and the edges of the pavement shall be protected and maintained by the Contractor until the repaving is completed. If the pavement edges are not maintained to the satisfaction of the Engineer, the pavement shall be saw cut prior to placing the pavement. All pavement shall be cut by a mechanical saw.
- C. The Contractor shall also protect the street surfaces outside of the trench limits and shall repair all damage done thereto as a result of his operations.

3.2 REMOVAL AND STORAGE OF MATERIAL:

- A. In the business districts or in streets that are important thoroughfares, or in narrow streets or at any other locations where the working space is limited, the material excavated from the first 100 feet of any opening, or from such additional length as may be necessary, when required by the Borough, shall be removed from the area as soon as excavated. The material subsequently excavated shall be used to refill the trench, except within Borough streets or State highways where the material used to refill the trench shall consist of Class 1 backfill material. In no case will the Contractor be allowed to cast excavated material beyond the curb or right-of-way lines, or on sidewalks or lawns.

- B. In case more material is excavated from the trench than can be backfilled over the completed pipe or can be stored on the street or within the limits of the right-of-way, leaving space for the traffic and drainage as herein provided, the excess material shall be removed to some convenient place provided by the Contractor. The Contractor shall bring back as much of the material so removed, as may be required to properly backfill the trench, or if the proper kind; or, if so required by the Borough, the Contractor shall furnish such other suitable material as may be necessary.
- C. When it is necessary to haul soft or wet material over the streets, the Contractor shall provide suitable tight vehicles to prevent spillage.
- D. All topsoil shall be removed from the limits of trenches before the commencement of trench excavation. After the trenches are backfilled, the topsoil shall be replaced. A minimum of 6 inches of topsoil shall be provided.

3.3 ORDER OF WORK:

- A. The Contractor shall submit a progress schedule and shall carry on his work in strict accordance therewith. Deviations from the progress schedule may be made only with the approval of the Borough.
- B. Service connections shall be constructed either at the same time as the main or immediately after its completion.
- C. All street paving shall be replaced by the Contractor, after which the street surfaces shall be cleaned as specified herein. The Borough shall use their discretion if the conditions are suitable for placement of paving or if the contractor shall wait until conditions are favorable.
- D. The failure of the Contractor to comply with these requirements concerning installation of service connections and manholes, repaving and cleaning of streets shall be sufficient cause for the Borough to stop all other work on the project until these requirements have been met.

3.4 WIDTH AND DEPTH OF TRENCHES:

- A. From the subgrade elevation to an elevation at least 12 inches above the top of the outside barrel of the pipe, the banks of trenches in all cases shall be excavated to vertical lines and the trenches shall be not less than 12 inches nor more than 16 inches wider than the outside diameter, at the barrel of the pipe to be laid therein. The trenches shall be excavated true to line so that a clear space not less than 6 inches or more than 8 inches in width is provided on each side of the barrel of the pipe. If sheeting is required, the foregoing dimensions shall be applicable to the inside faces of the sheeting.
- B. From a point 12 inches above the top of the outside barrel of the pipe to the surface, the banks of trenches in all streets, roads or highways, paved or

unpaved, shall be kept as nearly vertical as possible, and in no case shall the width of the trench at the top exceed the outside diameter of the pipe plus 40 inches. If the specified maximum width of the trench cannot otherwise be maintained, the Contractor shall install temporary sheeting. Where mains are to be constructed in rights-of-way or easements in open country, the specified maximum width of the trench at the top may be exceeded only if construction is kept entirely within the limits of the easements or rights-of-way and can be carried on without damage to adjoining property. The angle of slope shall be the angle at which the trench bank will stand without sliding and in no case shall the angle of slope be steeper than one-half horizontal to one vertical.

- C. In locations other than on easements or rights-of-way, the Borough may, as warranted by working conditions and where permitted by the Pennsylvania Department of Labor and Industry requirements, waive the requirements that the maximum width at the top of the trench shall not exceed the outside diameter of the pipe plus 40 inches. Proper shoring methods are the responsibility of the contractor.
- D. Except at locations where excavation of unsuitable material is required, care shall be taken not to excavate below the depths specified. When the material encountered at subgrade is unstable, or where, in the opinion of the Engineer, the ground does not afford a sufficiently firm foundation, the Contractor shall excavate the trench to such increased depth as may be required by the Borough and then shall refill the trench to subgrade with crushed stone conforming to PennDOT's grading and quality requirements for No. 1B coarse aggregate, thoroughly compacted to the satisfaction of the Borough, or if required by the Borough, the Contractor shall construct a timber foundation. If earth trenches are excavated beyond the specified depths without written requirements of the Borough, they shall be backfilled to the proper grade with thoroughly tamped No. 1B crushed stone.

3.5 LENGTH OF TRENCH:

- A. No trench shall be opened more than 100 feet in advance of the pipe lines laid. The Contractor shall limit all trench openings to a distance commensurate with all rules of safety.
- B. If the work is stopped either totally or partially, the Contractor shall provide adequate plates, flashers, etc. to protect the motorist and pedestrian during non-working hours. All open trenches shall be covered during non-working hours.

3.6 PUMPING AND DRAINING:

- A. The Contractor shall remove, by pumping or draining, any water which may accumulate in the trenches and other excavations and shall build all dams and do all other work necessary to keep the trenches or other excavation as free

from water as possible. Where it is impractical to completely drain the trench, special pipe or jointing materials may be authorized at no additional expense to the Owner. While the pipelines are being laid, the Contractor shall have sufficient pumping machinery ready for immediate use. All surface waters shall be prevented from entering the open ditches or excavations by proper grading of the surface in the vicinity of the excavation. Erosion and sediment control shall be exercised in accordance with the approved plan. Under no circumstances shall any pumped water be discharged to any sanitary sewer.

3.7 MAINTENANCE OF GUTTERS:

- A. The Contractor shall keep the gutters open at all times so the flow, storm or other waters shall not be obstructed. If the material excavated from the trenches must temporarily extend over the gutters, it shall be the duty of the Contractor to plank or bridge over the gutters, without extra compensation, so the flow of water is not impeded. Erosion and sedimentation control shall be exercised in accordance with the approved plan.

3.8 MAINTENANCE OF TRAFFIC:

- A. Work shall be conducted so as to cause minimum inconvenience to pedestrian and vehicular traffic and to private and public properties along the line of work. It shall be the duty of the Contractor, at all times, to maintain crossing, walks, sidewalks, and other roadways open to the traffic and in a satisfactory condition, and to keep all fire hydrants, water valves, fire alarm boxes, manholes, and letter boxes accessible for use. Whenever it is necessary to maintain pedestrian traffic over open trenches, a timber bridge at least three feet in width and equipped with side railings shall be provided. When the excavated material will encroach upon sidewalks or private property, planking shall be placed in order to keep the sidewalk or private property clear of excavated material.
- B. In important thoroughfares, highways or narrow streets, the material excavated from the trench shall be removed from the site of the work at the Contractor's expense and to bring back as much of the accepted material as necessary to properly refill the trench; or he shall, at his own cost and expense, furnish such other suitable materials as may be necessary to properly refill the trench.
- C. When it is necessary to haul soft or wet materials over public streets, the Contractor shall provide suitable vehicles and shall conform to all laws and ordinances relevant to such hauling.
- D. Maintenance and protection of traffic on Borough streets and State highways shall be in strict accordance with PennDOT Publication 213. The Contractor shall adjust the sign locations daily in order to protect that section of highway to be disturbed during that same day.

3.9 ROCK EXCAVATION:

- A. Unless otherwise accepted by the Borough, rock shall be fully taken out at least 25 feet in advance of pipe laying to subgrade as defined herein, and to a width not to exceed the specified width of the trench, for the size of pipe to be laid therein.
- B. If rock below the specified grade is shattered due to excessive drilling or blasting, and if, in the opinion of the Borough, it is unfit for foundation, such shattered rock shall be removed and the area backfilled to the proper grade with concrete or other material acceptable to the Borough.
- C. Where manholes are excavated in rock, they shall be excavated one foot outside the exterior lines of the walls of the manholes and to a depth of six inches below the bottom.
- D. All excavated material which is unfit for refilling must be immediately removed from the site of the work.
- E. Wherever rock is encountered in the excavations for manholes in which blank connections are to be left for future extensions of the sewers, the rock shall be excavated for a distance of not less than 10 feet from the center of the manhole, in the direction of the proposed extension of the sewer, and the excavation shall conform to the lines of the prism required by the dimensions of such extension.

3.10 BLASTING:

- A. All blasts shall be properly matted and securely covered. The Contractor shall be solely responsible for injury to persons or property located within or beyond the area or scope of the project that may result from this use of explosives.
- B. All blasting shall be done under the supervision of a Licensed Blaster and subject to State, Federal, including the Department of Labor and Industry, county or local regulations for blasting. Whenever any pipe main or conduit is encountered in the trench, all material within five feet of the same shall be removed by some method other than blasting or as otherwise governed by the owner of the utility.
- C. The Contractor will be responsible for the depths to which all blasting is performed.
- D. Should any street paving adjoining any trench be damaged in consequence of the Contractor's blasting operations, he shall immediately cease his blasting operations and repair the damaged street paving; also, he shall not again proceed with any blasting until he has submitted to and obtained approval from the Borough.

3.11 BRACED AND SHEETED TRENCHES:

- A. Open cut trenches shall be sheeted and braced as required by any governing Federal and State laws, and municipal ordinances, and as may be necessary to protect life, property or the work. The cost of furnishing, placing and removing the sheeting and bracing necessary to protect life, property or the work shall be included in the bid price for the pipe.

3.12 CAUTION IN EXCAVATION:

- A. The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined, and he shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on his part.

3.13 SUBSURFACE EXPLORATIONS:

- A. Whenever, in opinion of the Borough, it is necessary to explore and excavate to determine the location of existing underground structures, the Contractor shall make explorations and excavations for such purposes. If the Contractor is required to perform additional work in making the explorations and excavations, the cost of said work shall be borne by the Contractor.

3.14 PIPE BEDDING:

- A. The trench shall be excavated to a depth of six inches below the outside diameter of the pipe barrel, or deeper if so specified. The resultant subgrade shall be undisturbed. The bedding shall then be prepared by placing #8 or #57 stone in 6-inch uncompacted layers to 12 inches above top of pipe. Bedding shall provide uniform and continuous bearing and support for the pipe at every point between bell holes.

3.15 CONCRETE CRADLE AND CONCRETE ENCASEMENT:

- A. The trench shall be excavated to a depth of 6 inches below the outside of the barrel of pipes 24 inches or less and 9 inches below the outside of the barrel of pipes larger than 24 inches in diameter. All of this excavation may be done by machine. Quality of concrete and method of placement is specified elsewhere.

3.16 UNSTABLE SUBGRADE:

- A. Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, any type of refuse, vegetable or other organic material, or large pieces of fragments of inorganic material which, in the opinion of the Borough,

should be removed, the Contractor shall excavate and remove such unsuitable material to the width and depth recommended by the Borough. Before pipe is laid, the subgrade shall be made by backfilling with No. 8 or No. 57 stone (or larger if deemed necessary by the Borough) in 6 inch uncompacted layers, thoroughly tamped and the bedding prepared as hereinbefore specified.

3.17 SPECIAL FOUNDATIONS:

- A. Where the bottom of the trench at the subgrade is found to consist of material which is unstable to such a degree that, in the opinion of the Borough, it cannot be removed and replaced with an accepted material thoroughly compacted in place to support the pipe properly, the Contractor shall construct a foundation for the pipe, consisting of piling, timber or other materials, in accordance with Borough Specifications.

3.18 EXCAVATION IN FILL:

- A. When the pipe is laid in fill, the compacted embankment shall be brought to a height of at least 12 inches above the proposed top of the pipe before the trench is excavated. Compaction testing shall be conducted by a third party testing agency. Compaction test results shall be provided to the Borough Engineer for review. Backfill material shall be compacted to a minimum density of 95 percent proctor (ASTM D 1577).

3.19 EXCAVATION METHODS:

- A. General: Backfilling shall not be done in freezing weather except by permission of the Borough, and it shall not be made with frozen material. No fill shall be made where the material already in the trench is frozen. Any consolidation method utilizing water, such as jetting or puddling shall not be permitted.
- B. Backfill Beneath and to Centerline of Pipe Class 1S Material: All trenches shall be backfilled by hand, from the bottom of the trench to the centerline of the pipe with Class 1S material placed and compacted with hand-operated mechanical tampers in loose layers of not more than four inches in depth to provide specified compaction around and under the haunches of the pipe. Backfill material shall be deposited in the trench for its full width on each side of the pipe and fittings simultaneously. All backfill material shall be compacted to a minimum density of 95 percent proctor (ASTM D 1577).
- C. Backfill over Pipe - Class 1S Material: From the centerline of the pipe and fittings to a depth of one foot above the top of the pipe, the trench shall be backfilled by hand or accepted mechanical methods. The Contractor shall use special care in placing this portion of the backfill to avoid injuring or moving the pipe. The backfill shall be placed and compacted with hand-operated mechanical tampers in loose layers of not more than four inches in depth to provide specified

compaction around and over the haunches of the pipe. Backfill in this section of the trench shall be with Class 1S material unless otherwise specified. Backfill material shall be compacted to a minimum density of 95 percent proctor (ASTM D 1577).

3.20 BACKFILL TO RESTORATION DEPTH:

- A. State and Borough Roads Including Driveways - Class 1 Material: From one foot above the top of the pipe to restoration depth, the trench shall be backfilled by hand or by accepted mechanical methods. Backfill in this section of the trench shall be Class 1 material. Contractor shall submit, prior to beginning construction, a list of the compaction equipment to be utilized on the project, the recommendations of the equipment manufacturer as to the maximum lift thickness that can be placed and the method of compaction. In no case shall lift thickness placed exceed the limits specified by the manufacturer's recommendations or a maximum of two feet, which ever is the smaller. However, if the equipment manufacturer's specified compaction is followed and the specified compaction is not obtained, the Contractor shall, at his own expense, remove, replace and retest as many times as is required to obtain the specified compaction. Consolidation shall proceed from the center of the trench to the sides to prevent arching. Backfill material shall be compacted to a minimum density of 95 percent proctor (ASTM D1557). Compaction testing shall be performed by a geo-technical engineer hired by the contractor to confirm proper compaction is being achieved. Compaction test reports shall be provided to the Borough Engineer no later than one (1) week of the compaction testing.
- B. Lawn, Meadows and Cultivated Fields - Class 2 Material: From one foot above the top of the pipe to restoration depth, the trench shall be backfilled by hand or by accepted mechanical methods. Backfill in this section of the trench shall be Class 2 material. Contractor shall submit, prior to beginning construction, a list of the compaction equipment to be utilized on the project, the recommendations of the equipment manufacturer as to the maximum lift thickness which can be placed, and the method of compaction to be used with this equipment to achieve the required compaction. In no case shall lift thickness place exceed the limits specified by the manufacturer's recommendations or a maximum of two feet, whichever is the smaller. However, if the equipment manufacturer's specified compaction is followed and the specified compaction is not obtained, the Contractor shall, at his own expense, remove, replace and retest as many times as is required to obtain the specified compaction. Consolidation shall proceed from the center of the trench to the sides to prevent arching. Backfill material shall be compacted to a minimum density of 95 percent proctor (ASTM D 1557).

3.21 CLEAN-UP:

- A. During construction, the surfaces of all areas including, but not limited to, roads, streets and driveways shall be maintained on a daily basis to produce a safe, desirable, and convenient condition. Streets shall be swept and flushed after backfilling and recleaned as dust, mud, stones and debris caused by the work, or related to the work again accumulates. At no time should mud, stones, water or debris be allowed to enter the sanitary sewer or storm sewer facilities. Failure of the Contractor to perform this work shall be cause for the Borough to order the work by others, and back charge all costs to the Contractor. The contractor is not permitted to wash, sweep or place any construction clean-up activities into the sanitary sewer system.
- B. All surplus materials furnished by the Contractor and temporary structures shall be removed from the site by the Contractor. All dirt, rubbish and excess earth from the excavation shall be disposed of by the Contractor in a manner and place acceptable to all governing agencies. The construction site shall be left clean at the end of each working day to the satisfaction of the Borough. All surplus materials furnished by the Borough and delivered to the site by the Contractor shall be removed and delivered by the Contractor to a location designated by the Borough. All surplus materials furnished and delivered by the Borough will be removed by the Borough.
- C. In the execution of this work, the Contractor shall conform to the approved erosion and sedimentation control plan.

3.22 RESTORATION OF UNPAVED AREAS:

- A. The Contractor shall crown to such height as required by the Borough the top of all backfilled excavation in all unpaved areas, where such areas are not used as a way for vehicles.

3.23 RESPONSIBILITY FOR CONDITION OF EXCAVATION:

- A. The Contractor shall be solely responsible for the condition and results of all excavations made by him. All slides and cave-ins shall be removed by the Contractor at whatever time and under whatever circumstances they may occur.
- B. The failure or refusal of the Borough to suggest the use of bracing or sheeting; or a better quality, grade or section, or larger sizes of steel or timber; or to suggest sheeting, bracing, struts or shoring to be left in place, shall not in any way or to any extent relieve the Contractor of any responsibility concerning the condition of excavation or any of his obligations, nor impose any liability on the Borough Engineer or the Borough; nor shall any delay, whether caused by any action or want of action on the part of the Contractor, or by any act of the Borough Engineer, Borough or their agents or employees resulting in the keeping of an

excavation open longer than would otherwise been necessary, relieve the Contractor from the necessity of properly and adequately protecting the excavation from caving or slipping, nor from any of his obligations relating to injury of persons or property.

3.24 PROTECTION OF UTILITIES, PROPERTY AND STRUCTURES:

- A. The Contractor shall notify all utility companies in advance of construction to include requesting the utilities to be located in accordance with Pennsylvania Act 187, and cooperate with agents of these companies during the progress of the work. Procedures for emergency action and repairs to utilities shall be established with the utility company prior to commencement of the work. During the course of his work, if the Contractor damages any of the aforementioned utilities, he shall immediately follow the procedure of emergency action and repair as established at his own expense.
- B. Whenever the Contractor, during the progress of the excavation, shall uncover service pipes or lines, which because of injury or age are in poor condition, he shall immediately notify the proper Borough in order that steps may be taken for replacement or repair. Locations of repairs, and the procedures of repairs that have been made shall be recorded by the Contractor.
- C. The Contractor shall, at his expense, sustain in their places and protect from direct or indirect injury all pipes, conduits, tracks, walls, buildings and other structures or property in the vicinity of his work, whether above or below the ground, or that may appear in the trench. He shall at all times have a sufficient quantity of timber and plank, chains, ropes, etc. on the ground and shall use them as necessary for sheeting his excavations and for sustaining or supporting any structures that are uncovered, undermined, endangered, threatened or weakened, whether such structures are or are not shown on the drawings.
- D. Pipes and underground conduits exposed as a result of the Contractor's operations shall be adequately supported along their entire exposed length by timber or planking, installed in such a manner that the anchorage of the supporting members will not be disturbed or weakened during the backfilling operation. Backfill of selected material shall be carefully rammed and tamped under and around the supports and all supports shall be left in place as a guard against breakage of the supported structure due to trench settlement.
- E. Where necessary, in order to keep one side of the street or roadway free from any obstruction or to keep the material piled alongside of the trench from falling on private property outside the right-of-way, a safe and suitable fence shall be placed alongside the trench.

3.25 REMOVAL OF OBSTRUCTIONS:

- A. Should the position of any pipe, conduit, pole or other structures above or below the ground be such as, in the opinion of the Borough, to require its removal, realignment or change will be done by the Contractor or will be done by the Owner of the obstructions, however, should this work be done by the Owner of the obstructions, the Contractor shall uncover and sustain the structures before such removal and before and after such realignment or change as constituting part of the work of the project.
- B. The Contractor shall break through and reconstruct, if necessary, the invert or arch of any storm sewer, culvert or conduit that may be encountered, if the said structure is in such a position that in the judgment of the Borough and Borough Engineer, as not to require its removal, alignment or complete reconstruction. Said work shall be discussed with the Borough and Borough Engineer prior to being performed.
- C. The Contractor shall not interfere with any persons, firms or corporations, or with the Borough in protecting, removing, changing or replacing their pipes, conduits, poles or other structures; but he shall suffer said persons, firms or corporations, or the Borough to take all such measures as they may deem necessary or advisable for the purpose aforesaid. At railway or railroad track crossings, any expense to which the owner of the trackage is put, in shoring up tracks, or in maintaining traffic shall be borne by the Developer and/or Contractor whether the same is billed directly to them or to the Borough.
- D. Trees in rights-of-way shall not be cut down except by authorization of the Borough.
- E. Shrubbery which would interfere with the construction shall be carefully removed, protected and replanted or replaced by the Contractor.

3.26 REPLACEMENT OF STRUCTURES BY CONTRACTOR:

- A. The Contractor shall restore (unless otherwise stipulated) all sidewalks, curbing, gutters, shrubbery, fences, poles, sod or other property and surface structures removed or disturbed as part of the work to a condition equivalent to that before the work began, furnishing all labor and materials incidental thereof.
- B. Replacement of curbs, sidewalks, gutters and drainage structure shall be in full accordance with the materials and methods in these Borough Specifications, unless otherwise specified.

END OF SECTION

SECTION 02665

WATERMAINS AND APPURTENANCES

SECTION 02665 - WATERMAINS AND APPURTENANCES

PART 1 - GENERAL

1.1 RELATED SECTIONS:

Section 02201 - Trench Excavation and Backfill

1.2 DESCRIPTION OF WORK:

- A. The work within this section includes, but is not limited to, the furnishing of all equipment, labor and material, and in performing all operations in connection with the installation of water mains, valves, fire hydrants, manholes, joint materials, water services and appurtenances and in performing all tests required. All work shall be in accordance with the specifications, applicable drawings and contract documents.

1.3 QUALITY ASSURANCE:

- A. Referenced standards shall be the following:
1. American National Standard Institute (ANSI)
 2. American Society for Testing and Materials (ASTM)
 3. American Water Works Association (AWWA)

1.4 SUBMITTALS:

- A. Certificates: Contractor shall submit three (3) copies of each manufacturer's certification attesting that the materials meet or exceed specification requirements.
- B. Shop Drawings: Submit manufacturer's descriptive and technical product data for pressure pipe, fittings, etc. prior to the start of work for approval in accordance with Section 01300.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS:

- A. Pipe: All pipe shall be ductile iron in full accordance with the Standard Specifications as set forth in the ANSI Specification A21.51 or AWWA Specifications C151, latest edition, with wall thickness in full accordance with the Standard Specifications as set forth in the ANSI Specification A21.50 or AWWA Specification C150, latest edition.
- B. Thickness: Minimum pipe thickness shall be Class 52 for all pipe and fittings.
- C. Joints: Joints shall be of the push-on type or mechanical joint type in full accordance with ANSI A21.11 or AWWA C111 Specifications, latest edition.

D. Linings: Cement mortar linings shall be in full accordance with ANSI Specification A21.4 and AWWA C104, latest edition, except the thickness of linings should not be less than the following:

3" through 12"	1/8"
14" through 24"	3/16"

E. Encasement: Polyethylene encasement shall be in accordance with ANSI/AWWA C105-77 Specifications, latest edition.

F. Fittings: All fittings shall be ductile iron in full accordance with the Standard Specification set forth in the ANSI A21.10 or AWWA C110 Specifications, Latest Edition.

An alternative to ductile iron fittings may be Harco Ductile Iron Mechanical Joint Fittings. The fittings shall be designed to 350 psi working pressure, Class 53 ductile iron, ASTM A536-72, Grade 80-55-06 Ductile Iron.

G. Restrained Joints: Restrained joint pipe and fitting shall meet the specifications contained herein. Restrained joints shall be capable of being deflected after assembly. The joints shall be designed for a water working pressure of 350 psi.

H. Mechanical Joint Retainer Glands: Retainer glands shall be U.L. listed ductile iron meeting AWWA C11-64 (ASAA21.11) and of adequate construction to withstand twice the rated working pressure of the adjoining pipe or fitting, whichever is greater. Set screws shall be heat treated A151 4140 steel. All components of dissimilar metal shall be protected from corrosion by hand application of a bituminous coating.

I. Tie-Rods: The rods shall be constructed of suitable material and adequate dimensions to withstand at least twice the rated working pressure of the adjoining pipe or fitting, whichever is greater. All components of dissimilar metal shall be protected from corrosion by hand application of a bituminous coating.

2.2 VALVES:

A. Gate Valves: Valves shall be iron body compression resilient seated disc type with restrained joint ends as called for on the plans. All buried valves shall be non-rising stem type with "O" rings. The design of the valve and seal plate shall be such that the seal plate can be fitted with new "O" rings while the valve is under pressure in the fully open position. Valves shall be equipped with a 2 inch square operating nut and adjustable cast iron valve boxes and covers as herein specified. Gate valves shall open counter-clockwise. Gate valves shall be manufactured in accordance with the latest revision of AWWA Specification C-500 as minimum requirement, and shall be as manufactured by American Darling, CRS-80, or approved equivalent.

B. Check Valves: Valves shall be standard iron body swing type with straightaway passages for full pipe area. Valves shall be bronze mounted with self-adjusting rubber or leather-faced discs. Valves shall be either plain type or equipped with

outside lever and shall have joint ends as shown on the plans. Check valves shall be manufactured in accordance with AWWA C508.

- C. Air Release Valve: The work shall include the complete assembly with tap, shutoff valve, blowoff, air valve, piping with fittings and union, all complete and ready for operation. Air valves shall be a special stainless steel float enclosed in the valve body with an attached lever for opening and closing the air discharge port. The design of the float and lever shall be such as to ensure opening of the valve port under maximum internal pressure. The assembly shall neither leak nor the valve stick under service conditions. All components of the valve assembly shall be stainless steel material. Valves shall be A.R.I. Valves, Inc., or approved substitution.
- D. Valve Boxes: Valve boxes shall be adjustable roadway type constructed of cast iron with a 5-1/4 inch shaft provided with screw type extension pieces and either round or oval detachable base. Box shall have a plug lid fitting into a recessed seat. The lid shall have the word "WATER" cast on the top surface. All parts of the box shall be of tough gray iron, free from cold shuts and blow holes and shall be painted with black bituminous paint. Valve boxes shall be set at or above the surface of the adjoining ground or roadway.

2.3 HYDRANTS:

- A. Hydrants shall be cast iron body, fully bronze mounted, suitable for a working pressure of 150 lbs. per square inch, and shall be in accordance with the latest specifications of the AWWA. Hydrants shall be constructed in a manner permitting withdrawal of internal working parts without disturbing the barrel or casing. Valve, when shut, shall be reasonably tight when upper portion of barrel is broken off. Valve opening shall be at least 4.5 inch in diameter, with net area of waterway at smallest, with valves wide open, not less than 120 percent of valve opening. Each hydrant shall be tested to a hydrostatic pressure of 350 lbs. per square inch with valve in both open and closed positions.
- B. The standpipe shall be connected to the ground line either by a frangible coupling or by flanges with frangible cast iron bolts. The main valve rod at the ground line shall be connected employing a frangible coupling. Hydrants shall be provided with an "O" ring type seal plate. The seal plate shall be fitted with at least two "O" rings. The lower "O" ring shall serve as the pressure seal and the upper "O" ring as combined dirt and moisture seal.

2.4 WATER SERVICE LINES:

- A. Multiple service to more than one property for a water service line is not permitted. A single water connection to the Borough's system for each property is required.
- B. Water service lines shall be in conformance with ASTM B88, Type K, for ¾ inch to 2 ½ inch lines. Water service lines listed below in the Water Supply and Distribution section of the International Plumbing Code may be substituted with specific Borough approval.

MATERIAL	STANDARD
Brass pipe	ASTM B 43
Chlorinated polyvinyl chloride (CPVC) plastic pipe and tubing	ASTM D 2846; ASTM F 441; ASTM F 442; CSA B137.6
Copper or copper-alloy pipe	ASTM B 42; ASTM B 302
Copper or copper-alloy tubing (Type K, WK, L, WL, M or WM)	ASTM B 75; ASTM B 88; ASTM B 251; ASTM B 447
Cross-linked polyethylene (PEX) plastic tubing	ASTM F 876; ASTM F 877; CSA B137.5
Cross-linked polyethylene/aluminum/cross-linked polyethylene (PEX-AL-PEX) pipe	ASTM F 1281; ASTM F 2262; CAN/CSA B137.10M
Cross-linked polyethylene/aluminum/high-density polyethylene (PEX-AL-HDPE)	ASTM F 1986
Ductile iron pipe	AWWA C151/A21.51; AWWA C115/A21.15
Galvanized steel pipe	ASTMA53
Polyethylene/aluminum/polyethylene (PE-AL-PE) composite pipe	ASTM F 1282
Polypropylene (PP) plastic pipe or tubing	ASTM F 2389; CSA B137.11
Stainless steel pipe (Type 304/304L)	ASTM A 312; ASTM A 778
Stainless steel pipe (Type 316/316L)	ASTM A 312; ASTM A 778

- C. Service Line Fittings: Threads for underground service line fittings shall be in full accordance with AWWA C800.
- D. Corporation Cocks: Inlet thread shall be Mueller or iron pipe type as directed, with flange union couplings or wiped joints. Type shall be Mueller or approved substitution.
- E. Curb Stops: Ground key for use with copper water service. Make shall be Mueller or approved substitution.
- F. Curb Boxes: Extension type with the stationary rod. Pattern shall be approved by Borough. The boxes and lids shall be coated with bituminous enamel. Extension range shall be 42 inches to 60 inches.

2.5 MISCELLANEOUS:

- A. Concrete Thrust Blocks: Thrust blocks shall be in accordance with the latest revision of ANSI/AWWA C600 and shall be constructed to the dimensions shown on the plans. Care shall be taken during the concrete placement so that no joint nuts and bolts come in contact with the concrete.
- B. Tapping Sleeves and Valves: Tapping sleeves and valves shall be of the sizes shown on the drawings and shall be designed to operate at a working pressure of 200 psi unless otherwise specified. The valves shall be inside screw, iron body, compression resilient seated disc with either mechanical joint or hub ends and 2 inch square operating nuts. Valves shall open to the left.
- C. Mortar: Mortar for jointing and plastering the outside of brick manholes shall consist of one part Portland cement and two parts fine sand. For brickwork, lime may be added to the mortar in an amount of not more than 25 percent of the volume of the cement. Sand shall be clean and sharp and conform to the ASTM Specification C-

144. Hydrated lime shall conform to ASTM Specification C-6. Retempered mortar or mortar which has been mixed for more than 45 minutes shall not be used.

- D. Concrete: Concrete shall have a compressive strength of not less than 3,000 psi after 28 days (tests to be in accordance with Standard Method of Compression Tests of ASTM).
- E. Cast Iron: Gray iron castings shall be manufactured from iron conforming to ASTM A48, Class 35B, as noted in Section 3.1 of AASHTO M306. The iron material used in products provided shall have a minimum recycled material content of 75 percent. The recycled materials shall consist of post-consumer material.
- F. Frames/Covers: Manhole frame and cover shall be of cast gray iron with self-sealing cover as manufactured by Neenah Foundry Company frame model R-1642, cover model R-1642 (Type B) or approved equivalent, machined and having the words "WATER" cast approximately in the center of the cover. Frames shall be securely attached to the top of the manhole section by four stainless steel anchor bolts at 180 degrees C to C. Gray iron castings shall be manufactured from iron conforming to ASTM A48, Class 35B, as noted in Section 3.1 of AASHTO M306. The iron material used in products provided shall have a minimum recycled material content of 75 percent. The recycled materials shall consist of post-consumer material. Joint material between the frame and manhole or grade ring shall be as specified in Manhole Joint Sealing Material. The top of the manhole lid shall not extend above the frame.

2.6 INSPECTION:

- A. Field Inspection: All pipe and appurtenances shall be furnished, installed and tested for defects in material and/or workmanship in the manner specified and in the presence of and as accepted by the Borough.
- B. Disposition of Defective Material: All material found during the progress of the work to have cracks, flaws or other defects will be rejected by the Borough. All defective materials furnished by the Contractor shall be promptly removed by him from the site at his own expense.

2.7 HANDLING OF MATERIAL:

- A. Replacement of Damaged Material: The Contractor shall replace, at his own expense, all material furnished by him and found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all materials and labor required for replacement of installed material. Any material furnished by the Borough that becomes damaged after acceptance by the Contractor shall be replaced by the Contractor at his own expense.
- B. Responsibility for Safe Storage: The Contractor shall be responsible for the safe storage of material furnished by or to him, and accepted by him, and intended for the work, until it has been incorporated in the completed project. The interior of all pipe,

fittings and other accessories shall be kept free from dirt and foreign matter at all times. All equipment and materials subject to damage from freezing shall be drained and stored in a manner which will protect them.

- C. Hauling: All materials furnished by the Contractor shall be delivered and distributed at the site by the Contractor. Materials furnished by the Borough shall be picked up by the Contractor at points designated and hauled to and distributed at the site.
- D. Care of Pipe Coating and Lining: Pipe shall be handled so the lining will not be damaged. If, however, any part of the lining is damaged, the repair shall be made by the Contractor at his expense in a manner satisfactory to the Borough.

PART 3 - CONSTRUCTION

3.1 MAINTENANCE OF FLOW:

- A. The Contractor shall be responsible for coordinating and maintaining construction of all existing watermains, water services and fire hydrants. The Contractor shall submit his plans for maintenance of flow prior to the start of construction for approval by the Borough.

3.2 PIPE INSTALLATION:

- A. General: All pipe shall be laid and maintained to the required lines and grades with fittings and valves at the required locations; spigots centered in bells; and all valves plumb. The pipe shall be laid in the backfill materials as specified. Pipe laying shall commence at the lowest point and proceed up grade.
- B. Caution in Excavation: The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined, and he shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on his part.
- C. Depth of Pipe: All pipe shall be laid to the depth shown on the contract drawings or a minimum of 4.0 feet from finished grade to the crown of pipe.
- D. Handling of Water Main Material Into Trench: Proper implements, tools and facilities satisfactory to the Borough shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe, fittings, valves, etc., shall be carefully lowered into the trench piece by piece by means of a derrick, ropes or other suitable tools or equipment, in such a manner as to prevent damage to sewer line materials, protective coatings and linings. Under no circumstances shall such materials be dropped or dumped into the trench.
- E. Hammer Test: The pipe and fittings shall be inspected for defects and while suspended above grade, be rung with a light hammer to detect cracks.

- F. Cleaning Pipe and Fittings: All lumps, blisters and excess coal tar coating shall be removed from the bell and spigot end of each pipe, and the outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and dry and free from oil and grease before the pipe is laid.
- G. Laying Pipe: Every precaution shall be taken to prevent foreign material from entering the pipe while the pipe is being placed in the line. If the pipe-laying crew cannot put the pipe into the trench and in place without getting into it, the Borough may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made into the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.
- H. Cutting Pipe: The cutting of pipe for inserting valves, fittings or closure pieces shall be done in a neat and workmanlike manner, without damage to the pipe, so as to leave a smooth end at right angles to the axis of the pipe.
- I. Permissible Deflection of Joints: If deflection is required, make after joint is assembled. The amount of deflection shall not exceed 50 percent of the maximum limits as specified in the AWWA Standard C600, latest revision.
- J. Unsuitable Conditions for Laying Pipe: No pipe shall be laid in water or when, in the opinion of the Borough, trench conditions are unsuitable.
- K. Variations: The Borough reserves the right to vary the line and/or grade from that shown on the drawings for the pipe lines and manholes and to vary the location of fittings, valves and hydrants when such changes may be necessary or advantageous.
- L. Mechanical Joints: The spigot end of the pipe shall be centrally located in the bell so that the rubber gasket is evenly seated.
- M. All loose rust or foreign matter shall be removed from the inside surfaces of the bell and outside surface of the spigot prior to assembly. Bolts shall be tightened uniformly with a ratchet wrench so as to affect the joint seal. The normal range of bolt torques to be applied are:

<u>Bolt Size-Inches</u>	<u>Torque-Ft. Lbs.</u>
5/8	45 - 60
3/4	75 -90
1	100 - 120
1-1/4	120 - 150

- N. If effective sealing is not attained at the maximum torque indicated above, the joint shall be disassembled and reassembled after thorough cleaning.
- O. Push-On Type Joints: The joint shall be assembled as recommended by the manufacturer so as to affect the joint seal.

- P. A minimum of 18 inches vertical separation shall be provided between the water main and any pipe crossing. If 18 inches of clearance cannot be achieved, the other utility shall be encased in concrete. The concrete encasement shall extend 10 feet on each side of the pipe crossing.
- Q. A minimum of 10 feet horizontal separation shall be provided between the sanitary sewer pipe and any water main.
- R. A minimum of 5 feet horizontal separation shall be provided between the water main and all other utilities (i.e. gas, electric, telecommunications, storm water, etc.).

3.3 FITTINGS AND VALVES:

- A. General: Valves and fittings shall be set and jointed to pipe in the manner heretofore specified for cleaning, laying and jointing pipe.
- B. Valve Boxes and Valve Pits: A cast iron valve box or a masonry pit shall be provided for every valve as shown on the plans. A valve box shall be provided for every valve which has no gearing or mechanism or in which the gearing or operating mechanism is fully protected with a cast iron grease case. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve, with the box cover flush with the surface of the finished pavement or such other level as may be directed.
- C. Drainage of Mains: Mains shall be drained through drainage branches or blow-offs to dry wells from which the water can be pumped. Drainage branches, blowoffs, air vents and appurtenances shall be provided with gate valves and shall be located and installed as shown on the plans.

3.4 HYDRANTS:

- A. Location: Hydrants shall be located as shown on the plans or as directed by the Borough in a manner to provide complete accessibility and so that the possibility of damage from vehicles or injury to pedestrians will be minimized.
- B. When placed behind the curb, the hydrant barrel shall be set so that no portion of the pumper or hose nozzle cap will be less than 6 inches or more than 12 inches from the gutter face of the curb.
- C. When set in the lawn space between the curb and sidewalk, or between the sidewalk and the property line, no portion of the hydrant or nozzle cap shall be within 12 inches of the sidewalk.
- D. Position: All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb, with the pumper nozzle facing the curb, except that hydrants having two hose nozzles 90 degrees apart shall be set with each nozzle facing the curb at an angle of 45 degrees. Hydrants shall be set to the established grade, with the nozzles at least 12 inches above the ground, as shown or as directed by the Borough.

- E. Connection to Main: Each hydrant shall be connected to the main with a 6 inch branch controlled by an independent 6 inch gate valve except as otherwise directed.
- F. Hydrant Drainage in Pervious Soil: Wherever a hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone mixed with coarse sand, from the bottom of the trench to at least 6 inches above the waste opening in the hydrant and to a distance of 1 foot around the elbow.
- G. Hydrant Drainage in Impervious Soil: Wherever a hydrant is set in clay or other impervious soil, a drainage pit 2 feet in diameter and 3 feet deep shall be excavated below each hydrant and filled completely with coarse gravel or crushed stone mixed with coarse sand, under and around the elbow of the hydrant and to a level of 6 inches above the waste opening.

3.5 ANCHORAGE:

- A. Anchorage for Hydrants: The bowl of each hydrant shall be well braced against unexcavated earth at the end of the trench with stone slabs or concrete backing, or it shall be tied to rods or clamps as shown or as directed by the Borough.
- B. Anchorage for Plugs, Caps, Tees, and Bends: All plugs, caps, tees, and bends deflecting 11-1/4 degrees or more on mains 6 inches in diameter or larger shall be provided with a reaction backing, or movement shall be prevented by attaching suitable metal rods or clamps as shown on the plans or as directed by the Borough. All lateral line valves shall be rodded to the main line tee with 3/4 inch threaded tie rods if a flanged or restrained joint is not utilized.
- C. Reaction Backing: Reaction backing shall be concrete of a mix not leaner than 1 part cement, 2-1/2 sand, 5 stone, and having a compressive strength of not less than 2,000 psi, at 28 days. Backing shall be placed between solid ground and the fitting to be anchored; the area of bearing on the pipe and on the ground in each instance shall be as shown on the plans or as directed by the Borough. The backing shall, unless otherwise shown or directed, be so placed that the pipe and fitting joints will be accessible for repair.
- D. Vertical Reaction Blocking: All vertical reaction blocking shall be accepted by the Borough. Reaction blocking shall be used where any elbow or offset is used in vertical direction.
- E. Tie Rods: Metal harness of tie rods of adequate strength to prevent movement shall be used. Steel rods/clamps shall be galvanized and painted with two coats of asphalt type paint.

3.6 CONCRETE CRADLE AND ENCASEMENT:

- A. Preparation: Prior to the formation of the cradle or encasement, temporary supports consisting of solid concrete bricks or cap blocks shall have minimum dimensions and

shall support the pipe at not more than two locations, one at the bottom of the barrel of the pipe adjacent to the shoulder of the socket and the other near the spigot end.

- B. Placing: After jointing of the pipe has been completed, concrete shall be uniformly poured beneath and on both sides of the pipe. Placement shall be done by the use of suitable equipment. The concrete shall be wet enough during placement to permit its flow, without excessive prodding, to all required points around the pipe surface. The width of cradle shall be such as to fill completely the trench width. In case of extremely wide trenches, concrete encasement may be confined above the top of the pipe to a narrower width, but in no case shall it be less than the width of trench required for the size of pipe being used.
- C. Before depositing concrete, the space within the limits of the pour shall have been cleared of all debris and water. Water shall not be allowed to rise adjacent to, or flow over, concrete deposited for less than 24 hours. Concrete shall be protected from the direct rays of the sun and kept moist by a method acceptable to the Borough, for a period of 7 days or until backfilling is begun. In no case shall backfill begin within 36 hours of the time of placing and the Borough shall have strict control of the rate of backfilling.

3.7 BLOWOFF CONNECTION:

- A. See Construction Detail #22.

3.8 VAULTS/PITS:

- A. General: Water system vaults/pits shall be constructed of precast concrete units with cast iron frames and covers in the locations shown on the drawings or as directed by the Borough and in accordance with the construction details. Shop drawings shall be submitted by the Contractor for the Borough's review.
- B. Concrete or mortar shall conform to the requirements specified herein.
- C. Frames, Covers and Steps: Cast iron frames and covers and manhole steps shall conform to the drawings in all essentials of design. Standard castings differing in nonessential details and accepted by the Borough will be acceptable. Frames and covers shall be machined to produce a tight, rattleproof fit. The frames and covers shall be set that the top of the cover will be flush with or higher than the finished grade as directed by the Borough. Steps when shown on drawings or specified shall be furnished and set as manhole construction progresses.

3.9 WATER SERVICE LINES:

- A. To avoid cutting or excavating the existing roadway, all services less than 4 inches shall be bored with an auger or pushed through a drive pipe. (The drive pipe may be removed when the service is installed.) Where rock or other obstructions are encountered, the location of the service line may be moved as much as is necessary.

3.10 HYDROSTATIC TESTS:

- A. **Leakage Test:** After the pipe has been laid and backfilled as specified, all newly laid pipe or any valve sections thereof, shall be subjected to a hydrostatic pressure of 150 pounds per square inch, or 50 percent in excess of the normal working pressure, whichever is greater.
- B. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.
- C. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula

$$L = \frac{ND(P)^{1/2}}{7400}$$

in which "L" equals the allowable leakage in gallons per hour; "N" is the number of joints in the length of pipelines tested; "D" is the nominal diameter of the pipe, in inches and "P" is the average test pressure during the leakage test, in pounds per square inch gauge. (The allowable leakage according to the formula is equivalent to 23.3 US gallons per 24 hours per mile of pipe per inch nominal diameter, for pipe in 18-foot lengths evaluated on a pressure basis of 150 psi.). The duration of the test under pressure shall be two hours.

- D. **Procedure:** Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Borough. The pump, pipe connections and all necessary apparatus including gauges, shall be furnished by the Contractor. The Contractor will make all taps into the pipe and furnish all necessary assistance for conducting the tests.
- E. **Expelled Air Before Test:** Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow-off are not available at high places, the Contractor shall make the necessary taps at such points before the test is made and insert the plugs after the test has been completed.
- F. **Variation from Permissible Leakage:** Should any test of pipe laid disclose leakage greater than that specified, the Contractor shall, at his own expense, locate, repair and replace the defective joints, pipe or fittings until the leakage is within the specified allowance.
- G. Where any section of a main is provided with concrete reaction backing, the hydrostatic pressure test shall not be made until at least five (5) days have elapsed after the concrete reaction backing was installed. If high early strength cement is used in the concrete reaction backing, the hydrostatic pressure test shall not be made until at least two (2) days have elapsed.

- H. The Borough shall be present during the operating of valves required to fill mains for pressure and leakage tests.
- I. The Contractor shall schedule the pressure and leakage test at least 48 hours in advance of the test day with the Borough. No testing will be authorized unless air temperature is greater than 35 degrees F.
- J. The pressure and leakage tests shall be monitored by the Borough.
- K. The Contractor will furnish laboratory calibrated test gauge and measuring device for the leakage test.
- L. All field joints of fittings, valves and hydrants shall be exposed and examined during pressure and leakage test.
- M. Section under test shall be brought to test pressure of 150 psi at ½ hour intervals during the testing. The Borough will record both the makeup water pressure at each ½ hour repressurization.
- N. If the test is applied against an existing valve and the Contractor has determined that said valve is passing, Contractor shall excavate valve at his expense so Borough can perform a sound test on the valve. In addition to the sound test, test section shall be valved off and post pressure applied. Borough will observe pressure for 24 hours. This section should remain at post pressure if valve is passing.

3.11 DISINFECTION OF LINES:

- A. Preliminary Flushing: Prior to disinfection, the lines shall be flushed as thoroughly as possible with the water pressure and outlets available. Flushing shall be done after the line leakage test has been made. Disinfection shall be in full accordance with the latest revision of AWWA C651 and these specifications.
- B. Chlorination of Completed Line: Before being placed in service, the entire line shall be chlorinated. Chlorine may be applied by the following methods: Liquid chlorine and calcium hypochlorite granules, sodium hypochlorite solution and calcium hypochlorite tablets.
 - I. The chlorinating agent shall be applied at the beginning of the section adjacent to the feeder connection and shall be injected through a corporation cock, hydrant or other connection ensuring treatment of entire line.
 - II. Water shall be fed slowly into new line with chlorine applied in amounts to produce a dosage of 40 to 50 ppm. Mains previously filled shall be treated to a concentrated dosage at intervals along the line and retained for a period of 8 hours or more. A residual of not less than 5 ppm shall be produced in all parts of the line.
 - III. During the chlorination process, all valves and accessories shall be operated. After chlorination, the water shall be flushed from the line at its extremities until

the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply.

- IV. Contractor shall review disinfection procedures and time tables with Borough at least 3 days prior to implementing them.
- C. Liquid Chlorine: Chlorine gas-water mixture shall be applied by means of a solution feed chlorinating device. Chlorine gas shall be fed directly from a chlorine cylinder equipped with suitable device for regulating the rate of flow and the effective diffusion of gas within the pipe.
- D. Calcium Hypochlorite: Calcium hypochlorite shall be comparable to commercial products known as HTH perchlolen and maxochlor, a solution consisting of 5 percent of power to 95 percent of water by weight, should be prepared. The calcium hypochlorite and water mixture, first made into a paste and then thinned to a slurry, shall be injected or pumped into the newly laid line under the conditions specified hereinbefore.
- E. Final Flushing: Following chlorination, all treated water shall be thoroughly flushed from the line, at its extremities, until the replacement water throughout its length, upon test, be proved comparable to the quality of water in the existing water system.

3.12 BACTERIOLOGICAL TESTS:

- A. Chlorination of the completed line and two bacteriological tests shall be done at the expense of the Contractor as part of the construction contract. The tests shall be carried out by an approved laboratory and the results given to the Borough.

3.13 ABANDONMENT OF LINES AND SERVICES:

- A. Line and services to be abandoned shall be cut free from their sources and permanently capped to prevent leakage. This work shall be performed in a manner approved by the Borough.

END OF SECTION

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SECTION 02730

MANHOLES

SECTION 02730 - MANHOLES

PART 1 - GENERAL

1.1 RELATED SECTIONS:

Section 02201 - Trench Excavation and Backfill

1.2 DESCRIPTION OF WORK:

- A. The work within this section includes, but is not limited to, the furnishing of all equipment, labor, materials and performing all operations necessary to construct and install precast reinforced concrete manholes including steps and frames and covers as directed by the Borough, in accordance with Borough Specifications.

1.3 QUALITY ASSURANCE:

- A. Referenced standards shall be the following:

- 1) Pennsylvania Department of Transportation (PennDOT) Publication 408, Specifications and its revisions.
- 2) American Society for Testing and Materials (ASTM).
- 3) American Association of State Highway Transportation Officials (AASHTO).

1.4 SUBMITTALS:

- A. Certificates: Contractor shall submit three (3) copies of each manufacturer's certification attesting that the materials meet or exceed specification requirements.
- B. Shop Drawings: Submit detail shop drawings of manholes, frames and covers, manhole steps, manhole joint sealing material and flexible watertight gaskets prior to the start of work for approval in accordance with Section 01300.

PART 2 - MATERIALS

2.1 GENERAL:

- A. Materials for construction of manholes shall be new and unused and shall conform to the following.

- 1) Precast Reinforced Concrete Manhole Bases, Risers and Flat Slab Tops:
 - a. Concrete and steel reinforcement used in the manufacture of precast manhole bases, risers and flat slab tops shall conform to ASTM

C478 (latest revision). Type II cement shall be used in the construction of the manhole components.

- b. Provide four $\frac{3}{4}$ inch diameter, threaded inserts for the frame hold down bolts. The inserts shall be cast into the top sections at the manufacturer's plant. Coordinate locations of inserts between the manhole manufacturer and the frame and cover manufacturer.
- c. Through-wall lifting holes are not permitted. Provide factory installed lifting keys or lugs cast integrally in manhole components.
- d. The entire outer surface shall be coated with bitumastic to a minimum thickness of 20 mils. The manhole sections shall be precoated at the factory, however, the Contractor shall be required to complete any patching due to damage during installation.

2) PVC Coated Precast Reinforced Concrete Manhole Bases, Risers and Flat Slab Tops:

a. PVC Liner system

- I. PVC Coated Manholes shall be as manufactured by A-Lok Products, Inc. or pre-approved equal. The interior plastic liner for the precast manholes shall be Dura Plate 100. The Dura Plate 100 liner, when installed, shall provide a continuous, impermeable lining which will shield the precast concrete manhole against deterioration caused by corrosive material. The PVC Coated Manholes shall also meet all of the requirements specified for standard precast concrete manholes.
- II. The design of the liner shall insure that it will conform to the contour of the manhole and form a permanent mechanical bond to the concrete through use of preformed horizontal ribs. The liner will be formed in such a manner that the joints between the manhole sections will be afforded protection through the use of a continuous PVC return into the joint for a minimum $\frac{3}{4}$ of an inch. Provisions will be made to allow the pipe openings to be sealed.
- III. The liner shall be manufactured from Polyvinyl Chloride resin and shall be white in color. The compound will result in a semi-rigid material suitable for thermoforming to the contour of the manhole. The liner may be fabricated in panels with the panels joined together by a slotted strip of EDPM rubber according to the manufacturer's specifications. All plastic liner sections shall be free of cracks, pinholes or other defects

adversely affecting the protective characteristics of the material and shall have a minimum thickness of 65 mils.

- IV. The Dura Plate 100 liner will be installed during the precasting process in accordance with the specific instructions of the manufacturer.
- V. The manhole manufacturer shall provide installation instructions to each contractor prior to initial use of the Dura Plate 100 liner. The manhole will be installed using a joint sealing material as later specified.
- VI. The joint sealing material shall be placed on the joint surfaces as recommended by the manufacturer, to provide a watertight seal by filling the annular cavity, while providing sufficient squeeze-out between the PVC returns to protect against corrosion.
- VII. Flexible, corrosion-resistant, watertight connections between manhole castings and precast concrete cones or flattops shall be installed for all PVC coated manholes. This connection shall be accomplished by Water-Lok Connectors, as manufactured by A-Lok Products, Inc., or approved equal. The connector shall allow flexibility in reaching finished grade and permit up and down movement to accommodate freeze/thaw conditions close to the ground surface without compromising watertightness. This shall be accomplished by utilizing two independent, corrosion-resistant PVC sleeves which telescope within each other to allow adjustment to the correct grade. A seal is created between the two independent sleeves by a system of neoprene o-rings. The top and bottom flanges of the Water-Lok Connector are sealed to their appropriate mating surfaces by a preformed butyl gasket material furnished with the assembly. The Bolt Fastening Assembly shall be an anti-floating assembly.

b. HDPE/PP-R Liner System

- I. Liner shall be AGRU Sure Grip® CPL system with HDPE/PP-R with a minimum thickness of 2 mm (0.0787 inch) as furnished by Terre Hill Concrete Products.
- II. All HDPE liner sheets and anchors shall be extruded during a single manufacturing process. Anchoring studs shall not be welded or mechanically attached to the liner. The minimum anchoring stud concentration shall be 39 studs per square foot. The anchoring stud shall have a pull out resistance of 112.5 lbs/stud.

- III. Flat non-anchored liner sheet, used for overlapping joints, shall have a minimum thickness of 3 mm (0.1181 inch). The cap strip shall be capable of spanning across a maximum gap of one inch that may occur at the joint between precast sections without damage to the lining.
- IV. Manufacturer certified welders with extrusion welding equipment shall weld all final joints with extrusion welds.
- V. Physical Properties
 - a) The AGRU Sure Grip® CPL systems and welding rod shall be manufactured from the same resins and meet the following properties:

Property	Testing Method	Units	HDPE	PP-R
Density	ASTM D792	g/cm ³	0.0945	1.78
MFI (Melt Flow Index)	ASTM D1238	g/10min	(190/5)	(190/5)
Heat Reversion (Dimensional Stability)	ASTM D1637	%	<3	<3
Yield Stress	ASTM D638	PSI	≥2175	≥2900
Elongation of yield.	ISO527-3 specimen	1B%	≥10-	≥12
Elongation	ISO527-3 specimen	1B%	>450	>200
Fire Classification	UL-94		94-HB	94-HB
Maximum Working Temperature		° C ° F	60 140	90 194

- b) Upon request, the manufacturer shall provide written certification that the liner meets or exceeds the requirements of this specification.
- c) Liner material shall be fitted and secured in the form prior to placing the concrete.
- d) All joints within each precast section shall be sealed by extrusion welding performed by AGRU certified welders, before shipment to the job site. Joints between precast sections shall be welded in the field by Terre Hill Concrete Products; Taylor Precast; US-Precast; or certified equal.

- e) Manhole steps shall be used. The joint between the step and liner shall be shop welded per manufacturer's recommendation.

VI. Assembly

- a) The responsibility of providing a leak free precast structure rests on the utility contractor installing the lined structure. Welding cannot occur when concrete joints leak.
- b) Place only a single strip of gasket towards the exterior of the precast section joints to prevent entrapped air blowouts and oozing of the sealant on the liner surface.

VII. Field Welding

- a) All welding shall be performed by AGRU certified welders in accordance with the published directives and procedures of the manufacturer. Completion of welding shall provide a monolithic concrete protective liner.
 - i. The following welding methods are acceptable:
 - Extrusion Welding (For all final welds)
 - Wedge welding
 - Butt welding
 - Hot air welding
 - ii. The joint areas shall be clean, dry and free of oil and lubricants. The prepared edges shall be free of chips and notches detrimental to maximum fusion of the weld.
 - iii. All welded joints shall be finish welded with an extrusion weld, spark tested for leaks and visually inspected.
- c. Concrete: Composition and compressive strength conforming to ASTM C478 except use Type II cement in manhole components and increase compressive strength to 4000 psi (at 28 days) in precast bases.
 - I. Openings in precast concrete manholes to accommodate the connections of piping shall be custom preformed for each manhole at the time of manufacture. Openings for connection of the piping shall be of the size and shape required for the particular type of seal provided.
 - II. All precast concrete manholes shall be designed to accommodate AASHTO highway load class HS-20.

- III. The tops of the precast bases shall be accurately formed to receive the tongue of the bottom precast concrete manhole section of the wall.
 - IV. Precast top sections shall have hold down bolt inserts factory cast in the top section. Each top shall have four (4) three quarter (3/4) inch threaded inserts or slotted inserts to accommodate manhole frame hold down bolts. Insert types designed for an ultimate load in tension of 12,500 pounds. Coordinate insert locations in the top section to match the bolt hole locations on the manhole frame. All inserts shall be factory plugged before shipping.
- d. Steel Reinforcement:
- I. Steel reinforcement used in the manufacture of precast concrete manhole bases and precast riser and top sections shall conform to the requirements specified in Section 6 of ASTM C478.
- e. Pipe Openings and Seals:
- I. Openings shall be pre-formed during manufacturing in each base and Riser section requiring a piped opening. Each opening shall accommodate the type of pipe and pipe seal required.
 - II. Pipe opening seals shall meet the requirements specified in ASTM C923.
 - III. Pipe opening seals integrally cast with holes for pipe in precast concrete manhole walls shall be all-rubber composition, flexible, pliable and provide up to 15 degrees lateral, diagonal or vertical pipe deflection. Gaskets shall be leak proof tested to 20 psi, and shall meet or exceed rubber quality standards of ASTM C-443.
 - IV. Pipe opening seals not cast with holes for pipe shall be pliable and permit deflection. A strong rubber coated steel center compression ring and a long rubber sleeve with a deep groove secured stainless steel clamp shall be used to create a positive seal.
 - V. Rubber adapter ring for use on PVC pipe in poured-in – place manhole bases shall be recommended by the manufacturer.
 - VI. Manhole adapters shall be provided for all PVC pipe in cut-in pipe opening and shall be recommended by the pipe manufacturer.

f. Frame Hold Down Bolts:

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

2.2 MANHOLE JOINT SEALING MATERIAL:

- A. Joints between manhole sections shall be provided with double preformed joint sealing material such as ConSeal CS-102B, or approved equal. The chemical composition of the sealer shall be as follows: Hydrocarbon plastic content, ASTM D4; Inert Mineral Filler, AASHTO T111-42; Volatile Matter, ASTM D6.

2.3 FLEXIBLE WATERTIGHT GASKETS:

- A. Bases shall have flexible watertight gaskets at the point of entry of sewer pipe into the manhole. The rubber materials shall conform to ASTM C443. The gaskets shall be cast into the manhole base to become an integral part of the concrete. The gaskets shall be Presswedge II as manufactured by Press-Seal Gasket Corporation, Dura-Seal II as supplied by Terre Hill Concrete Products, or equivalent.
- B. Cutting of openings in precast manholes in the field will only be permitted where authorized by the Borough, and these openings shall be of proper size as required for the installation of a gasket type waterstop. Non-shrink grout shall be tightly placed into the annular space from both the inside and outside of the wall in such a manner as to completely fill the annular space and provide a watertight installation.

2.4 STANDARD FRAME AND COVER:

- A. Manhole frame and cover shall be of cast gray iron with self sealing cover as manufactured by Neenah Foundry Company frame model R-1642, cover model R-1642 (Type B) or approved equivalent, machined and having the words "SANITARY SEWER" cast approximately in the center of the cover. Frames shall be securely attached to the top of the manhole section by four stainless steel anchor bolts at 180-degrees C to C. Gray iron castings shall be manufactured from iron conforming to ASTM A48, Class 35B, as noted in section 3.1 of AASHTO M306. The iron material used in products provided shall have a minimum recycled material content of 75 percent. The recycled materials shall consist of post-consumer material. Joint material between the frame and manhole or grade ring shall be as specified in Manhole Joint Sealing Material. Manhole frame shall be specified to accommodate the manhole lid and the manhole insert. The top of the manhole lid shall not extend above the frame.

2.7 MANHOLE STEPS:

- A. Contractor shall provide reinforced plastic, or approved equivalent, manhole steps for manholes.

- B. Manhole steps shall be installed at the manufacturer's plant. Installation of manhole steps in the field shall not be permitted. Manhole steps shall be aligned vertically and spaced a maximum distance of 12 inches apart. The top step shall be 9" – 12" below the top of the precast structure.
- C. Reinforced plastic steps shall consist of ½ inch diameter deformed steep reinforcing bar completely encapsulated in polypropylene plastic. Reinforcing steel bar shall be Grade 60 as per ASTM A615 and the encapsulation material as per ASTM D2146-82, Type II, Grade 43758.

2.8 PRECAST CONCRETE MANHOLE GRADE RINGS:

- A. Concrete manhole grade rings for leveling units shall be full circle and shall be manufactured as per ASTM C-478 and shall be as thick as necessary to provide the required grade adjustment. Each grade ring shall have two holes cast therein at the manufacturer's plant for the manhole frame hold down bolts. Joint material between grade rings shall be as specified in Manhole Joint Sealing Material. No more than two (2) grade rings shall be used for elevation adjustment.
- B. Rubber Grade Rings:
 - 1) Rubber grade rings (rubber adjustment riser) for leveling units shall comply with the following:
 - a. Density:
 - 1) As specified in ASTM C 642-90.
 - b. Durometer Hardness:
 - 1) As specified in ASTM D 2240.
 - c. Compression:
 - 1) As specified in ASTM D 575.
 - d. Compression Set:
 - 1) As specified in ASTM D 395.
 - e. Freeze and Thaw:
 - 1) As specified in ASTM C 672-91.
 - f. Coefficient of Thermal Expansion:
 - 1) As specified in ASTM C 5314-85.
 - g. Weathering (70 hours at 70°C):
 - 1) As specified in ASTM D 573-88.
 - 2) Rubber grade rings shall only be used in paved areas.
 - 3) Tapered rubber grade rings shall be used to accommodate sloped paved surfaces.

C. HDPE Grade Rings

- 1) All adjusting rings shall be injection molded-recycled HDPE – as manufactured by LADTECH, Inc. or approved equal and installed as per manufacturer's recommendations.
- 2) The adjustment rings shall be manufactured from polyethylene plastic as identified in ASTM Designation D-1248 Standard Specification for Polyethylene Plastic Molding and Extrusion Materials.
- 3) Material properties shall be tested and qualified for usage per the ASTM Test Methods referenced above.
- 4) The adjustments rings shall be molded from 100 percent recycled material.
- 5) The plastic rings shall be manufactured utilizing the injection molding process as defined by the Society of Plastic Engineers.
- 6) The adjustment rings shall be tested to assure compliance with impact and loading requirements per the ASSHTO Standard Specification for Highway Bridges.
- 7) Installation shall be per manufacture's recommendation only.
- 8) The annular space between the grade rings and the precast manhole top/cone and the rings and manhole frame shall be sealed using the approved butyl sealant (See Manhole Joint Sealing Material-this Section).
- 9) All adjustment for matching road grade shall be made utilizing a molded and indexed slope ring.

D. Chemical Grout:

- 1) Cement grout shall be non-shrink non-metallic.
- 2) Use Type I cement where grout is not in contact with sewage.
- 3) Use Type II (Sulfate Resistant) cement where grout is in contact with sewage.

E. Waterproofing mortar:

- 1) Material composition meeting the requirements of ASTM C270, Type M with waterproofing admixture included.
- 2) Apply in accordance with manufacturer's instructions.

F. Epoxy Bonding Compound

- 1) Provide a high-modulus, low viscosity, moisture insensitive epoxy adhesive having the following characteristics.
 - a. Mix Ratio: 100 percent solids, two components; mixed one part by volume component B to two parts by volume component B.

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

2.9 INSPECTION:

- A. Field Inspection: All pipe and appurtenances shall be installed and tested for defects in material and/or workmanship in the manner specified and in the presence of, and as approved by the Borough.

2.10 HANDLING OF MATERIAL:

- A. Replacement of Damaged Material: The Contractor shall replace, at his own expense, all material furnished by him and found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all materials and labor required for replacement of installed material. Any material furnished by the Borough that becomes damaged after acceptance by the Contractor shall be replaced by the Contractor at his own expense.
- B. Responsibility of Safe Storage: The Contractor shall be responsible for the safe storage of material furnished by or to him and accepted by him, and intended for the work until it has been incorporated in the completed project. The interior of all pipe, fittings and other accessories shall be kept free from dirt and foreign matter at all times. All equipment and materials subject to damage from freezing shall be drained and stored in a manner which will protect them.
- C. Hauling: All materials furnished by the Contractor shall be delivered and distributed at the site by the Contractor. All materials furnished by the Owner shall be picked up by the Contractor at points designated by the Borough and hauled to and distributed at the site.

Pipe, fittings, items of equipment and other materials of construction shall be loaded and unloaded by lifting with hoists or skidding to avoid shock or damage. Under no circumstances shall such materials be dropped. Materials handled on skidways shall not be skidded or rolled against materials already on the ground.
- D. At Site of Work: In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench or as otherwise directed by the Borough. Under no circumstances should lawns, grass plots or other private property be used for this purpose without the consent of the property owner.

PART 3 - CONSTRUCTION

3.1 GENERAL:

- A. Manholes shall, in all cases, be fully and completely built and fitted with their frames and covers as the work progresses. Manholes shall be constructed in accordance with the following.
- 1) Excavation and Backfill: Excavation and backfill shall conform to the applicable requirements of Section 02201 and to the following:
 - a. Excavations for manholes shall be made to a vertical plane 1 foot outside the walls of the manhole. Rigid type pavement if encountered shall be cut to a rectangular shape whose sides do not exceed more than 2 feet of the diameter of the manhole base.
 - b. Spaces outside the manhole shall be backfilled with acceptable material in uniform layers not exceeding 4 inches in depth.
 - 2) Precast Concrete Bases: All precast concrete bases shall be installed on a layer of crushed stone which shall have a minimum depth of 6 inches. The crushed stone shall conform to the quality and grading requirements specified in Section 703.3 of PennDOT Publication 408, Specifications for 1B, Type C crushed stone aggregate.
 - a. Where rubber gasket pipe seals used for connecting pipe sewer piping to precast concrete bases are of a type in which an annular space remains on the interior and exterior of the wall of the base after the pipe connection has been made, these annular spaces shall be completely filled with preformed plastic sealing compound. The sealing compound shall be tightly caulked into the annular spaces in such a manner as to completely fill the annular spaces and provide a completely watertight installation. The sealing compound shall be trowelled smooth at the inside face of the manhole base.
 - b. A 6"x8" flanged base shall be provided for all manholes.
 - 3) Manhole Walls: All precast reinforced concrete riser and top sections necessary to build a completed manhole shall be furnished and the different sections shall fit together readily to permit effective jointing.
 - a. Rubber gasket joints between adjacent sections shall be carefully made in accordance with the written instructions of the manufacturer of the precast concrete manhole sections.
 - b. Preformed plastic sealing compound joints between adjacent sections shall be carefully made in accordance with written instructions of the manufacturer of the preformed plastic sealing compound. After the joints have been made, the preformed plastic

sealing compound shall be trowelled smooth across the joint on the inside of the manhole wall.

- c. Pipe connections to manhole walls shall be made in the same manner as specified hereinbefore for pipe connections to precast manhole bases.
- 4) Frames and Covers: Where required, final adjustment of frame to elevation shall be made by manhole grade rings. All joints located between the bottom of the frame and the top manhole section shall have Manhole Joint Sealing Material. The interior face of this area shall receive a ½ inch thick trowelled mortar finish. Frames for all manholes shall be bolted to the manhole as shown on the detail drawings. Bolts, nuts and washers shall be of steel and conform to ASTM A307. Bolts shall have sufficient number of proper-sized threads for installation thereof in the insert provided in the top manhole section. The bolts shall be of such length and be provided with a sufficient number of threads above the top of the frame to properly tighten the nuts thereon.

All water air release manholes installed outside of paved areas shall have a frame and cover installed 18 inches above finished grade (unless otherwise approved by the Borough).

3.2 ACCEPTANCE TESTS:

- A. General: A visual observation of each manhole shall be performed by the Borough. Any defects or deficiencies shall be properly addressed by the contractor prior to acceptance.

END OF SECTION

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CONSTRUCTION DETAILS

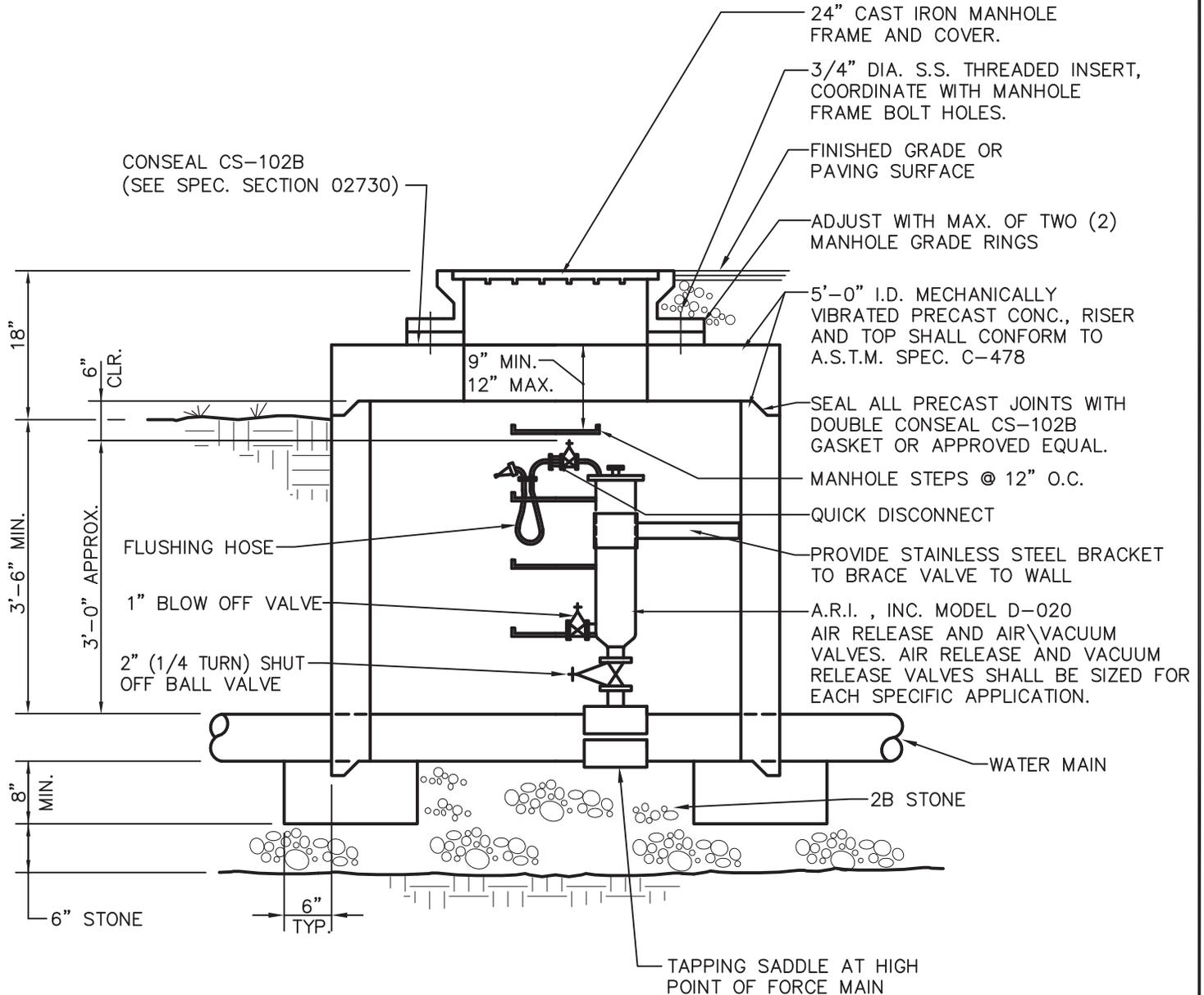
New Holland Borough
Lancaster County, Pennsylvania

Construction Details

<u>NUMBER</u>	<u>DESCRIPTION</u>
1.....	AIR RELEASE/VACUUM BREAK MANHOLE
2.....	<BLANK>
3.....	MANHOLE STEP
4.....	STANDARD FRAME AND COVER
5.....	<BLANK>
6.....	TYPICAL THRUST BLOCKING
7.....	TYPICAL THRUST BLOCKING
8.....	TYPICAL THRUST BLOCKING
9.....	TYPICAL TRENCH
10.....	TYPICAL TRENCH BACKFILL
11.....	LAWN RESTORATION
12.....	PAVED DRIVEWAY RESTORATION
13.....	STONE DRIVEWAY RESTORATION
14.....	TEMPORARY BOROUGH ROADWAY AND SHOULDER RESTORATION
15.....	PERMANENT BOROUGH ROADWAY AND SHOULDER RESTORATION
16.....	CONCRETE ENCASEMENT
17.....	CONCRETE CRADLE
18.....	STANDARD DOMESTIC SERVICE INSTALLATION
19.....	STANDARD ¾" METERING CHAMBER
20.....	TYPICAL GATE VALVE & VALVE BOX
21.....	FIRE HYDRANT SETTING
22.....	CAP AND BLOW-OFF
23.....	TAPPING VALVE & SLEEVE

NOTES:

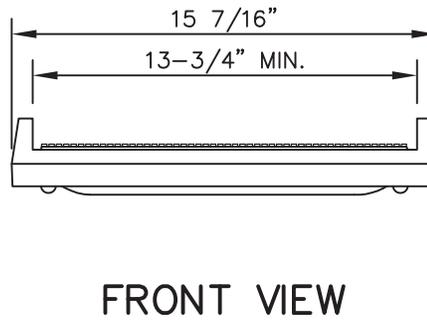
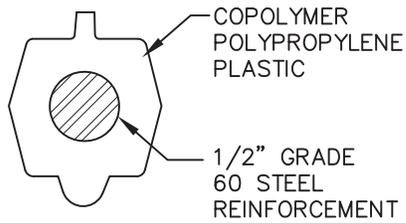
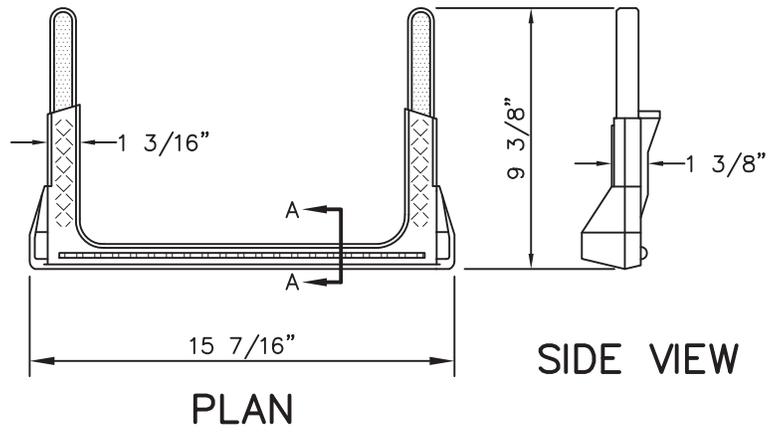
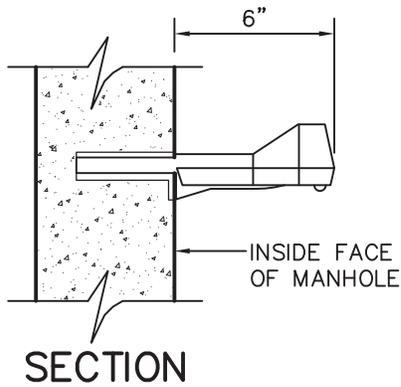
1. MECHANICALLY VIBRATED PRECAST CONCRETE, RISER AND TOP SHALL CONFORM TO A.S.T.M. SPEC. C-478.
2. MANHOLE SHALL HAVE 2 COATS BITUMASTIC COATING ON EXTERIOR.
3. ALL OPENINGS AROUND PIPES SHALL BE FINISHED WITH NON-SHRINK GROUT.
4. ALL MANHOLE FOOTINGS TO BE UNDISTURBED EARTH W/ CRUSHED AGGREGATE UP TO PIPE INVERTS. MANHOLES TO BE OPEN TO DRAIN.
5. ALL AIR RELEASE MANHOLES SHALL BE PROVIDED WITH A LINER THAT PROVIDES A 20-YEAR MATERIAL AND LABOR DEFECTS WARRANTY.



AIR RELEASE / VACUUM BREAK MANHOLE

NOT TO SCALE

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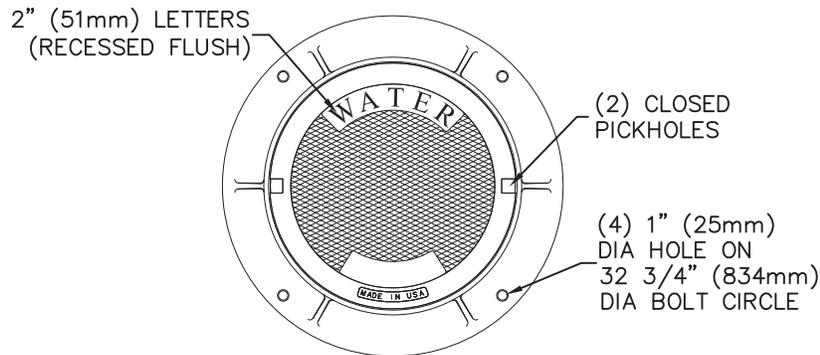


MANHOLE STEP

NOT TO SCALE

NOTES

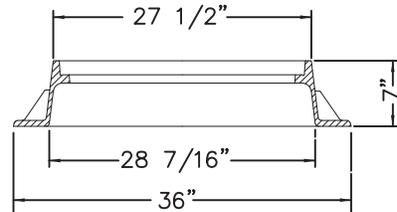
1. ALL MANHOLE FRAME AND COVER DIMENSIONS SHALL BE CONSIDERED MINIMUM, UNLESS OTHERWISE NOTED, WITH THE EXCEPTION OF THE BOLT HOLE AND CORED HOLE DIMENSIONS.
2. ALL MANHOLE FRAMES AND COVERS SHALL BE FOR HEAVY DUTY TRAFFIC.
3. ALL COVERS SHALL BE SELF SEALING.
4. ALL HARDWARE TO BE STAINLESS STEEL..



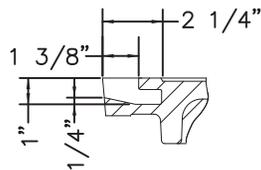
PLAN



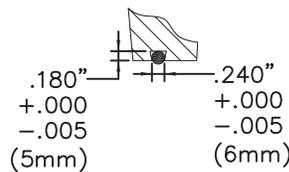
COVER SECTION



FRAME SECTION



PICKHOLE
DETAIL



GROOVE
DETAIL

STANDARD FRAME AND COVER

NOT TO SCALE

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NOTES:

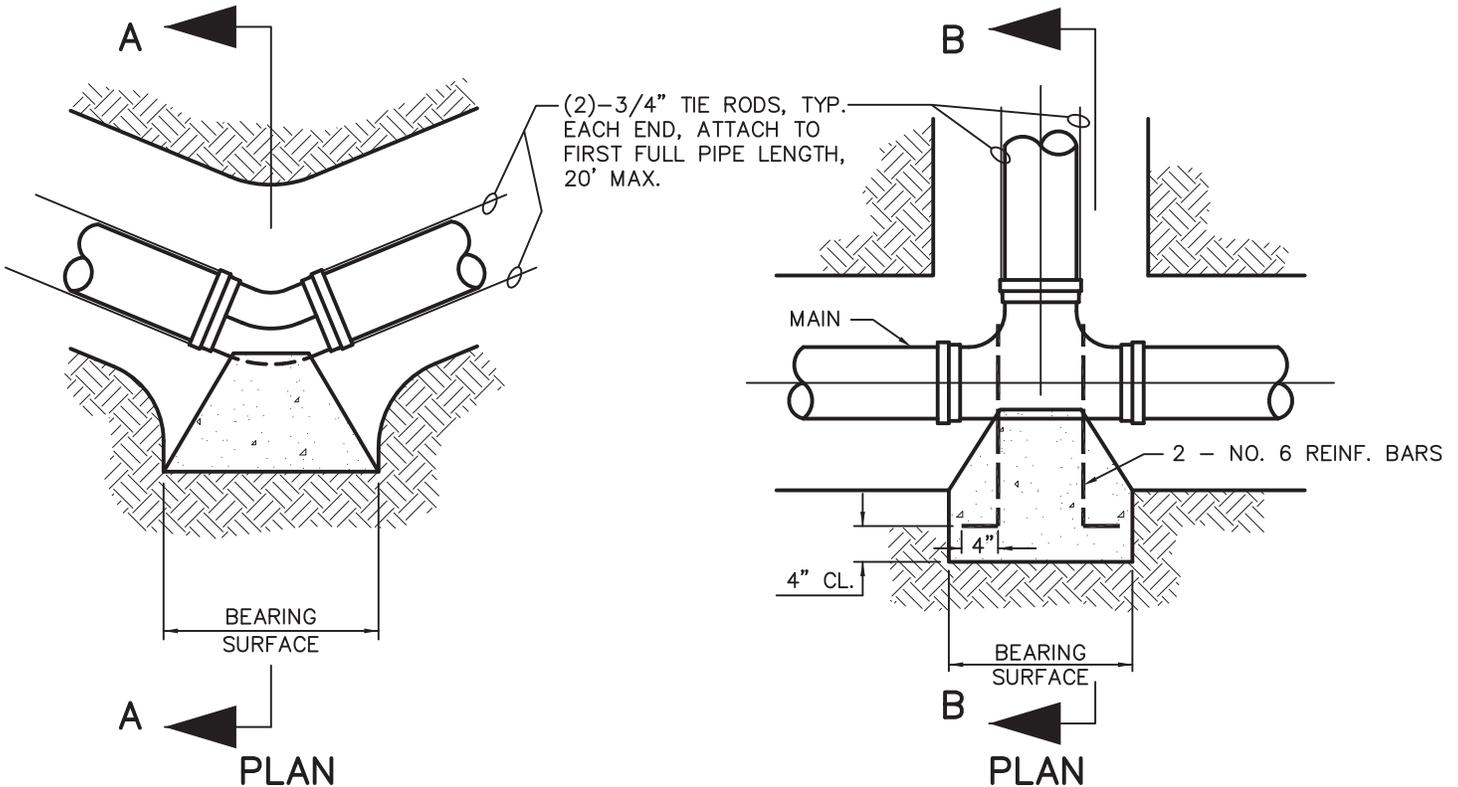
1. THRUST BLOCKING FOR TEES SHALL HAVE THE SAME BEARING AREA AS 90° BENDS OF THE PIPE SIZE OF THE OUTLET. DEAD ENDS SHALL HAVE THE SAME BEARING AS 90° BENDS.
2. NO COUPLING OR JOINTS SHALL BE COVERED WITH CONCRETE.
3. REINFORCING BAR STRAPS TO BE SHAPED TO PIPE CURVATURE.
4. ALL EXPOSED STEEL TO BE PAINTED WITH TWO COATS ASPHALTIC PAINT.

BEARING AREA REQUIRED, SQUARE FEET

TYPE OF BEARING MATERIAL AND ALLOWABLE LOADS, PSF	4" AND LESS DEGREE BEND				6" AND 8" DEGREE BEND				10" AND 12" DEGREE BEND			
	11 1/4'	22 1/2'	45'	90'	11 1/4'	22 1/2'	45'	90'	11 1/4'	22 1/2'	45'	90'
LOOSE SAND OR MEDIUM CLAY - 2,000	1.0	2.0	2.7	4.0	1.5	3.0	6.0	10.0	3.0	6.2	12.0	22.0
PACKED GRAVEL AND SAND - 4,000	1.0	1.0	1.5	2.0	1.0	1.5	3.0	5.0	1.5	3.1	6.0	11.0
ROCK - 10,000	1.0	1.0	1.0	1.0	1.0	1.0	1.2	2.0	1.0	1.3	2.4	4.4

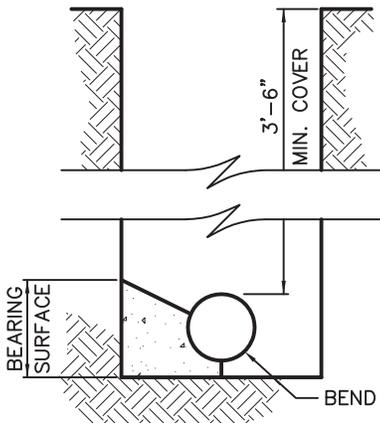
BEARING AREA REQUIRED, SQUARE FEET

TYPE OF BEARING MATERIAL AND ALLOWABLE LOADS, PSF	14" AND 16" DEGREE BEND OR DEFLECTION				18" AND 20" DEGREE BEND OR DEFLECTION			
	11 1/4'	22 1/2'	45'	90'	11 1/4'	22 1/2'	45'	90'
LOOSE SAND OR MEDIUM CLAY - 2,000	6.0	12.0	22.5	40.0	9.5	19.0	37.0	67.0
PACKED GRAVEL AND SAND - 4,000	3.0	6.0	11.3	20.0	4.8	9.5	18.5	33.5
ROCK - 10,000	1.2	2.4	4.5	8.0	2.0	3.8	7.4	13.5

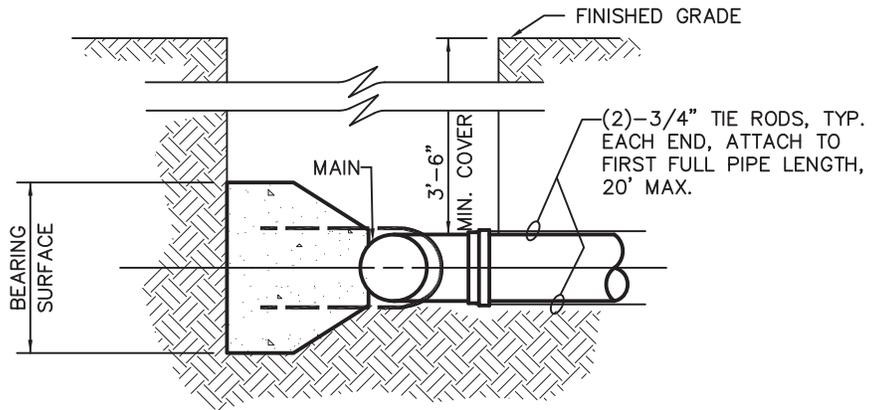


TYPICAL THRUST BLOCKING FOR HORIZONTAL & VERTICAL DOWNWARD THRUSTS UP TO 150 PSI WORKING PRESSURE

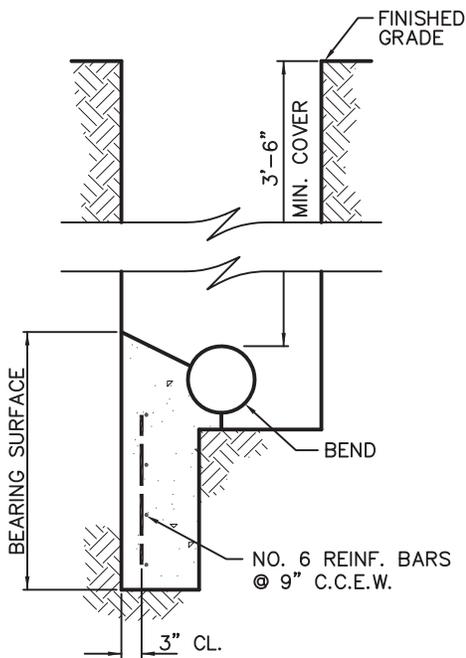
NOT TO SCALE



SECTION A-A



SECTION B-B



SECTION A-A

ADDITIONAL BEARING AS REQUIRED

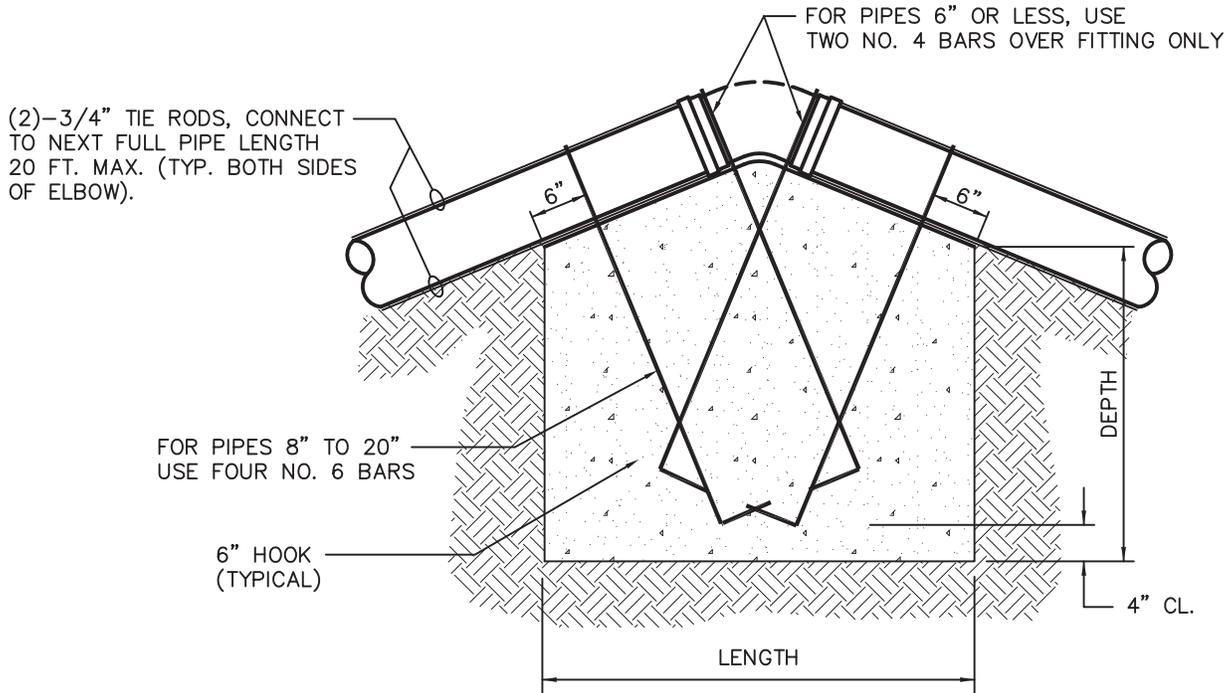
NOTES:

1. NO COUPLING OR JOINTS SHALL BE COVERED WITH CONCRETE (WRAP IN PLASTIC).
2. REINFORCING BAR STRAPS TO BE SHAPED TO PIPE CURVATURE.
3. ALL EXPOSED STEEL TO BE PAINTED WITH TWO COATS ASPHALTIC PAINT.

**TYPICAL THRUST BLOCKING
FOR HORIZONTAL & VERTICAL
DOWNWARD THRUSTS UP TO 150 PSI WORKING PRESSURE**

NOT TO SCALE

PIPE SIZES	DIMENSIONS OF CONCRETE BLOCKING								
	LENGTH			WIDTH			DEPTH		
	11 1/4'	22 1/2'	45'	11 1/4'	22 1/2'	45'	11 1/4'	22 1/2'	45'
4" AND SMALLER	2'	4'	4'	1.5'	3'	3'	1'	2'	3'
6" AND 8"	3'	4'	6'	3'	3'	3'	2'	3'	4'
10" AND 12"	4.5'	6'	8'	3'	3'	4'	3'	4.5'	5'
14" AND 16"	6'	8'	11'	3.5'	3.5'	5'	2.5'	5'	5'
18" AND 20"	7'	9'	13'	4'	5'	5.5'	4'	5'	6'



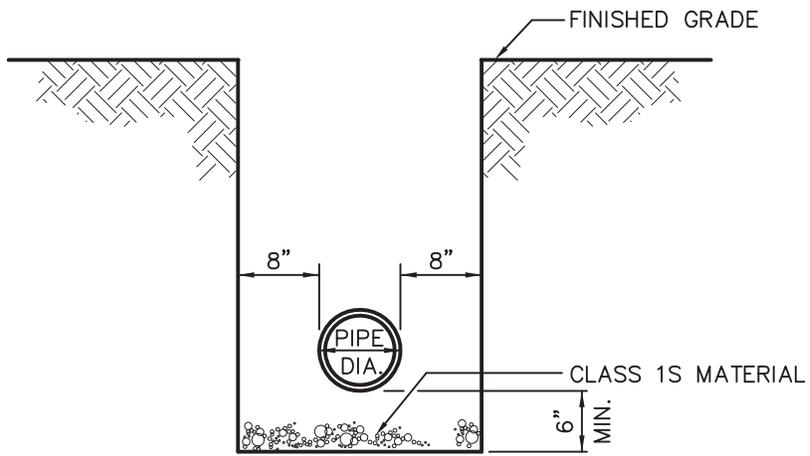
TYPICAL SECTION

NOTES:

1. NO COUPLING OR JOINTS SHALL BE COVERED WITH CONCRETE (WRAP W/ PLASTIC).
2. REINFORCING BAR STRAPS TO BE SHAPED TO PIPE CURVATURE.
3. ALL EXPOSED STEEL TO BE PAINTED WITH TWO COATS ASPHALTIC PAINT.

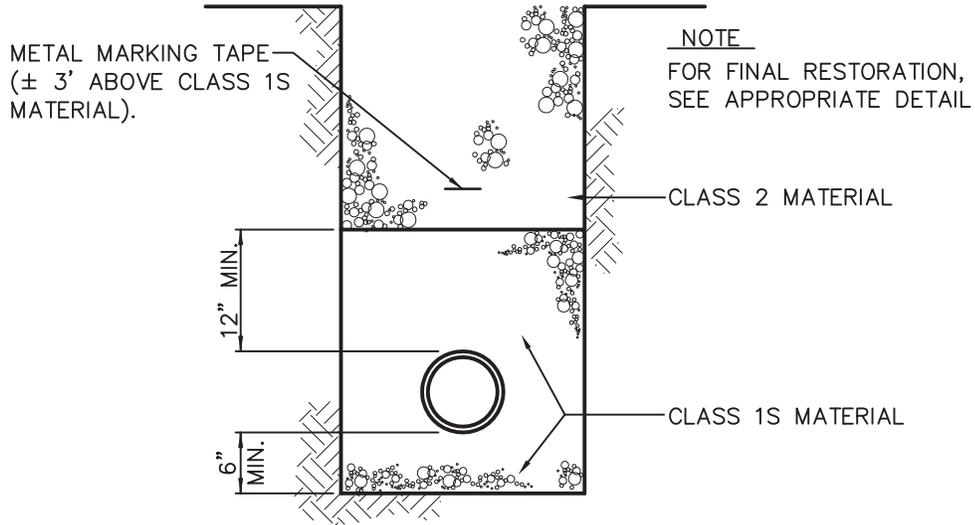
THRUST BLOCKING
VERTICAL THRUSTS UPWARD UP TO
150 PSI WORKING PRESSURE

NOT TO SCALE

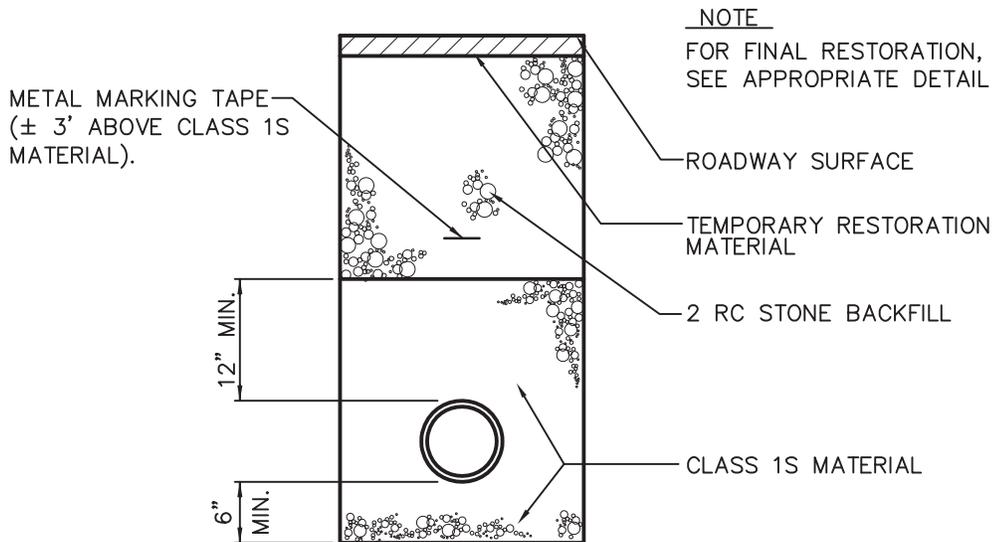


TYPICAL TRENCH

NOT TO SCALE



**TYPICAL BACKFILL
(OTHER THAN PAVED AREAS)**



**TYPICAL BACKFILL
(ALL PAVED AREAS)**

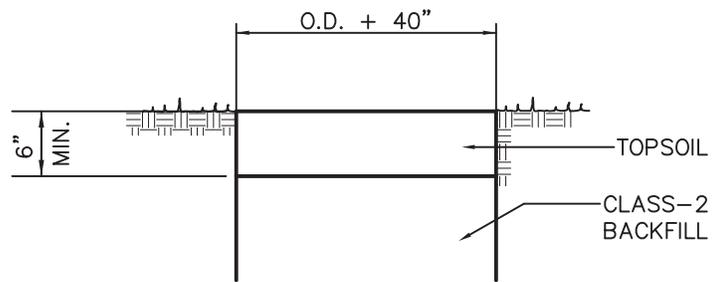
CLASS 1 – THIS MATERIAL SHALL CONSIST OF 2A COARSE AGGREGATE OR 2 RC STONE FREE OF SLAG, EXCEPT IN WET OR UNSTABLE AREAS WHERE THE BEDDING MAY BE NO. 8 OR NO. 57 COARSE AGGREGATE. ALL MATERIALS SHALL CONFORM TO PennDOT PUBLICATION 408, SECTION 703.3.

CLASS 1S – THIS MATERIAL SHALL CONSIST OF NO. 8 COARSE AGGREGATE FREE OF SLAG, EXCEPT IN WET OR UNSTABLE AREAS WHERE THE BEDDING MAY BE NO. 8 OR NO. 57 COARSE AGGREGATE. ALL MATERIALS SHALL CONFORM TO PennDOT PUBLICATION 408, SECTION 703.3.

CLASS 2 – THIS MATERIAL SHALL CONSIST OF EXCAVATED MATERIAL FREE FROM CINDERS, ASHES, REFUSE, VEGETABLE OR ORGANIC MATERIAL, BOULDERS, ROCKS NO LARGER THAN FOUR (4) INCHES IN DIMENSION, STONE OR OTHER MATERIAL WHICH IN THE OPINION OF THE ENGINEER IS UNSUITABLE.

TYPICAL TRENCH BACKFILL

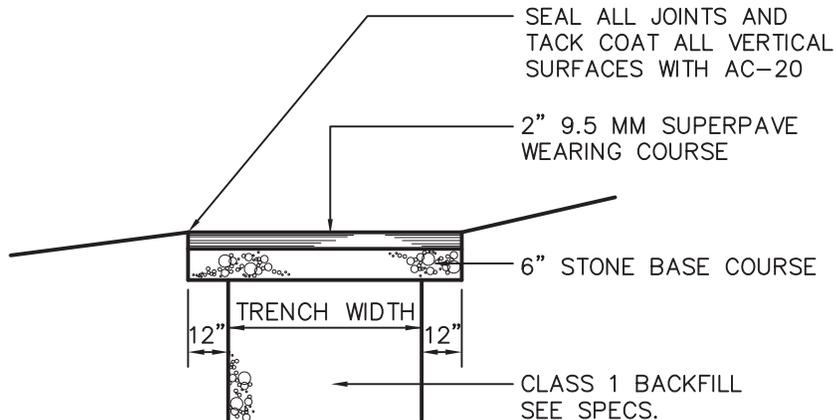
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LAWN RESTORATION DETAIL

NOT TO SCALE

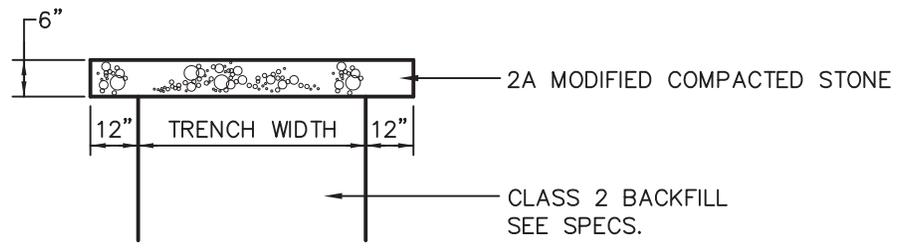
NOTE:
MATCH EXISTING WIDTH
OF DRIVEWAY



PAVED DRIVEWAY RESTORATION

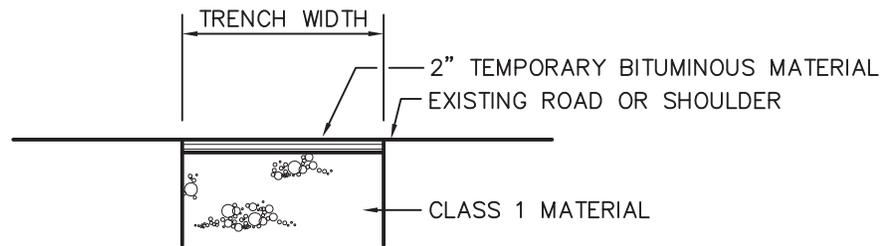
NOT TO SCALE

NOTE:
MATCH EXISTING
WIDTH OF DRIVEWAY



STONE DRIVEWAY RESTORATION

NOT TO SCALE

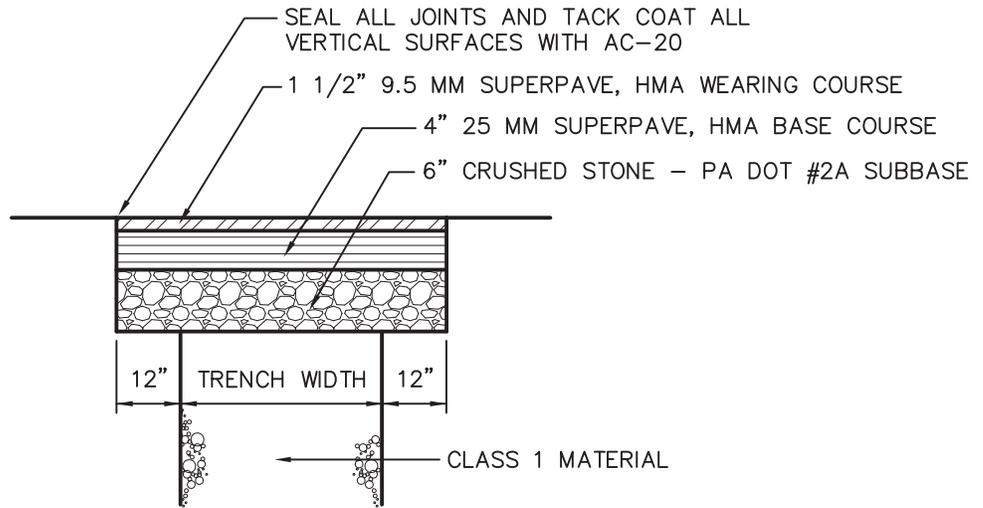


TEMPORARY BOROUGH ROADWAY AND SHOULDER RESTORATION

NOT TO SCALE

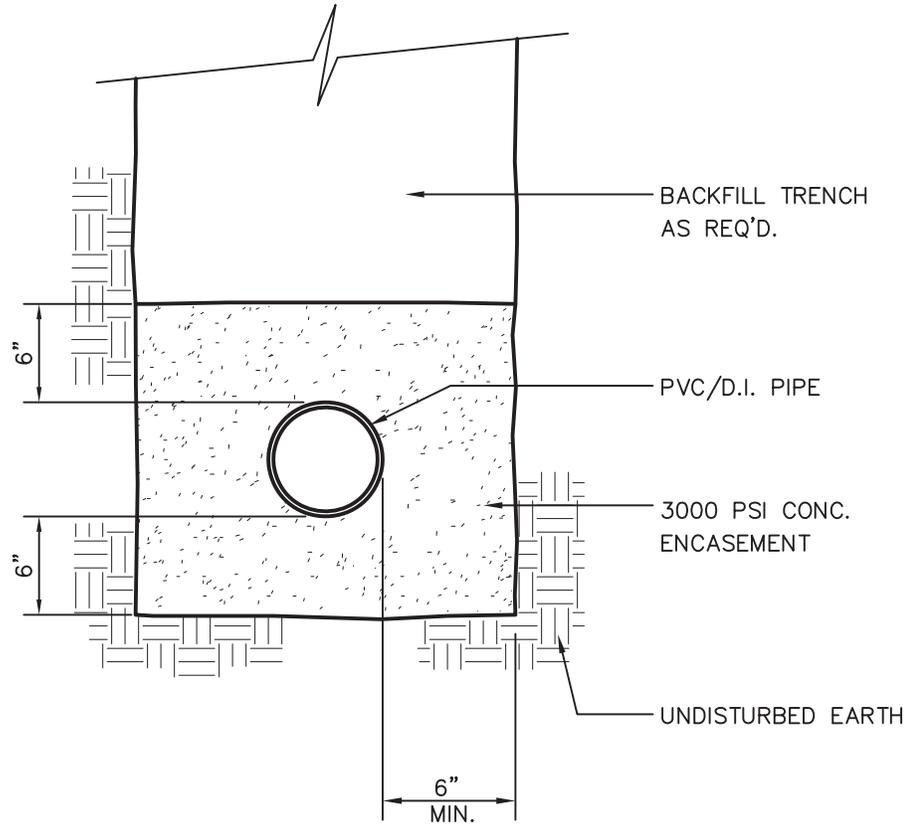
NOTES

- ALL VERTICAL CUTS SHALL BE SAWCUT ONLY
- MATERIAL AND PLACEMENT FOR COARSE AND FINE AGGREGATES SHALL BE IN ACCORDANCE WITH PENNDOT SPECIFICATIONS PUBLICATIONS 408, LATEST EDITION.



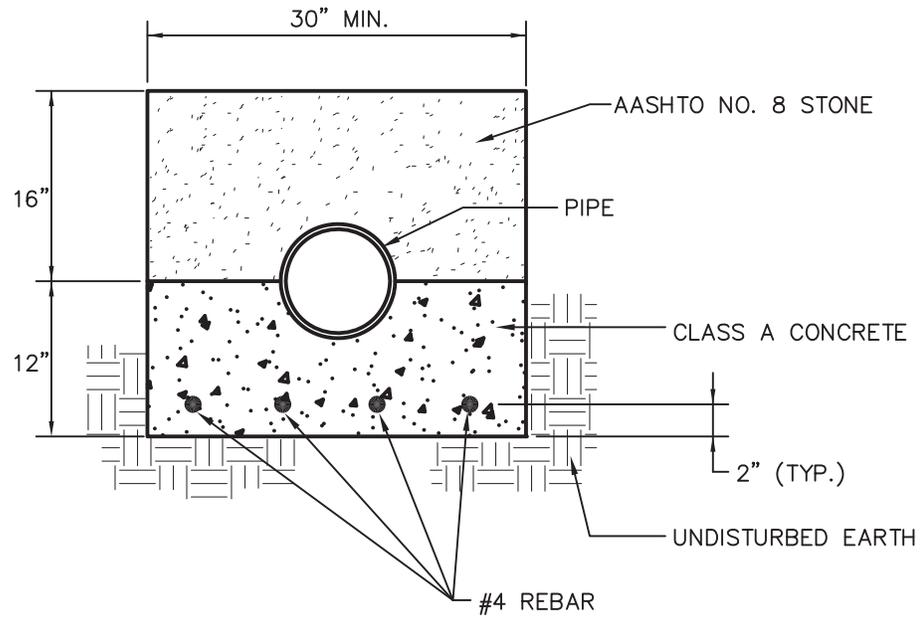
PERMANENT BOROUGH ROADWAY
AND SHOULDER RESTORATION

NOT TO SCALE



CONCRETE ENCASEMENT

NOT TO SCALE

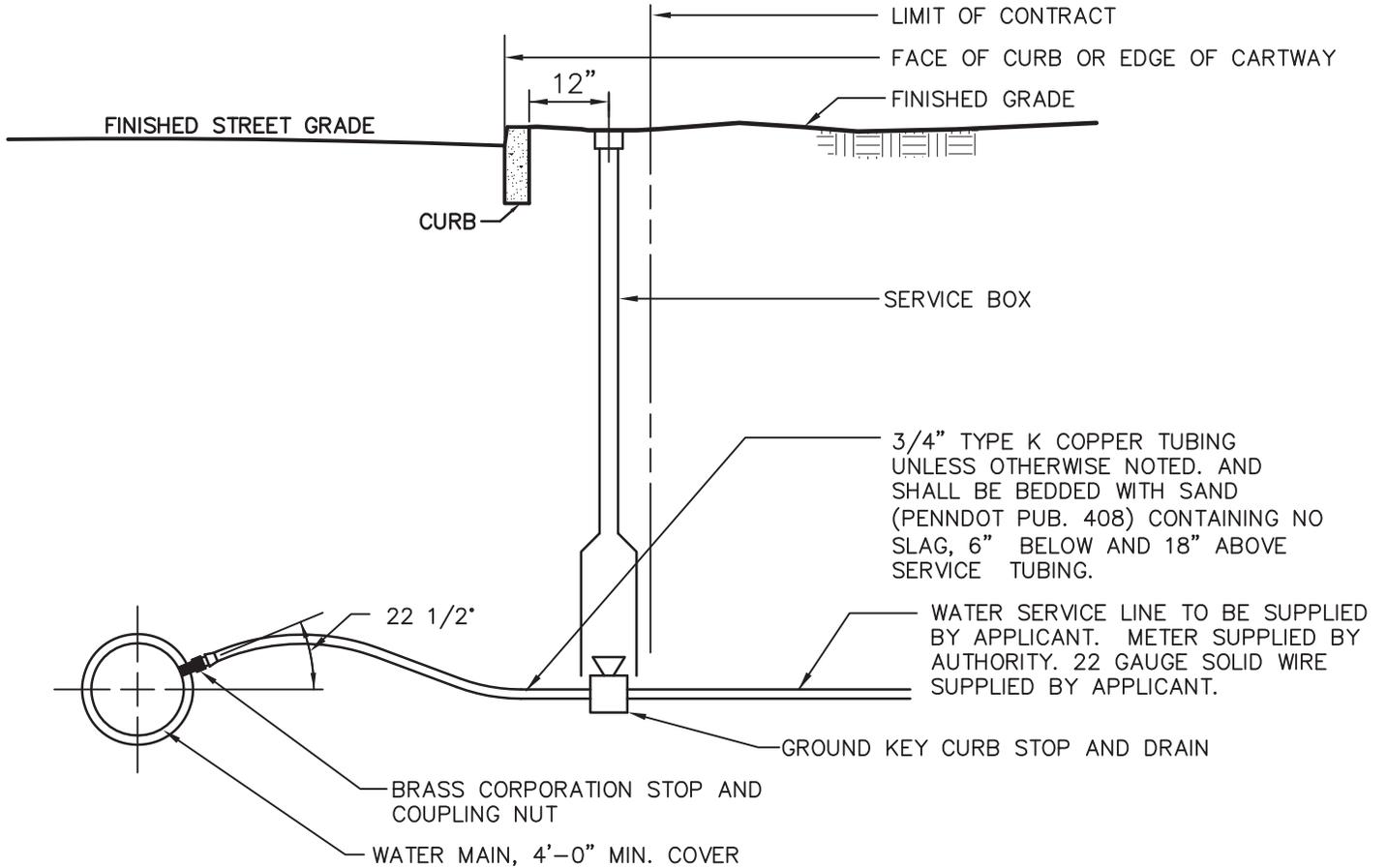


NOTES:

1. FOR USE ONLY WITH AUTHORITY'S SPECIFIC APPROVAL.
2. THE LENGTH OF CONCRETE SHALL EXTEND 10- FEET ON BOTH SIDES OF THE DEPRESSION.
3. FIELD ADJUSTMENTS MAY BE NECESSARY.

CONCRETE CRADLE

NOT TO SCALE

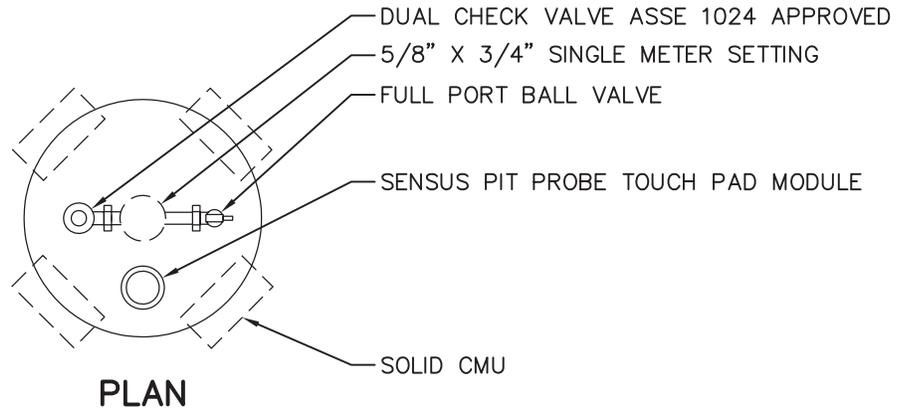


NOTES:

1. THE AUTHORITY REQUIRES THAT A WATER METERING CHAMBER BE INSTALLED FOR ALL WATER SERVICE LINES GREATER THAN 100 FEET MEASURED FROM PUBLIC RIGHT-OF-WAY TO FACE OF BUILDING ALONG THE WATER SERVICE LINE. THIS APPLIES TO BOTH RESIDENTIAL AND COMMERCIAL INSTALLATIONS. THE WATER METERING CHAMBER SHALL BE INSTALLED AT THE RIGHT-OF-WAY LINE OR ALTERNATE LOCATION APPROVED BY THE AUTHORITY.
2. WATER METERING CHAMBERS SHALL BE REVIEWED AND APPROVED BY THE AUTHORITY.

STANDARD DOMESTIC SERVICE INSTALLATION

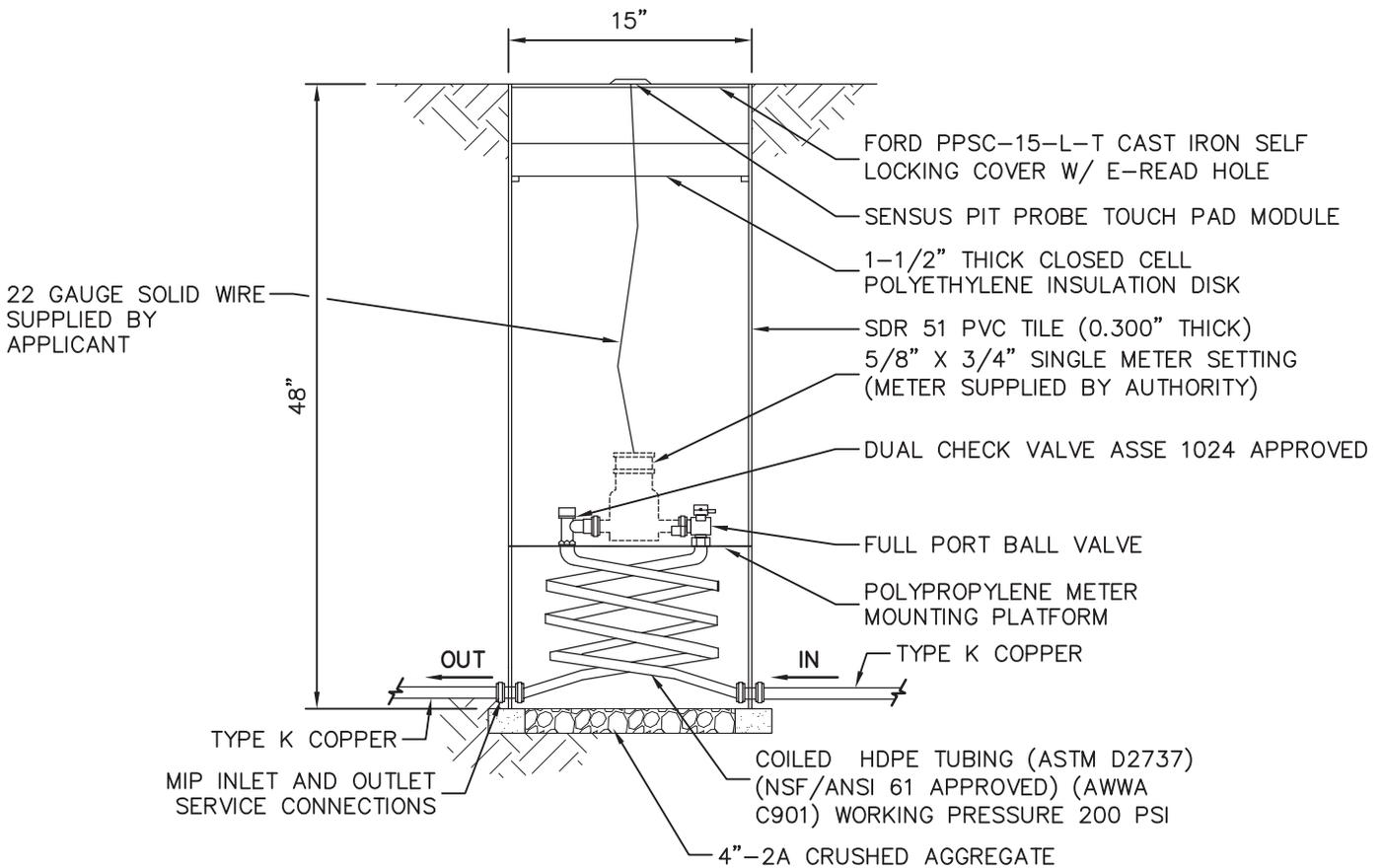
NOT TO SCALE



PLAN

NOTES:

1. FORD COIL PIT SETTER OR APPROVED EQUAL.
2. BRASS CONNECTIONS CONFORM TO ASTM C800.
3. BRASS VALVES & FITTINGS NSF/ANSI 61 APPROVED.



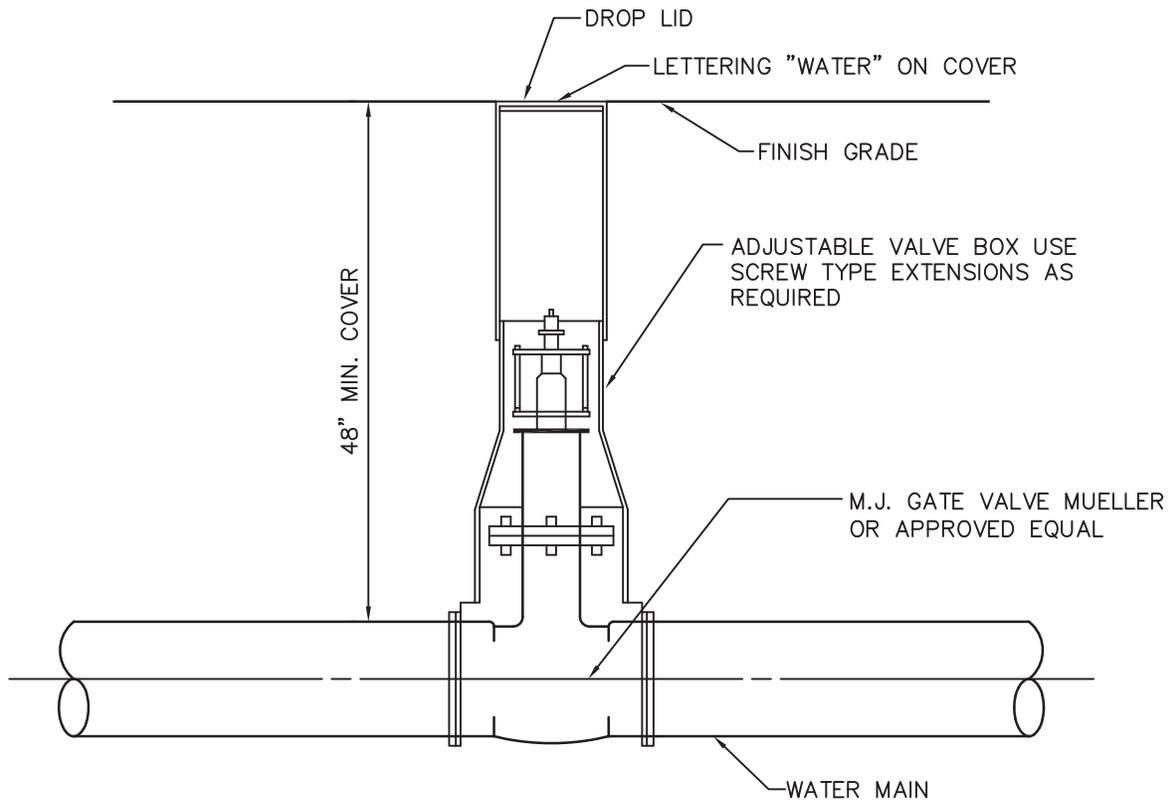
SECTION

NOTES:

1. THE AUTHORITY REQUIRES THAT A WATER METERING CHAMBER BE INSTALLED FOR ALL WATER SERVICE LINES GREATER THAN 100 FEET MEASURED FROM PUBLIC RIGHT-OF-WAY TO FACE OF BUILDING ALONG THE WATER SERVICE LINE. THIS APPLIES TO BOTH RESIDENTIAL AND COMMERCIAL INSTALLATIONS. THE WATER METERING CHAMBER SHALL BE INSTALLED AT THE RIGHT-OF-WAY LINE OR ALTERNATED LOCATION APPROVED BY THE AUTHORITY.
2. WATER METERING CHAMBERS SHALL BE REVIEWED AND APPROVED BY THE AUTHORITY.
3. OTHER SIZES SHALL BE REVIEWED ON A CASE BY CASE BASIS.

STANDARD 3/4" METERING CHAMBER

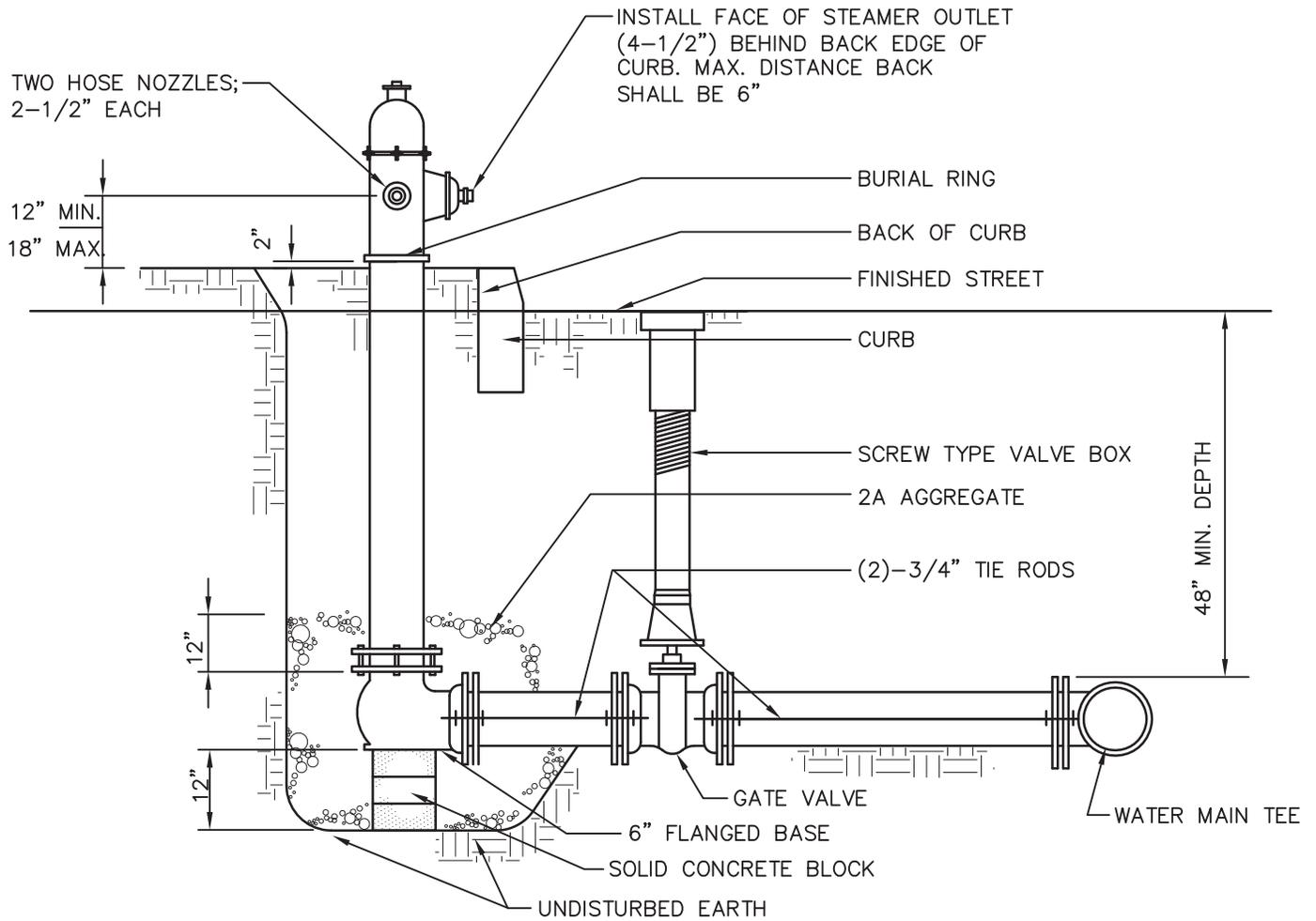
NO SCALE



NOTE: IF EXTENSIONS ARE NECESSARY
CONTRACTOR SHALL SET "PLUMB"
AND ALIGN PROPERLY FOR ACCESS TO
OPERATING NUT.

TYPICAL GATE VALVE & VALVE BOX

NOT TO SCALE

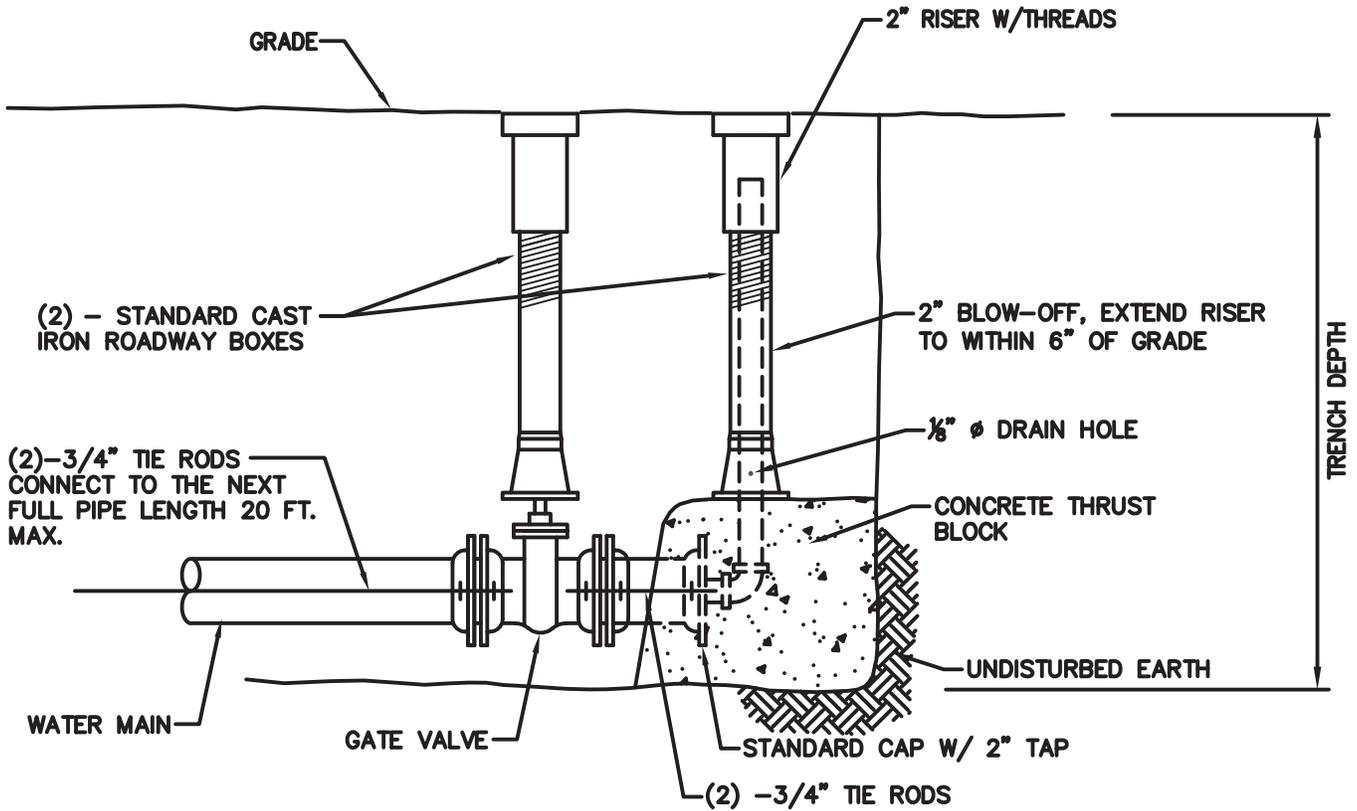


NOTES:

1. HYDRANT SHALL BE PAINTED AS REQUIRED BY AUTHORITY.
2. HYDRANT SHALL MEET UL-FM STANDARD SPECIFICATIONS.

FIRE HYDRANT SETTING

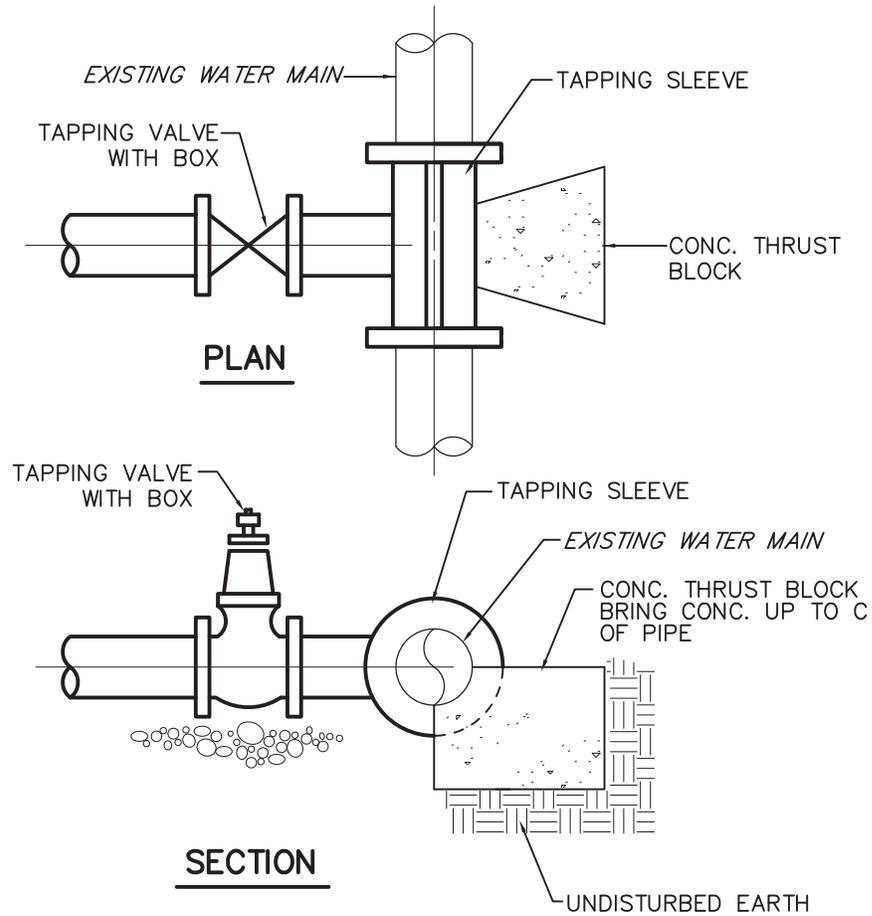
NOT TO SCALE



SECTION

CAP AND BLOW-OFF DETAIL

NOT TO SCALE

**NOTE:**

1. VALVE BOX TO BE PROVIDED AT ALL TAPPING VALVES.
2. ALL BOLTS SHALL BE WRAPPED IN PLASTIC PRIOR TO POURING CONCRETE THRUST BLOCK.
3. TAPPING VALVE SHALL BE INSTALLED ON 6" BED OF STONE.
4. CENTER VALVE BOX OVER OPERATING NUT TO INSURE FREE VALVE OPERATION.

TAPPING VALVE & SLEEVE

NO SCALE