ADOPTION

The "Specifications and Standard Detail Drawings for Waterline Construction" dated August 2017 are hereby approved and adopted this 21st day of August, 2017 by the Board of Directors of the Brighton Township Municipal Authority. This version of the Specifications and Standard Detail Drawings for Waterline Construction dated August 2017 shall supersede all previous versions of the same.

Chairman

Secretary

SPECIFICATIONS
AND
STANDARD DETAIL DRAWINGS
FOR
WATERLINE CONSTRUCTION

The Brighton Township Municipal Authority
1300 Brighton Road
Beaver, Pennsylvania 15009-9211

January 1997
REVISED DECEMBER 2014
REVISED MARCH 2015
REVISED AUGUST 2017

TABLE OF CONTENTS

	PAGE NOS.
SECTION ONE – GENERAL REQUIREMENTS	1-1 – 1-14
SECTION TWO – WATER MAIN INSTALLATION.....	2-1 – 2-17
SECTION THREE – MATERIALS OF CONSTRUCTION.....	3-1 – 3-7
SECTION FOUR – PAVEMENT REPLACEMENT AND REPAIR	4-1 – 4-4
SECTION FIVE – MISCELLANEOUS ITEMS OF CONSTRUCTION.....	5-1
STANDARD DETAILS	Appended

SECTION ONE

GENERAL REQUIREMENTS

1.1 SCOPE OF WORK

1.1.1 These specifications which cover requirements for construction of all of the Authority's standard waterline facilities are intended for and apply to all such projects, whether directly contracted with a Contractor(s) by the Authority, or, contracted indirectly through a land developer. They are to be used in conjunction with The Manual of Rules and Regulations, as amended. The Rules and Regulations Manual describes and identifies procedural requirements, requirements relative to engineering work, payment of fees, certain facility design criteria and parameters, private water service facility requirements, time restraints, certain terms which will be incorporated in an agreement with the Authority before commencement of construction and other factors relating to the water system facilities desired to be constructed in connection with development in Brighton Township.

1.1.2 Except where waterlines; service lines; valves and hydrants; storm sewers and appurtenances are shown by either written dimension lines or coordinates, their location may be adjusted by the Authority to best accommodate field conditions encountered. All work shall be performed in accordance with the requirements of these Specifications. All materials and equipment installed in the work shall conform to the descriptions and specifications contained herein, except as otherwise may be approved in writing by the Authority. All work shall be constructed complete.

1.2 COMMENCEMENT OF WORK

1.2.1 Notice to Proceed will be issued by the Authority upon execution of the Developer's Agreement and approval of the bonds, insurance, shop drawings, and affidavit furnished by the Contractor and/or Developer.

1.3 TEMPORARY FACILITIES

1.3.1 **Temporary Buildings** -- Temporary buildings (storage sheds, shops, offices, etc.) may be erected by the Contractor only with the approval of the Authority. Location of temporary buildings shall be as approved by the Authority. Such temporary buildings and/or utilities shall remain the property of the respective Contractor and will be removed by him at his expense upon the completion of the work.

1.3.2 **Sanitary Provisions** -- The Contractor shall make arrangements for sanitary facilities required by his workmen. Sanitary facilities furnished by the

Contractor shall comply with the requirements and regulations of the Pennsylvania Department of Environmental Protection or local Department of Health or of other bodies or agencies having jurisdiction thereof. The Contractor shall permit no public nuisance or unsanitary condition to exist on the work.

1.3.3 **Temporary Utilities** -- The Contractor shall furnish, install, maintain, pay all expenses and costs, and remove when no longer required, all utilities that he required for his use in the completion of this Contract.

1.4 USE OF ROADWAYS

1.4.1 The Contractor shall use only established roadways or construct and use such temporary roadways as may be authorized by the Authority. Where materials are transported in the prosecution of the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local laws or regulations. When it is necessary to cross curbings or sidewalks, protection against damage shall be provided by the Contractor and any damaged roads, curbings, or sidewalks shall be repaired by or at the expense of the Contractor.

1.5 PERMITS AND LICENSES

1.5.1 With the exception of permits which will be obtained by the Authority, the Contractor shall, unless otherwise specified elsewhere in this Document, or in the Developer's Agreement, procure all necessary permits and licenses, pay all charges and fees therefore, and shall give all notices necessary and incident to the proper and lawful protection of the work.

1.5.2 Payment for personnel from state agencies, as required to be on hand during the construction of work on highways under their jurisdiction, shall be borne by the Contractor and/or Developer.

1.5.3 The Developer will obtain all Department of Environmental Protection and/or Federal Environmental Protection Agency permits required for construction of the facilities, and State Department of Highways and/or railroad permits. The Contractor shall obtain all other permits such as road opening, building permits, etc.

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

1.6 SALVAGE MATERIALS AND EQUIPMENT

1.6.1 All existing **salvageable** material, equipment, valves, fittings, etc., removed by the Contractor during the performance of his work shall be salvaged and become the property of the Authority. The Contractor shall store all salvaged material on the Authority's property at locations specified by the Authority. The term salvageable shall be defined as meaning useful or as having value to the Authority. **All** unsalvageable materials shall be disposed of by the Contractor in accordance with all applicable Federal, State or local regulations, and at no expense to the Authority. The Engineer shall make the decision as to whether or not an item is salvageable and his decision shall be final.

1.7 WATCHMEN, FLAGMEN, BARRICADES, DANGER AND DETOUR SIGNS

1.7.1 The Contractor shall place sufficient warning lights on or near the job site and keep them in service from **twilight** to **sunrise.** He shall erect suitable railings, barricades, detour signs, danger signals or signs, bridges, fences, or other protection about open trenches, materials or supplies after delivery, and provide all watchmen on the job by day or night that may be necessary for the preservation of public safety, and for the prevention of accidents during and after delivery of materials and supplies, and shall at all times, take necessary precautions to avoid accidents or injury to persons or property.

1.8 CLEANING UP

1.8.1 The Contractor shall at all times, keep the premises free from accumulations of waste material or rubbish caused by his employees or subcontractors, and at the completion of the work, he shall remove all rubbish from and about the project site. In case of dispute, the Authority may remove the rubbish and charge the cost to the Contractor as the Engineer shall determine to be just.

1.9 WORK IN PUBLIC RIGHT-OF-WAY

1.9.1 The Contractor's attention is especially directed to the following:

A. Under this Contract, all work within the right-of-way limits of streets under the jurisdiction of Brighton Township shall conform in all respects with the requirements of Brighton Township. The Contractor shall be guided by these requirements in executing the work and shall consult with the officials having proper jurisdiction relative to this type of work during the performance of this portion of the work.

B. All work performed under this Contract within the limits of state highway rights-of-way shall conform in all respects with the particular

requirements of the Pennsylvania Department of Transportation. The Contractor shall be guided by these requirements in executing the work and shall consult with the officials having proper jurisdiction relative to this type of work during the performance of this portion of the work. All costs of inspection to be provided by the Department of Transportation shall be borne by the Contractor and/or Developer.

C. The Contractor, at all times, shall keep informed as to the right-of-way limits of the proposed work and confine all operations of his work to this area unless otherwise indicated by the Engineer. The Contractor will be held responsible for any claims for damages resulting from operations carried out in locations outside the designated work areas.

1.10 WATERLINE RIGHTS-OF-WAY

1.10.1 The alignment and location of proposed waterlines and appurtenances shall be within street, highway and/or other acquired rights-of-way limits. No waterline shall be relocated outside of the street or other right-of-way within which is shown without obtaining the formal written approval for such change from the Authority. Where a special waterline right-of-way is obtained through private property, the minimum permanent width for operation and maintenance purposes shall be twenty feet (20'); the width of the temporary right-of-way obtained through such private properties for initial waterline installation and construction purposes shall be forty feet (40'), ten feet (10') of which shall be located adjacent to and on the outside of both limits of the permanent right-of-way. The minimum distance between the center of any longitudinal waterline and the right-of-way limit line shall be eight feet (8'). All construction activities shall be confined within the forty feet (40') wide construction right-of-way.

1.10.2 The waterline Contractor shall, however, make his own arrangements for office space, materials storage yards, change trailers, sanitary facilities, utility services, debris disposal sites, and; for ingress and egress to any location along the waterline project for which the Contractor desires or requires use and, for which the Authority has obtained no such right-of-way.

1.10.3 Proposed pipelines and appurtenances may also encroach upon right-of-way occupied by pipelines or other facilities owned, operated and/or maintained by other utility companies and/or other utility and governmental entities. It shall be the responsibility of the Contractor and/or Developer to notify the appropriate representatives of those agencies in advance of performing any work therein and, to conduct all construction activities in accordance with the respective regulations appertaining thereto.

1.10.4 The position of waterlines (mainline and service connections) proposed to be constructed in connection with land development projects shall be such that, regardless of the sequencing of various utility line construction (gas, power,

telephone, water, storm sewer, sanitary sewers, etc.) no pipeline shall be aligned longitudinally, along the waterlines, any closer than three feet (3'). (Applies to both main line and service line on private or public property.) It is imperative that such minimum distance be obtained along all waterlines to provide space required for future maintenance and/or repairs. Provide separate ditches for waterline and other utilities. No sharing of waterline or service line trenches with other utilities is permitted. Maintain 18" vertical separation for all crossings.

1.10.5 In accordance with the regulations of the Pennsylvania Department of Environmental Protection, the separation between water and sewer pipeline shall be as shown on the Standard Detail Drawing.

1.11 BLASTING

1.11.1 Must be approved by the Authority.

1.11.2 When hard rock is encountered in the trenches and cannot reasonably be removed by excavating equipment, the Authority may, authorize the Contractor to fracture by pre-drilling and blasting in a manner which will enable the Contractor to remove the materials and complete the excavation in accordance with the specified trench widths and/or shapes, and in a manner that will produce the least practicable disturbance to adjacent subsurface material and existing above ground or underground structures and pipelines. All blasting shall be performed and supervised by licensed blasters and shall be performed in accordance with applicable Federal, State and local laws and rules and regulations regarding registration, transportation, storage, handling and otherwise using explosives. Prior approval for blasting operations is required to be obtained from Brighton Township.

1.11.3 The Contractor shall have a plan of his proposed blasting procedures prior to commencing with same, and shall continually adjust his operations when materials of varying and/or different characteristics are encountered in order to obtain specified and desired trench shapes. Hole spacing, size and loading; off set benching; ignition sequencing; type of equipment utilized and all other procedures and operations shall be especially adapted at each location in order to produce relatively smooth, unshattered and stable back slopes and/or trench walls, and in order to assure protection of all personnel employed in connection with the Contract and other persons.

1.11.4 Attention is directed to the fact that potable water utilized by local residents, may be obtained from private on-lot water wells. Therefore, blasting as well as all other construction activities shall be conducted in a manner to assure that no damage is imposed upon any of the well facilities and/or well water supplies. The Contractor shall be solely liable for all such claims.

1.11.5 As part of the authorization process and **prior** to initiating any blasting activities, the Contractor shall provide; 1) an executed Hold Harmless Agreement to the Authority in form satisfactory to the Authority's Attorney; 2) Certificate of Insurance providing at least $5,000,000 coverage for blasting operations and naming the Authority and Engineer as additional insured, and copies of the actual policy, policy declarations and limitations; and 3) copies of any necessary permits or approvals.

1.11.6 The Contractor shall retain the services of an independent geotechnical consultant with expertise in the field of vibration monitoring to monitor all blasting activity and provide written reports with supporting documentation of pre-blast conditions (pre-blast survey of all structures along the route of construction), and actual operations performed, and a final report with all data collected.

1.11.7 The Contractor shall provide copies of current licenses and permits for the firm/persons performing the blasting. All work shall be supervised by a competent, qualified licensed blaster. A resume of the blasting superintendent shall be submitted to the Authority. The Contractor shall be responsible to notify all utilities of his proposed blasting operations and shall conduct his operations so as to preclude damage to adjacent underground utilities. The Contractor shall contact all natural gas companies with underground facilities within the vicinity and advise them of his proposed activities and shall assist them in determining the presence of pre- or post-blasting underground gas leaks and shall take all protective measures required to preclude the possibility of secondary explosions or ignition of the existing natural gas lines. The Contractor shall take all precautions required to insure that the blasting work is performed in a safe manner including but not limited to use of adequate blast mats, storage of explosives, use of blast caps, and other appropriate procedures.

1.11.8 The Contractor shall design and perform all blasting work in a manner that will; 1) limit vibration to a maximum particle velocity not exceeding two inches (2") per second, 2) preclude fly rock, and 3) maintain air blast (air over pressure) within regulatory guidelines for work performed in residential areas. The Contractor shall maintain a blaster's log each day and a copy of the log shall be transmitted to the Authority for each day's blasting. The blaster's log shall record all the appropriate data including but not limited to; time of shot, number of holes, depth of holes, size of each hole, type of detonator used, lag time, and any unusual observations.

1.11.9 Recording seismographs shall be employed on both sides of the trench between the location of the blasting and adjacent structures to monitor vibration dissipation at distance. The location of all seismographs shall be as recommended by the vibration consultant. A copy of all seismograph tracings shall be attached to the daily blaster's log and shall be included in the final report prepared for the project. The Contractor shall have the blasting subcontractor prepare all design

blasting computations and provide record in writing of all such computations. All blasting work and blasting related work shall be performed at no additional cost to the Owner.

1.12 PROPERTY PROTECTION

1.12.1 The Contractor shall, at his own expense, when necessary, sustain in their places, and protect from injury, all pipes, tracks, walls, buildings, and other structures or property in the vicinity of his work, or below the ground. He shall at all times, have a sufficient quantity of timber, chains, ropes, and other material and equipment on the job and shall use them as necessary for sheeting his excavations and for sustaining any structures that are uncovered, undermined, weakened, or otherwise endangered.

1.12.2 The Contractor shall assume all risks in the presence or proximity of pipes, poles, walls, buildings, and other structures, utilities, and property, of every kind and description, as encountered in or over his excavation or in the vicinity of his work, whether above or below the surface of the ground; and he shall be responsible for all damages and assume all expense for direct or indirect injury, caused by his work, to any of them, or to any person or property by reason of injury to them, whether such structures are or are not shown on the Drawings, once they have been uncovered by the work.

1.12.3 Where necessary, in order to keep one side of the street or roadway free from any obstruction or to keep the material piled alongside the excavation from falling on private property outside the right-of-way, safe and suitable fences or walls shall be placed alongside the excavation.

1.12.4 In the event of encountering quicksand, subsurface streams or similar dangerous contingencies, or where passing especially heavy buildings or any structures which by their construction or position might bring a great pressure upon the excavations, the buildings, or structures, shall be underpinned, supported, and protected or special sheeting shall be driven. Supports, underpinnings, and/or sheeting shall be designed by a licensed professional engineer subcontracted by the Contractor and constructed by the Contractor.

1.13 RESPONSIBLE EMPLOYEE REQUIREMENT

1.13.1 The Contractor shall provide the Authority with the names and telephone numbers of three employees; at least one of whom shall be responsible for all aspects of job safety including trenching requirements as defined by OSHA and all agencies having jurisdiction over the work, and one of which shall be available to remedy emergency situations stemming from the construction activity during non-working hours.

1.14 WATER REQUIRED FOR CONSTRUCTION

1.14.1 The Contractor shall be required to furnish **all** water necessary to complete this Contract including water for testing, sterilization and flushing, if not specified otherwise.

1.15 PROTECTION OF ORNAMENTAL TREES

1.15.1 The Contractor's attention is called to the fact that preservation of natural vegetation in general, and trees in particular, is of prime importance.

1.16 "AS BUILT" CONSTRUCTION INFORMATION

1.16.1 The Developer shall provide a complete set of as-built drawings to the Authority at completion of the project. As-built information shall be provided according to the following:

A. The edge of the road and all valves, hydrants, blow-offs, waterlines and related appurtenances shall be located in the field by a professional land surveyor. The horizontal control shall be tied to state plane coordinates (PA South Zone). The vertical control shall be tied to USGS datum (NAVD 88).

B. As-built information delivered to the Authority shall include the following:

- Mylar as-built drawing(s) illustrating the in-place locations of all items described in 1.16.1(A) above. Mapping features such as roadways and property lines must be shown.

- Digital files providing the northing, easting, elevation and description of all items shown on the as-built drawings.

- Description and coordinate valves of all horizontal and vertical control points.

1.16.2 All as-built information must be delivered, and approved by the Authority prior to acceptance of improvements and release of Bonds.

1.18 SHOP DRAWINGS AND SAMPLES

1.18.1 At least six (6) copies of shop drawings, catalog cuts, certifications, job mix formulas or other descriptive data shall be submitted by the Contractor for each item requiring shop drawings or samples. Shop drawings shall be submitted for items as noted in the Technical Specifications.

1.19 FEDERAL OCCUPATIONAL SAFETY AND HEALTH ACT

1.19.1 All Contractors shall comply with the Federal Occupational Safety and Health Act of 1970, and any revisions and/or amendments thereto. Where required by the Act, the Contractor shall prepare and implement an appropriate health and safety plan and shall designate a responsible employee or competent person for maintenance of the same.

1.20 WORK COOPERATION WITH OTHER CONTRACTORS

1.20.1 The Contractor shall cooperate and coordinate all work with other contractors who may be performing work under other contracts involved in this project.

1.21 CLEARING AND GRUBBING

1.21.1 Clearing and grubbing shall consist of the removal of all trees, brush, and other vegetation and old structures or obstructions from site of the work, which will be required to be removed so the planned construction may be made. All live trees shall be protected and not removed unless permitted or ordered by the Authority's Representative. The method of clearing, including the use of bulldozers, shall be at the option of the Contractor. However, he will not be permitted to cover up brush and similar debris with earth. All work under this heading shall be done sufficiently ahead of topsoil removal and excavation so as not to interfere with those operations. The Contractor shall remove stumps and large roots and refill the depression with suitable compacted earth fill where necessary to bring the grade back to its original elevation or final grade.

1.21.2 All brush, stumps, roots, etc., cleared or grubbed from the site shall be disposed of in a manner satisfactory to the Authority's Representative. Burning **if** permitted by the Township shall be conducted under guard at all times, and each Contractor shall exercise every possible precaution to prevent fires from getting out of hand and destroying adjacent property, or from causing unnecessary smoke nuisance and/or hazards. Burning will not be permitted where local ordinances or state or federal laws prohibit same. When in the opinion of the Authority's

Representative, weather is not conducive to non-nuisance or non-hazardous burning, burning operations shall be suspended at his discretion until conditions are satisfactorily improved. Regardless of whether the Authority's Representative has or has not suspended such operations, any and all damages resulting from burning shall be the Contractor's responsibility.

1.22 REMOVAL, STORAGE, AND PROTECTION OF SURFACE ITEMS

1.22.1 The Contractor shall remove all salvageable surface items, over the area to be excavated; and he shall properly separate, classify, store, protect, and preserve such materials and items for use in backfilling, resurfacing, replanting, or otherwise replacing the area of construction to its original condition prior to construction, except as may hereinafter be noted.

1.22.2 The cultivated, landscape areas, all shrubbery, hedges, and small trees in the area of construction shall be carefully removed, stored, and preserved for reuse upon completion of construction, unless otherwise authorized by the Authority's Representative. Large trees which cannot be safely transplanted or reasonably replaced shall be left standing unless permission is specifically granted by the Authority's Representative to remove the tree. Where trees are to be permanently removed, the Contractor shall be responsible for the complete removal of the tree. Trees removed shall be replaced by the Contractor at his expense with a tree of the same size or of the largest size available in local nursery stock.

1.22.3 For all cultivated, landscaped areas, the lawn sod shall be cut and removed for the width of expected excavation within the right-of-way. The topsoil in these areas of excavation shall be stripped off to a depth of at least eight inches (8") and stored separately from all other excavation for reuse upon completion of backfilling. **All grass areas not to be excavated shall be protected from permanent damage.**

1.22.4 All fencing, mailboxes, drainage pipes, doghouses, clothes post, steps, ornamental lawn fixtures and the like which may be in the way of construction shall be carefully removed and placed temporarily in a place convenient to the property owner until construction is completed and then replaced in their original condition and location.

1.22.5 Clearing and grubbing shall be limited to the minimum area required for construction. **Before proceeding with clearing in any area, and in particular wooded areas, each Contractor shall notify the Authority's Representative and obtain approval for the method and extent of grubbing and clearing.**

1.22.6 For paved areas and thoroughfares in the area of excavation, all base material, curbings, gutters, flagstones, and all other such materials shall be carefully removed and stored for reuse upon completion of backfilling, unless

otherwise authorized by the Authority's Representative. For excavation in paved areas, the paving shall be removed for a width equal to the outside diameter of the pipe plus three feet (3') four inches (4"). In case the Contractor removes or disturbs the paving for a greater width or in case he removes or disturbs any paving on account of settlement, slides, blasting, or cave-ins, the Owner will require the Contractor to replace all such pavement removed or disturbed without additional compensation. Pavement shall be cut to neat lines using equipment suitable for such work and the edges of the pavement shall be protected and maintained by the Contractor until the repaving is completed. Each Contractor shall also protect the street surfaces outside of the trench limits and shall repair at his own expense all damage done thereto as a result of his operations. All removal and protection of pavement of state highways will be subject to inspection by representatives of the Commonwealth of Pennsylvania, Department of Transportation, and the work must be performed in accordance with requirements of that Department.

1.22.7 All private driveways that are disturbed during the construction shall be repaired with the same material and restored.

1.22.8 All property corners in the line of work shall be properly referenced before excavation begins. As soon as the backfilling and compaction operations have been completed, the property corners shall be replaced in the exact position of the original corner, utilizing an approved marker. Surveys shall be performed by a registered land surveyor.

1.23 MAINTENANCE OF TRAFFIC

1.23.1 The roadway on one side of the line of work shall be kept open at all times and the streets, crosswalks, and sidewalks shall be kept clean, clear, and free for the passage of vehicles or pedestrians, unless otherwise authorized in writing by the Authority's Representative. The Contractor shall in all cases so arrange his work as to cause the least inconvenience to property owners consistent with the proper prosecution of the work as determined by the Authority's Representative.

1.24 OVERHEAD ELECTRIC LINES AND SUBSURFACE UTILITIES (PENNSYLVANIA ONE CALL)

1.24.1 The Contractor is hereby informed that there may be overhead and underground electric power and telephone lines as well as underground water, sanitary, electric, telephone, and gas lines in the vicinity of the work, and he shall, therefore, take all precautions necessary to avoid interference with them, and shall be responsible for all bodily injury and property damage claims resulting from interference with these facilities.

1.24.2 The Contractor shall be responsible to contact all utility companies in the project area through the Pennsylvania One Call System to determine the exact locations of all underground installations.

1.25 CLEARING OF RIGHT-OF-WAY

1.25.1 The Contractor shall, prior to stringing pipe, clear the right-of-way to a width sufficient for his needs in the construction of the pipeline, and confine his operations to a reasonable width, not exceeding the right-of-way.

1.26 REFERENCE TO PennDOT

1.26.1 Wherein these Documents or on the standard drawings, where reference is made to PennDOT Form 408, it shall mean the current edition of Standard Specification Publication 408 published by the Commonwealth of Pennsylvania Department of Transportation and any supplements thereto.

1.26.2 Wherein these Documents or on the standard drawings, reference is made to PennDOT Standard Drawings, it shall mean the current edition of the Standards for Roadway Construction, Series RC-0 to 100 as published by the Commonwealth of Pennsylvania Department of Transportation and any supplements or revisions made thereto.

1.27 SURVEYS AND LAYING OUT THE WORK

1.27.1 The Contractor shall employ a competent survey crew and shall lay out the work from the initial points of instruction as shown on the Contract Drawings or as given by the Engineer. The Contractor's survey crew shall set all offset stakes, building lines, batter boards; set, test and check all elevations and levels; as the work progresses. The Contractor shall furnish all equipment, materials and supplies required for the survey and layout work. He shall also furnish men to assist the Engineer in checking the survey and layout work if required.

1.28 INSPECTION OF CONSTRUCTION WORK

1.28.1 All work performed in connection with the extension, modification or improvement of public water facilities within the Township shall be required to conform with all Authority rules and regulations and shall be inspected during construction by an authorized representative of the Authority. All completed work shall be required to meet the approval of the Authority’s Engineer and shall be changed, modified, replaced, removed or otherwise corrected by the Contractor to such extent as directed by the Authority’s Engineer.

1.28.2 The work will be periodically or continuously inspected during its progress and when substantially completed, shall be inspected jointly, by the Authority’s engineer and the Contractor. A punch list of incomplete or corrective

work will be prepared. After all punch list items have been corrected to the satisfaction of the Authority's Engineer, the work will be declared complete and an eighteen (18) month maintenance bond period shall commence. During the term if the maintenance bond, the Contractor shall return when and as required to correct any problems resulting from construction, such as waterline leakage mechanical malfunctions, trench settlement, pavement failure, surface restorations, drainage, etc. In addition, a Maintenance Bond inspection shall be made by the Authority's Engineer at a date between twelve (12) and eighteen (18) months following the date of declaration of completion of construction. The Contractor will be notified in advance of that inspection date any may participate therein.

1.29 PRE-CONSTRUCTION PHOTOGRAPHS AND VIDEO TAPING

1.29.1 Provide a complete set of project photographs to document surface conditions prior to the start of construction. The photographic record is intended to document pre-construction conditions along the route of the construction work to provide a basis to resolve disputes with property owners and the Owner and/or Contractor regarding surface damage. Where photography does not provide detail sufficient to establish pre-existing surface conditions the dispute will be resolved by the Owner. No additional compensation will paid to the contractor to resolve such undocumented disputes. Still and videotape photographic records are to be provided.

1.29.2 Furnish color photographs of the proposed construction area along each right-of-way on private property and along all unpaved streets and thoroughfares both prior to the actual start of construction and also immediately upon completion. Photographic documentation may be obtained with a self-developing type of camera and will be at least three inches (3") by five inches (5") in size, or by alternative photographic means as approved by the Owner. Date each photograph. Keep a camera with adequate supply of film available at the job site to take additional photographs during construction.

1.29.3 Furnish a complete audio-videotape record of the pre-construction surface features within the proposed construction zone of influence and of any and all Township roadways utilized for access to and/or along the proposed construction zone. Provide a complete audio-videotape record showing the pre-construction condition of PennDOT roadways, shoulders, guide rail, mailboxes, and signs in the construction zone. Provide a record which includes, but is not limited to, all audio-videotapes, vinyl storage cases, tape logs, and indexes. Utilize high energy, extended still frame capable, color VHS videocassettes that have not been used on previous projects. Perform the record using a responsible **commercial firm** known to be skilled and regularly engaged in the business of pre-construction color audio-videotape documentation. Two (2) complete copies of the audio-videotape(s) are required.

[END OF SECTION]

SECTION TWO

WATER MAIN INSTALLATION

2.1 PIPE INSTALLATION

2.1.1 The Contractor shall furnish, install, lay joint and test all pipe, fittings, special castings and appurtenant materials and equipment all as indicated on the drawings and as specified. Fittings shall be furnished to conform with the changes in horizontal and vertical alignment indicated on the plans. Maximum joint deflection for pressure pipe shall be in accordance with manufacturer's recommendations.

2.1.2 All pipe shall be stored, handled and installed in strict accordance with the manufacturer's recommendations. All pipe shall be inspected for damage before installation in the trench. No damaged pipe will be installed in the trench. All dirt and other foreign materials shall be removed from the interior of the pipe by swabbing with 500 ppm HTH/water solution prior to placement.

2.1.3 No pipe shall be placed in trenches with pooled or flowing water. All open ends shall be plugged to prevent the entrance of water, dirt, and other foreign objects.

2.1.4 Pipe shall be laid with bell ends facing the direction of laying, unless otherwise specified by the Engineer. Where pipe is laid on a grade of ten percent (10%) or greater, the laying shall start at the bottom and shall proceed upward with the bell ends of the pipe upgrade. All joints to be restrained.

2.1.5 The use of blocks for supporting pipe and fittings will not be permitted. Only approved aggregate backfill is permitted to support pipe and fittings.

2.2 TRENCH EXCAVATION

2.2.1 The trench shall be excavated so that the pipe can be laid to the alignment, and grade required, and it shall be excavated only so far in advance of pipe laying as reasonable. The Contractor shall be responsible for sheeting, shoring or bracing in accordance with the Department of Labor and Industry Regulations. The Contractor shall provide a competent employee to monitor all trenching and safety activities. The Contractor shall bear sole and complete responsibility to insure compliance with these regulations, and for the construction means, methods, techniques, sequences on procedures and safety precautions and programs in connection with the work.

2.2.2 **The clear space between wall of trench and barrel of the pipe shall not be less than six inches (6") or more than twelve inches (12") on each side to a**

height of not less than twelve inches (12") above the top of the pipe. If sheeting is required, the foregoing dimensions shall be applicable to the inside faces of the sheeting.

2.2.3 Trenches may be, in general, excavated and backfilled either by machinery, or by hand as the Contractor may elect; provided that backfilling by hand shall be done to the extent hereinafter specified.

2.2.4 Where the proposed waterline is constructed where existing construction material is encountered, the Contractor shall remove these materials from the site and dispose of them.

2.2.5 Ledge rock, boulders and large stones shall be removed to provide a clearance of not less than six inches (6") below the subgrade and on each side of the pipe. Trenches excavated for rock clearance shall be backfilled as specified herein, with six inches (6") of PennDOT approved 2A (no slag).

2.2.6 If, in the opinion of the Authority's Representative, the bottom of the trench is found to be of unsuitable material, including but not limited to muck, quicksand, soft clay, ashes, cinders, refuse, vegetable, or other organic material that in the judgment of the Authority's Representative, is not suitable for pipe foundation subgrade or backfill, the Contractor shall excavate and remove such unsuitable material to the width and depth ordered by the Authority's Representative. The trench shall be backfilled to subgrade with stone backfill material approved by the Authority's Representative in layers.

2.3 BACKFILL

2.3.1 In no case will the wheel or track of any equipment utilized to compact trench backfill.

2.3.2 Detailed backfilling procedures are separated into three (3) zones:

A. The Pipe Zone, which begins at a minimum depth of six (6") inches below the bottom of the pipe and ends at a point twelve inches (12") above the crown of the pipe;

B. The Intermediate Zone, which begins at a point twelve inches (12") above the crown of the pipe and ends at a point eighteen inches (18") below finish grade; and

C. A Final Zone that includes the top eighteen inches (18") of trench area.

2.3.3 Pipe Zone Preparation and Backfill

A. The trench shall be excavated to a depth as to provide a uniform and continuous bearing and support for the pipe, as required by the drawings. Pipelines shall be supported on and bedded with PennDOT approved 2A (no slag). The bedding material shall be placed to a minimum depth of six inches (6") below the bottom of the pipe and for the full width of the trench. The bedding material shall be installed in accordance with the Detail Drawings. The material shall be placed in the pipe zone in such a manner as to not disturb, displace, or otherwise misalign the installed pipelines. **PennDOT approved 2A (no slag) shall be placed in six inch (6") layers from the invert of the pipe (top of bedding) to at least twelve inches (12") above the top of the pipe.**

B. The Authority reserves the right to require that the Contractor deviate from the elected method if in the opinion of the Engineer, the elected method is not providing adequate bedding.

2.3.4 Intermediate Zone Backfill

A. The select material excavated during trenching and other construction operations, shall be used as backfill in the intermediate zone as defined herein under all **unimproved** (e.g. lawn areas) surfaces. The backfill shall contain no stones more than six inches (6") in the largest dimension. Where the open-cut trench is located under **improved** areas (e.g. roadways, streets, sidewalks, state highways, berms, or other improved areas), the entire (full depth) intermediate zone shall be backfilled with PennDOT 2A limestone. The entire depth of the intermediate zone, regardless of material shall be placed in layers and compacted to maximum density using suitable vibratory compaction equipment. Maximum lift shall be eight inches (8") compacted to ninety-five percent (95%) modified proctor.

B. In all cases, regardless of the backfill material used and/or the compaction procedure selected and employed and/or specific requirements of the Authority's Representative, the Contractor shall be responsible to restore and repair all trench settlement occurring within an eighteen (18) month period after approval of final payment.

2.3.5 Final Zone Backfill

A. Backfill of the final zone of the trenches occurring in roadways, streets and the shoulder of a road shall be accomplished with PennDOT 2A limestone or aggregate compacted in four inch (4") layers.

B. Shoulder areas must be graded, rolled, and penetrated with an approved bituminous material at a rate of 0.25 or 0.30 gallon per square yard.

C. Backfill in the final zone of all trenches occurring in areas other than highways, roadways, driveways, berms or sidewalks, and areas not requiring pavement replacement shall be backfilled with excavated material approved by the Authority's Representative and compacted in six inch (6") layers to within 8-inch of final grade. Remaining 8-inches to be backfilled with topsoil.

D. For yard areas, refer to Section 2.6 of these specifications.

2.3.6 General

A. The Contractor shall, at all times, maintain a work force of sufficient numbers to insure proper backfill of the excavated trench as determined and directed by the Authority's Representative. The top of the backfill trench in all areas, shall be maintained for the life of the Contract, or as long after as required by the terms of the maintenance bond. In any event, restoration of trench settlements occurring within eighteen (18) months after completion of work shall be the responsibility of the Contractor.

B. The Contractor shall, at all times, provide and maintain in operation suitable and adequate pumping and/or well point equipment for complete dewatering of the excavation in such a manner as to permit the successful installation of the proposed improvements. No pipe shall be permitted to be constructed in a trench in which water flows or is pooled.

C. As the trenches are filled in and the work completed, the Contractor shall, remove and dispose of all surplus earth, stone, or other material from the work, in such a manner and at such points, as he may select or provide, subject to State or local laws, regulations, or ordinances and the approval of the Authority’s Representative; or he may deposit the same, either with or without rehandling at any point or points on the lines of the work covered by the Contract, if so directed by the Authority’s Representative; and shall leave all roads, sidewalks, and other places free, clear, and in good order. In case the Contractor shall fail to do so, or to make satisfactory progress in doing so, within twenty-four (24) hours after the receipt of written notice from the Authority’s Representative, the Authority may remove such surplus material and clear the roadways, sidewalks, and other places, and the cost of said work shall be charged to the Contractor and deducted from the Performance Bond or letter of credit provided by the Developer.

D. The Contractor shall furnish all deficiency in backfill material required, or shall remove any spoil excess excavation.

E. In the event that the Contractor desires to employ the use of special vibratory and/or heavy-duty machinery for that purpose, such methods

will be approved by the Authority's Representative, subject to demonstration by the Contractor that satisfactory end results can be attained.

2.4 SHEETING, SHORING AND BRACING

2.4.1 Sheet piling, sheeting, bracing, and shoring shall be furnished and driven or set in places by the Contractor where necessary to protect the work or adjacent structures and to protect against accidents, as required by the Federal Occupations Safety and Health Act of 1970, as may be amended.

2.4.2 The Contractor shall furnish all engineering, labor, material, and appliances for any shoring as may be required by the proper installation of this work. Shoring material shall be sound timber or of steel, designed to safely carry the loads, shall be wedged in place to prevent movement of the structures or shoring and shall be braced where necessary. Shoring shall not be removed until the permanent work is in proper condition to receive the load.

2.5 ACCOMMODATION OF DRAINAGE

2.5.1 Gutters, sewers, drains, and ditches shall be kept open at all times for surface drainage. No damming or ponding of water in gutters or other waterways will be permitted, except where stream crossings are necessary and then only to an extent which the Authority's Representative shall consider necessary. The Contractor shall not direct any flow of water across or over pavements except through approved pipes or properly constructed troughs, and he shall, when so required and at his own cost and expense, provide pipes or troughs of such sizes and lengths as may be required and place the same as directed. The grading in the vicinity of excavations shall be controlled so that the ground surface is properly pitched to prevent water from running into the excavation.

2.6 RESTORATION OF NON-PAVEMENT AREAS

2.6.1 Upon completion of all compacted backfilling on non-topsoil excavation, the topsoil previously removed and stored shall be replaced to a depth of 8 inches. Furnish additional topsoil as required to provide 8-inch minimum depth. **Immediately** upon backfilling of the trench for the entire length over each individual property, the entire disturbed area of this property shall be cleaned of all debris, graded, and fine-raked. Thereafter, all shrubbery, hedges, trees, fences, walkways, etc., shall be replaced to a condition equal to that before construction. **Reseeding of the backfilled area within the reasonable limits of the construction is required.** The careful replacement of the topsoil, the prompt cleanup and raking of the construction area on each property, the **complete** replacement of all removed surface items and the **continued** maintenance of the top surface of the trench shall be **strictly** enforced. In the event that the trench surface settles in some places lower than the original grade, these areas shall be

refilled with topsoil, whether or not available on the property upon which the depression occurs and seeded. The Contractor shall be required to periodically inspect all areas of backfill and repair and maintain these areas as necessary until no further settlements occur.

2.6.2 Before seeding, the topsoil shall be loosened to a depth of at least two inches (2"), and raked to remove all stones. Lime shall be applied to the surface at the rate of 100 pounds per 1,000 square feet of area; lime shall be raw, finely ground limestone. At least one (1) full week after the lime has been applied, fertilizer shall be applied at the rate of 50 pounds per 1,000 square feet; fertilizer shall be a complete commercial fertilizer with an analysis of 5-10-5. Seed mix shall be Penn State.

Seed shall be applied at the rate of one (1) pound per 250 square feet. The seed shall be raked or brushed in and the area covered with one-fourth inch (¼") of peat moss and hay applied at a rate of 1,200 pounds per 1,000 square yards. The Contractor shall be responsible for a good stand of grass and shall be responsible for the watering and reseeding.

2.6.3 The Contractor **shall be responsible** to implement all control measures required to prevent erosion. The Contractor shall be responsible to establish a good stand of weed-free grass. A good stand of grass will have 95% coverage of all areas with no weeds.

2.7 RESTORATION OF IMPROVED SURFACES, WALKS AND CURBINGS

2.7.1 Street paving, walks, existing piping, and curbing where broken into shall be restored by the Contractor and shall be repaved or rebuilt using the same type of construction and at least equal quality of materials as in the original, unless otherwise specified herein or on the drawings. The Contractor shall be responsible for restoring all such work including subgrade and base course where present so that it is equal in quality of material and workmanship to the original pavement or structure, unless otherwise specified. The permanent replacement of pavement and concrete sidewalks over any section of trench will not be permitted until at least fourteen (14) days after the backfilling of that section of trench is completed. In all cases, the Contractor will be required to maintain without additional bonds, all permanent replacement of street paving and curbs done by him or his subcontractors under the Contract for a period of eighteen (18) months after the date of certificate of completion and replacement of such work wherever surface depressions or underlying cavities result from settlement of trench backfill.

2.8 TEMPORARY DRIVEWAY AND ROADWAY RESTORATION

2.8.1 At the end of each work day, all roadway and driveway crossings shall be temporarily surfaced with two inches (2") of bituminous cold patch material in

accordance with PennDOT Form 408. Bituminous material shall be compacted in place.

2.9 BORING, JACKING AND TUNNELING

2.9.1 At the location shown on the drawings, the Contractor will not be permitted to construct the proposed pipeline by the open-cut method of excavation. The Contractor shall be required to bore, jack or tunnel that section to the length indicated on the drawings.

2.9.2 Minimum casing diameter shall be as indicated on the drawings or in the specifications.

2.9.3 Minimum wall thickness and minimum yield strength for all steel casing pipe shall be as specified under the section entitled "Materials of Construction".

2.9.4 Where tunneling is accepted as the means of construction, the tunnel shall be carefully excavated by experienced tunnel workers. The tunnel shall be excavated and trimmed to such size and shape as to allow the proper placing of the casing and the pipeline which will be contained therein to the lines and grades required after all bracing, shoring, or lining is in place. After the casing has been laid through the tunnel, the space between the tunnel bore and the casing shall be completely filled with Class C concrete, or an approved sand-cement mortar or as required by the railroad or State Highway Department. The nominal diameter of the tunnel shall not be less than two inches (2") more than the internal diameter of the casing pipe bell.

2.9.5 All sheeting and shoring, bracing, lining, etc., required for the construction of tunnels, shafts, portals, or pits, shall be designed, furnished and installed by the Contractor. Such sheeting, shoring, bracing, and lining shall be of sufficient structural capacity to insure the safety of job personnel and the Contractor shall be responsible for the adequacy of same to withstand all loads imposed thereon. The Contractor shall be solely and fully liable for all personal or property damages incurred as a result of his failure to provide and properly maintain adequate shoring, sheeting, and bracing. All material excavated from the tunnels or shafts shall be removed from the site of the work as soon as excavated, and shall be disposed of by the Contractor in an approved manner. All tunnel sheeting and shoring, bracing, lining, etc., shall be left in place.

2.9.6 The Contractor shall excavate the tunnel and support the surrounding area so that no movement of the arch over or adjacent to the work shall occur at any time. If such earth movement does occur, the Contractor shall rectify the situation before continuing new tunnel construction.

2.9.7 The carrier pipe installed in the casing shall be as specified herein except where shown otherwise on the drawings. After the casing and the carrier

pipeline(s) being constructed have been installed, the entire space between the pipeline and the casing shall be backfilled with sand, fine gravel, cement mortar, or other material approved by the Authority and/or as required by the railroad or State Highway Department.

2.9.8 When jacking is employed, a minimum one-half inch (½") thick steel shield at least twenty-four inch (24") long shall be required to extend beyond the forward end of the liner plate or conduit being jacked. The outside radius of this shield shall not exceed the outside diameter of the pipe by more than one inch (1"). Excavation ahead of the conduit shall not be permitted to progress beyond the end of the shield being used.

2.9.9 Where boring is called for on the drawings, it shall be mandatory to conduct said operation from the high end of the pipe unless otherwise permitted. The pipe shall at all times, follow immediately behind the boring auger at a distance no greater than two feet (2'). The method of augering the entire hole and then pushing the pipe through will not be permitted.

2.9.10 All boring and jacking shall be unclassified and no extra payment will be made for rock, boulders, shale, timber, old foundations, masonry, logs, or other natural or artificial materials encountered in the boring and/or jacking operations. The Contractor shall not, at any time, claim a misunderstanding in regard to depth or character of the boring or jacking to be made or in the nature of the materials to be encountered.

2.9.11 When boring is employed, the Contractor shall be responsible for construction of the various crossings true to line and grade and shall be held fully responsible for protecting against surface subsidence damages or disturbances to adjacent property and facilities from his construction operations, and shall rectify resultant subsidence, damages, or disturbances to the satisfaction of the Authority.

2.9.12 All voids between casing pipe and undisturbed earth and the space between the casing pipe and the carrier pipe shall be filled with an approved material and by an approved method. The ends of the casing pipe shall be sealed by an approved method.

2.9.13 Attention is directed to the fact that grade is critical at some of the crossing locations. At certain other locations, however, some latitude in required final elevation exists, and adjustment may be made to either the inlet or outlet pipes, provided that the crossings are installed prior to construction of said connecting lines. It is, therefore, suggested that the Contractor program his boring operations early in the construction schedule. The tolerance which will be permitted in elevation of the pipe at the crossings will be determined by the Engineer.

2.9.14 All sheeting, shoring, and bracing required for the construction of portals and access shafts to the bore pits shall be furnished and installed by the Contractor and shall conform to the requirements set forth previously herein. All work relative to the installation of waterlines by means of boring shall be performed in accordance with the regulations set forth under Subpart S, "Tunnels and Shafts, Caissons, Cofferdams, and Compressed Air" published as a part of the Safety and health Regulations for Construction by the United States Department of Labor.

2.10 DISPOSITION OF UNSATISFACTORY AND/OR EXCESS EXCAVATED MATERIAL

2.10.1 Where the Contractor encounters boulders, rock, swampy, or other materials determined by the Authority's Representative to be unsatisfactory for use as backfill, the same shall be removed from the site and disposed of by the Contractor. All excess material remaining after completion of trench backfilling and all excavated material replaced by special backfill, shall be similarly disposed of by the Contractor.

2.11 ALIGNMENT AND GRADE

2.11.1 The waterline shall be laid and maintained to the required lines and grades as shown on the drawings and at the required locations.

2.11.2 The minimum depth from finished grade to the crown of all pipe shall be forty-eight inches (48").

2.11.3 The proposed line is designed to be installed with continuous upgrade to air relief points, shown on the drawings, and, therefore, grade and elevations are important components of construction.

2.11.4 The Contractor shall employ a competent survey crew, satisfactory to the Authority's Representative, to lay out the work from the initial points of instructions as given by the Authority's Representative. He shall set all offset stakes, set, test, and check all elevations and levels and other parts of the construction as the work progresses. The Contractor shall furnish all stakes required for the survey and layout work. He shall also furnish men to assist the Authority's Representative in checking the survey and layout work, if required.

2.12 HAULING, UNLOADING AND CARE OF PIPE

2.12.1 Pipe and accessories shall be hauled in a manner to prevent damage, and shall be unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall pipe be dropped or rolled against pipe already on the ground.

2.12.2 Pipe and fittings shall be handled at all times in a manner that shall prevent damage.

2.13 ACCOMMODATION OF TRAFFIC

2.13.1 Streets shall not be unnecessarily obstructed, and unless the local municipality authorized in writing the complete closing of the street, the Contractor shall take such measures at his own expense, as may be necessary to keep the street or road open and safe for traffic. The Contractor shall provide adequate written notice to all public transportation companies (bus, school bus), traversing the project of his schedule and shall coordinate his activities so as to not impede or infringe on normal operation or access. Where work is to be performed in State highways, the Contractor shall prepare and submit and offer approved by the State Highway Department, shall implement a Traffic Control Plan.

2.13.2 The Contractor shall construct and maintain, such adequate and proper bridges over excavations as may be necessary or as directed for the safe accommodation of pedestrians or vehicles. The Contractor shall furnish and erect substantial barricades at crossings of trenches, or along the trench, to protect the traveling public.

2.13.3 The roadway on one (1) side of the line of work shall be kept open at all times, unless otherwise authorized by the Authority's Representative.

2.13.4 The streets, crosswalks, and sidewalks shall be kept clean, clear, and free for passage of vehicles or pedestrians. A straight and continuous passageway on sidewalks and over crosswalks, at least three feet (3') in width, shall be preserved free from all obstructions.

2.13.5 The Contractor shall temporarily repair all disturbed pavement prior to the cessation of construction activity each working day. Pavement surfaces shall be repaired with a two inch (2") wearing course of compacted bituminous cold patch, said cold patch shall then be maintained by the Contractor until the pavement is permanently repaired. This method of repair shall be employed for driveways as well as public roads and it shall be clearly understood that this is the only method of temporary pavement repair that is deemed acceptable.

2.13.6 Should the Contractor fail to repair any excavation in the aforementioned manner prior to terminating his construction activity for the day, the Authority will provide the temporary pavement repair and will deduct the cost from the letter of credit provided by the Developer.

2.13.7 Where deemed necessary, such additional passageways as may be directed shall be maintained free of obstructions. In narrow or congested streets or alleys, when so directed, the Contractor shall complete his work up to a point

designated by the Authority's Representative before opening the work ahead, in order to give access to garages and other places. The Contractor shall in all cases, so arrange his work as to cause the least inconvenience to property owners consistent with the proper prosecution of the work as determined by the Authority's Representative.

2.14 DUST CONTROL

2.14.1 The Contractor shall use water, calcium chloride, or other suitable dust control material dependent on existing conditions, to control excessive dust or mud conditions during the installation of pipe or while maintaining surface areas at the direction of the Authority's Representative.

2.15 LAYING PIPE - GENERAL

2.15.1 Proper implements, tools, and facilities approved by the Authority's Representative, shall be provided and used by the Contractor for the safe and workmanlike performance of his work. All pipe and fittings, shall be carefully lowered into the trench piece by piece by means of a derrick, ropes, or other approved equipment, in such a manner as to prevent damage to material. Under no circumstances shall material be dropped or dumped into the trench.

2.15.2 All pipe and fittings shall be carefully examined for cracks and other defects while suspended above the trench immediately before installation in final position. Defective pipe and fittings shall be rejected, as specified by the Authority's Representative.

2.15.3 The interior of all pipe shall be free of dirt and foreign material at all times.

2.16 BLOCKING AND ANCHORAGE FOR WATERLINES

2.16.1 All bends in excess of 10° shall be equipped with mega-lug flanges for securing purposes, and all plugs, caps, tees and wye branches along the pipelines shall be blocked and anchored with cast-in-place PennDOT Class A concrete (3,300 psi) poured solidly in formed excavations between the pipe and **firm** trench walls and bottom or tied down to anchor blocks in such a manner to prevent the lines pulling apart. Blocking and anchorage shall be as shown on the Detail Drawings. All piping shall be supported properly and shall be blocked and/or anchored as above described or shall be tied in by means of rods, bolts, or struts to prevent their pulling apart. All supports, blocking, rods, nuts, and collars or clamps proposed must receive the approval of the Engineer before fabrication. Should it be impractical, or should the Contractor desire, he may furnish fittings and pipe with lugs and bolts at those points where blocking and/or anchoring by means shown on the drawings is not appropriate. The Contractor must obtain the approval of the Engineer for any substitution for blocking and anchoring.

2.16.2 All piping that is rodded together shall be assembled by replacing the affected bolts of the mechanical joint fittings with "Tie Bolt Restraints" as manufactured by Star National Products of Columbus, Ohio or **approved** equal. Rodded piping shall be coated with a bituminous material that has been approved by the Engineer and shall be backfilled with special material approved by the Authority's Representative.

2.17 TESTING FOR WATERLINES

2.17.1 All newly laid pipe, or any valved section containing newly laid pipe shall be subject to hydrostatic testing and leakage testing at the working pressure of the existing system. The hydrostatic test and leakage test shall be performed concurrently. The hydrostatic pressure and test shall be performed at a gauge pressure, as measured at the low point of the line, equal to a pressure in pounds per square inch numerically equal to 1.5 times the normal working pressure, or 50 psi greater than the normal working pressure of the pipe, whichever is greater. The duration of the test shall be for a period of at least two (2) hours. During the test, the test pressure shall be maintained within 5 psi of the specified test pressure at all times.

2.17.2 Maximum leakage, defined as the quantity of water that must be supplied into the test section to maintain the specified test pressure, shall not exceed:

$$L = \frac{SD\sqrt{P}}{133{,}200}$$

WHERE:

L	=	Allowable leakage, in gallons per hour.
S	=	Length of pipe tested, in feet.
D	=	Nominal diameter of the pipe, in inches.
P	=	Average test pressure during the leakage test, in pounds per square inch (gauge).

When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gph/in of nominal valve size shall be allowed.

When hydrants are in the test section, the test shall be made against closed hydrant valves.

2.17.3 The test section of pipe shall be slowly filled with water. All air shall be removed through the permanent air vents installed in the line or through taps at all high points where permanent air vents are not installed. Taps shall be furnished by the Contractor and plugged with suitable brass plugs after testing and sterilizing at no additional cost for expelling the air from the line. After the line is

completely filled with water, the pressure shall be brought to the required test pressure using the pumping equipment.

2.17.4 The pump, pipe connections, measuring device, pressure gauges and all necessary apparatus required for testing shall be furnished by the Contractor at no additional cost and shall be subject to the approval of the Project Representative. Pressure gauges shall be furnished sufficiently in advance of the testing in order that the Engineer may determine their accuracy. Gauges showing an error of 3 percent or more of gauge pressure shall be rejected.

2.17.5 All visible leaks shall be repaired regardless of total leakage as shown by test.

2.17.6 Repairs of Defects -- If inspection or test shows defects, including visible leaks, such defective work or material shall be replaced at the expense of the Contractor and inspection and tests repeated. All repairs to piping shall be made with new material.

2.17.7 Failure of piping to meet the tests specified above will be sufficient cause to reject the work until the defects are satisfactorily repaired. All expenses and costs incurred in carrying out the specified tests shall be borne by the Contractor.

2.18 DISINFECTION FOR WATERLINES

2.18.1 During pipe laying, each pipe joint shall be swabbed inside with a hypochlorite solution of 500 ppm or greater. One ounce of granular HTH shall be placed in each pipe joint after swabbing. This work shall be performed prior to laying the next pipe joint.

2.18.2 Following the testing of any potable water mains, the entire line shall be drained and thoroughly flushed **prior to disinfecting the main** using such special temporary bypasses as may be required to accomplish this purpose. All valves and connections between the new and existing work shall be closed or plugged to insure against leakage of the disinfecting solution into the existing system. Application of the disinfecting solution shall be made at a convenient location through a corporation cock or tap installed on the service line.

2.18.3 Disinfecting including chemical and bacteriological testing and disposal of chlorinated water of all waterlines shall be in strict accordance with AWWA C651 (latest revision) "Standard for Disinfecting Water Mains".

2.18.4 The disinfecting solution shall be made from a standard hypochlorite commercial product in powder form and injected into the service line. A 5 percent solution of the powder shall be prepared, consisting of 5 percent of powder to 95 percent of water by weight, due attention being given to the chlorine content of the product used. This calcium hypochlorite, first made into a paste

and then thinned to a slurry with clean water, shall be injected or pumped into the newly laid pipe after preliminary flushing. If sodium hypochlorite is used, mix the solution, as purchased, with water to obtain the desired concentration of chlorine and feed into the pipe under treatment in the same manner as is used for feeding other hypochlorites.

2.18.5 Water from the source of supply shall be controlled so as to flow slowly into the newly laid pipe during the application of chlorine. The rate of chlorine mixture flow shall be in such proportion to the rate of water entering the pipe that the chlorine dose applied to the water entering the newly laid pipe shall be at least 40 to 50 ppm.

2.18.6 Treated water shall be retained in the pipe long enough to destroy all nonspore-forming bacteria. This period should be at least 48 hours and preferably longer, as may be directed by the Engineer. After the chlorine-tested water has been retained for the required time, the chlorine residual at the pipe extremities and at other representative points should be at least 25 ppm.

2.18.7 Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipeline at its extremities until the replacement water throughout this length shall, upon test, show a residual chlorine content of not more than 1 ppm. All super chlorinated water shall be disposed of in accordance with all applicable Federal, State or Local laws, rules, regulations or ordinances. Super chlorinated water shall be contained and de-chlorinated prior to discharge.

2.18.8 Should the initial treatment fail to result in the conditions specified in the above paragraphs, the chlorination procedure shall be repeated until such results are obtained in the opinion of the Engineer.

2.18.9 After final flushing and before the line is placed in operation, the Authority shall take samples, for bacteriological testing by a certified laboratory. Samples shall be preserved, transported and tested in accordance with Standard Methods latest edition for total and/or fecal coliform. Lines demonstrating presence of coliform bacteria shall be re-disinfected and retested until no coliform bacteria are present as determined by laboratory testing. The Contractor shall pay for all cost of testing by the certified laboratory.

2.18.10 All expenses and costs incurred in carrying out the specified sterilization work shall be borne by the Contractor.

2.18.11 The Engineer reserves the right to direct the Contractor to provide material and labor as is necessary to channel the discharge of flushing water, disinfection solution and testing water to a drainage structure if in the opinion of the Authority's Representative the unrestricted discharge of said liquids causes an undesirable or hazardous condition.

2.19 SETTING OF VALVES AND FITTINGS

2.19.1 Valves in distribution lines shall be located as shown on the plans. A valve box shall be provided for every valve. The valve box shall be set so stress or shock shall not be transmitted 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 directed by the Authority's Representative.

2.20 SETTING OF HYDRANTS

2.20.1 Hydrants shall be located as shown on the plans or as directed so as to provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians. When placed behind a curb, the barrel shall be set so that no portion of the pumper nozzle cap shall be less than six inches (6") nor more than twelve inches (12") from the gutter face of the curb. When set in the lawn space between the property line and the sidewalk, no portion of the pumper nozzle cap or hydrant shall be within twelve inches (12") of the sidewalk.

2.20.2 All hydrants shall be set plumb with the pumper nozzle facing the curb or street. Hydrants shall be set to the established grade with nozzles at least eighteen inches (18") above the ground or as directed by the Authority.

2.20.3 Hydrants shall be connected to the main with a six inch (6") branch the same type as the mainline. All installations shall be restrained. Anchorage and installation details shall be as shown on the Detail Drawings, and/or as called out on the drawings.

2.20.4 All hydrants shall be installed with a six inch (6") or larger gate valve. On in-line hydrants the valve shall be six inches (6") and installed in the branch. One valve and valve box shall be included in the unit price of each installed hydrant.

2.21 STREAM CROSSING CONSTRUCTION

2.21.1 The Contractor shall construct all temporary facilities necessary or required by the "Erosion and Sedimentation Control Plan". The Contractor shall control stream flow during the course of constructing all waterline stream crossings. Erosion and sedimentation shall be kept to minimum while this work is in progress and the Contractor shall be responsible to adequately control stream flow to obtain the required results. The stream crossings shall be constructed in accordance with the applicable drawings.

2.22 CLEANUP

2.22.1 As excavation is completed, the Contractor shall immediately cleanup the entire area of all surplus earth, stone and other materials. If he fails to do so, or neglects to do so, or fails to make satisfactory progress within 24 hours after receipt of written notice from the Authority's Representative, the Authority may remove such surplus material and clear roads, walks, and other places. Cost of said work done by the Authority shall be charged to the Contractor and deducted from letter of credit provided by the Developer.

2.23 SERVICE CONNECTIONS

2.23.1 Service connections shall be installed where directed by the Authority's Representative or where indicated on the drawings.

2.23.2 Existing services shall be reconnected by installing a new curb stop new corporation stop, new service line and curb box, and making the necessary connections to the existing service line. The Contractor shall furnish all fittings required to make the necessary reconnections to the existing lines.

2.23.3 For private developments, all service connections shall be made by Authority personnel. The Developer shall install a PVC conduit (Schedule 80) under the roadway for future service line installations by the Authority.

[END OF SECTION]

SECTION THREE

MATERIALS OF CONSTRUCTION

3.1 SCOPE

3.1.1 This section of the specifications describes the requirements of material to be installed under this Contract.

3.1.2 All proposed waterline pipe shall be constructed of the type and size shown on the drawings, or as specified herein. The minimum mainline pipe size is 8-inch.

3.2 ABBREVIATIONS

3.2.1 Where in these specifications or on the drawings, the following abbreviations, words, expressions, or pronouns used in their stead occur, they shall have the meaning here given:

ASA - American Standards Association
ASTM - American Society of Testing Materials
ANSI - American National Standards Institute
AWWA - American Water Works Association

3.2.2 It shall be understood that the latest revision of all specifications shall apply, unless specifically noted otherwise.

3.3 PIPE/MATERIAL CERTIFICATIONS, SUBMITTALS AND MANUFACTURER'S REPRESENTATIVE

3.3.1 Prior to delivery to the job site of any materials or pipe specified herein, the Contractor shall obtain from the manufacturer of said material or pipe, and submit to the Authority's Representative, six (6) notarized copies of manufacturer's certification that the pipe or material has been manufactured, inspected and tested according to these specifications and meets or exceeds all requirements thereof. All certifications shall reference the project name, the Authority and the Contractor. All pipe or materials delivered shall be so marked and shall bear identification that refers to the date and place of manufacturer and actual test records.

3.3.2 The manufacturer shall furnish a representative to remain on the job site for a sufficient period of time at the start of the job, to instruct the Contractor's personnel, and to ensure proper installation of the materials and pipeline.

3.4 DUCTILE IRON PIPE AND FITTINGS

3.4.1 The Contractor shall furnish, install, lay joint and test all ductile iron pressure pipe, fittings, special castings and appurtenance materials and equipment all as indicated on the drawings and as specified. Fittings shall be furnished to conform with the changes in horizontal and vertical alignment indicated on the drawings. The cost of all such fittings is considered incidental and shall be included in the per foot unit price bid.

3.4.2 Unless otherwise specifically noted on the drawings described herein, all ductile iron pipe shall be furnished with thickness Class 52 and have a minimum diameter of eight inches (8"). The Authority reserves the right to require a thickness class greater than fifty two (52) and/or a diameter larger than eight inches (8") where conditions and circumstances warrant.

3.4.3 All pipe, fittings and accessories shall conform to the requirements of the following standard specifications, of the latest revision, as applicable.

A. A.21.10 ANSI -- Standard for Cast Iron and Ductile Iron Fittings, 2" through 48", for Water and Other Liquids.

B. A.21.11 ANSI -- Standard for Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings.

C. A.21.50 ANSI -- Standard for the Thickness Design of Ductile Iron Pipe.

D. A.21.51 ANSI -- Standard for Ductile Iron Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water and Other Liquids.

E. A.21.4 ANSI -- Cement-Mortar Lining per Cast Iron Ductile - Iron Pipe and Fittings for Water.

3.4.4 All ductile iron pipe shall be designed in accordance with ANSI A.21.50 and shall be manufactured in accordance with ANSI A.21.51.

3.4.5 Joints for ductile iron pipe shall be push-on joints except at fittings or where indicated on the drawings.

3.4.6 Fittings shall conform to the requirements of ANSI A.21.10 and shall be of a pressure classification at least equal to that of the pipe with which they are used. Reduced thickness ductile iron fittings will not be accepted. All fittings shall have mega-lug flanges.

3.4.7 Mechanical joint fittings shall be provided with sufficient quantities of accessories conforming to ANSI A.21.11. Bolts shall be of high strength cast iron.

3.4.8 Joints for all fittings, except for self-restrained joints, shall be mechanical joint and shall conform to ANSI A.21.11. Pipe joint deflection shall conform to 50% of the requirements of ANSI/ AWWA C600-77.

3.4.9 The inside of all pipe and fittings shall be given a double thickness cement lining and bituminous seal coat in accordance with ANSI A.21.4 (AWWA C104).

3.4.10 Ductile iron pipe and fittings shall have an outside coating of bituminous material approximately 1 mil thick. The coating shall be applied to the outside of all pipe, unless otherwise specified, and shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and shall be strongly adherent to the pipe.

3.4.11 Gaskets shall be of a composition suitable for exposure to the liquid within the pipe.

3.4.12 All pipe and fittings shall be inspected and tested under the supervision and inspection of independent testing laboratory, at the manufacturing plant or elsewhere. The tests shall conform to those outlined in ANSI A-21-51.

3.4.13 **All ductile iron pipe and fittings, including valves, shall be installed with a single layer of two ply cross laminated high density polyethylene encasement per AWWA C105, meeting the following nominal specifications; AWWA C105-93, Section 4.1.2, High Density Cross Laminated Polyethylene Film, Type III, Class C (black), Grade 33, tensile strength, 5,000 psi minimum elongation 100 percent, thickness nominal 0.004 inch (4 mil).**

3.5 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

3.5.1 Pipe shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D3350 with a minimum cell classification of 445574C. The polyethylene resin is to contain antioxidants and be stabilized for protection against ultraviolet degradation. Produce pipe from virgin material with no rework compound, except that obtained from the manufacturer's own production of the same formulation. Furnish homogenous pipe throughout, free of visible cracks, holes, foreign material, blisters or other detrimental faults.

3.5.2 Provide DIPS HDPE pipe. Wall thickness and DR pipe designation to be determined based on water system pressure zone. Provide all HDPE pipe having a minimum inside diameter of eight inches (8"). Provide an inside diameter matching the adjoining pipe for modifications to existing waterlines.

3.5.3 Provide pipe and joints meeting or exceeding the following physical properties.

Property	ASTM Test Method	Nominal Value
Material Designation	ASTM F714	PE4710
Cell Classification	ASTM D3350	445574C (black)
Density (g/cc)	ASTM D1505	0.960
Melt Index (g/10 min)	ASTM D1238	0.08
Flexural Modulus (psi)	ASTM D790	>120,000
Tensile Strength (psi)	ASTM D638 Type IV	>3,500
SCG (PENT) (hours)	ASTM F1473	>500
HDB at 73°F (23°C) (psi)	ASTM D2837	1,600
Color; UV Stabilizer	ASTM D3350	Black w/ Blue Stripe

3.5.4 All fittings to be ductile iron in accordance with Paragraph 3.4. Provide HDPE mechanical joint adapters for connection with all valves and fittings.

3.5.5 Assemble pipe lengths in the field with butt-fused joints in accordance with ASTM D2657. Follow the pipe manufacturer's written instructions. If conflict arises, apply pipe manufacturer's instructions. Provide butt-fused joints having internal bead projections of not more than ¼ inch. Provide a joint strength equal to or greater than the pipe. When joints are tested, they must indicate a ductile failure.

3.5.6 Utilize a fusion machine having hydraulic pressure control for fusing two pipe ends together (butt fusion type), and equipped with gauges to monitor fusion pressures. Equip the machine with an engine powered facing unit to square and trim the pipe ends smooth and provide full surface contact with the heating plate. Electrically heat the heating plate on the fusing machine thermostatically controlled with a temperature gauge capable of maintaining 500°F with a tolerance of 10°F. Utilize fusion temperature and pressure as recommended by the pipe manufacturer.

3.6 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE

3.6.1 Polyvinyl Chloride Pipe (PVC) designed, manufactured, and tested in strict accordance with AWWA C900 (DR-14). Pressure rated at 305 psi minimum (AWWA). Minimum standard dimension ratio (DR) of 14 for both barrel and bell dimensions. Pipe greater than 20 feet in length will not be accepted. Provide National Sanitation Foundation seal of approval. Comply with the requirements for Type 1, Grade 1 (PVC 1120), of ASTM D-1784. Provide push-on type joints with a rubber O-ring gasket conforming to ASTM D-1869.

3.6.2 Use of PVC is approved for select areas in Distribution System only as approved by the Authority and its Engineer (dependent on working pressure of proposed installation).

3.6.3 Supply all pipe from one manufacturer.

3.6.4 Make connections of PVC pipe to ductile iron fittings using fully restrained retainer glands suitable for PVC pipe joints.

3.7 FIRE HYDRANTS

3.7.1 A hydrant shall be furnished and installed where shown on the drawings and as approved by the Authority's Representative. The installation shall be adapted to the location of the hydrant so as to make the best installation possible. The installation shall be in general accord with the Detail Drawings. The installation shall include but not be limited to the following items:

A. One (1) anchoring tee with a six inch (6") diameter branch.

B. One (1) six inch (6") anchoring gate valve and valve box. Valves shall be as specified under section "Gate Valves".

C. Six inch (6") diameter ductile iron Class 52 pipe (length shall be as required).

D. Six inch (6") diameter anchoring pipe and anchoring coupling.

E. All lines on which fire hydrants are located shall be at least six inches (6") in diameter, and hydrants shall be provided, spaced not over 500 feet apart. Hydrants shall be Super Centurion 250 manufactured by Mueller Company. Hydrants shall comply with AWWA Specification C-502 designed to operate under a 250 psi working pressure.

F. Hydrants shall be the self-oiling, dry bonnet type with O-ring seal, and shall be the "traffic" type to provide a break flange and stem for protection against water loss if the hydrant barrel is broken. Hydrants shall meet the following requirements:

1. Valve Opening Size - 5¼" minimum,

2. Nozzle Arrangement - Two 2½" hose nozzles and one 4½" pumper nozzle and have national standard threads (7½ threads per inch),

3. Cover (over connecting pipe - four feet, six inches (4'6") minimum,

4. Size of Inlet Connection - six inches (6"),

3. Operating Nut - To comply with Brighton Township fire company standard,

6. Direction of Opening - Counterclockwise, to the left,

7. Barrel Diameter - seven inches (7") minimum.

8. In addition to the shop coat, two (2) field coats of yellow urethane paint of a type approved by the Authority will be provided.

3.8 VALVE BOXES

3.8.1 Each buried valve shall be equipped with a Tyler Union valve box installed flush with finish grade. Valve boxes shall be made of cast iron of two (2) piece construction of the slide type with not less than a five and one quarter inch (5¼") diameter shaft and large oval base.

3.8.2 The "size" or depth of setting shall be adjustable over a range to accommodate a cover over the pipe of four feet, six inches (4' 6") (minimum) and the box length shall be variable to suit the installation. A deep socket type cover shall be furnished with each box on which shall be cast the word "Water". The valve boxes shall be given two (2) coats of coal tar epoxy.

3.9 SERVICE CONNECTIONS

3.9.1 Services shall be installed in general accord with the Detail Drawings. All connections to DI Class 52 or cast iron pipe shall be a Mueller double strap, bronze saddle in high pressure areas (greater than 150 psi). All new service lines shall be one inch (1") or as sized as shown on the drawings, Type K soft copper tubing. The use of one inch (1”) PEXa 3306 (SDR 9) tubing is permitted for use in Long Services inside conduit road crossings as directed by the Authority and the Authority Engineer dependent on working pressure. The corporation stop shall be a Mueller H-15008 of one inch (1") diameter tapped directly to ductile iron waterline. For tapping HDPE waterline, provide electrofusion service saddle (DIPS) with 2” female brass iron pipe tread, brass bushing (2” male iron pipe thread by 1” female iron pipe tread), and Mueller H-15028 corporation stop. For tapping PVC waterline, provide Mueller H-13000 Series (or equal) fixed ranged, bronze double service saddle. The use of ranged service saddle is not permitted. The corporation stop shall be Mueller H-15028 of one inch. The curb stop shall be a Mueller B-25209 of one inch (1") diameter with Tyler Union two-piece screw type curb box. Provide a Mueller insulated straight coupling for connection to existing copper service.

3.10 GATE VALVES

3.10.1 All buried line valves for water, size 3 inch through 12 inch, shall be the Mueller 2360 Series resilient-wedge gate type with non-rising stems (NRS) and mechanical joint ends. Valves shall be cast iron body with O-ring stem seals, suitable for a water working pressure of 250 psi and 500 psi test pressure and

shall conform to AWWA C509. All bolts, studs and nuts shall be stainless steel. All valves shall open by turning to the left (counterclockwise). All gate valves shall be HP epoxy coated.

3.10.2 All **gate valves 2½" and smaller** shall be Mueller as approved by the Authority and have bronze body and inside screw.

3.11 STEEL CASING PIPE

3.11.1 Steel casing pipe shall be welded steel pipe, manufactured and tested in accordance with ASTM A-120, Grade B, with a minimum yield strength of 35,000 psi. The pipe shall be **new**, visibly sound, and round. Minimum casing wall thickness shall be as follows:

Nominal Diameter of Casing Pipe in Inches	Wall Thickness
Under 14	0.251"
14 and 16	0.282"
18	0.313"
20	0.344"
22	0.375"
24	0.407"
26	0.438"
28 and 30	0.469"
32	0.501"
34 and 36	0.532"

3.11.2 Prior to delivery of the pipe to the job site, the Contractor shall submit to the Authority's Representative six (6) copies of the manufacturer's notarized certification that all pipe was manufactured, tested, and inspected in accordance with these specifications. All pipe delivered to the job site shall be so marked.

3.12 TAPPING SLEEVES

3.12.1 Where tapping sleeves and gate valves are called out on the drawings, the tapping sleeve shall be Mueller Type H615 rated for 250 psi water pressure. Gate valve shall be Mueller resilient seat per specifications suited to tapping sleeve with flange on one end and mechanical joint on the other end. Pipe surface shall be clean, free of debris, burrs or condition that will interfere with the sleeve/pipe seal. Final installation shall be free of visible leakage.

[END OF SECTION]

SECTION FOUR

PAVEMENT REPLACEMENT AND REPAIR

4.1 SCOPE

4.1.1 The work covered by this section of the Specifications consists of furnishing all plant, labor, equipment, and materials, and performing all operations in connection with the replacement of paving removed during construction operations in strict accordance with this section of the Specifications and the applicable drawings, and subject to the terms and conditions of the Contract.

4.1.2 In general, pavement replacement shall conform to the requirements of this section and to the details indicated on the standard drawings.

4.1.3 Where reference is made in these Specifications to the Pennsylvania Department of Transportation (PennDOT) Specifications, it shall be understood to mean the Highway Department's latest specifications published, and those sections and paragraphs of the Highway Specifications that apply shall be as much a part of these Specifications as though they were herein attached.

4.2 ORDER OF WORK

4.2.1 The Contractor shall so plan the work under this section to insure completion of the work contained herein at such time when the majority of work under Contract has been completed in order to keep heavy traffic loads during construction to a minimum over finished road surfaces. Final inspection and acceptance of the work covered under this section will be made when all contracts are completed in all respects. Pavement newly replaced and damaged or destroyed during construction operations will be replaced and/or repaired by the Contractor.

4.2.2 Roadway surfaces will only be placed when weather conditions will not detrimentally affect the quality of the finished work. Any road areas, including base course, damaged by freezing temperatures or other weather conditions during any phase of construction, shall be removed and replaced by the Contractor.

4.2.3 Prior to preparing the trench or disturbed area for repaving, the entire area shall be clean of all loose and accumulated dirt and construction debris and the original pavement exposed in order to determine the extent of the repaving work required. Cleaning operations shall be conducted with an approved type street brooming machine, or with suitable hand brooms.

4.3 GENERAL REQUIREMENTS

4.3.1 Wherein these Contract Documents or on the drawings, where reference is made to PennDOT Form 408, it shall mean the current edition or the latest revision of Standard Specification Publication published by the Commonwealth of Pennsylvania Department of Transportation and any supplements thereto.

4.3.2 Wherein these Contract Documents or on the Contract Drawings reference is made to PennDOT Standard Drawings, it shall mean the latest edition of the Standards for Roadway Construction, Series RC-0 to 100 as published by the Commonwealth of Pennsylvania Department of Transportation and any supplements or revisions made thereto.

4.4 SHOP DRAWINGS

4.4.1 The Contractor shall submit two (2) originals and four (4) copies of shop drawings, catalog cuts, certifications, job mix formulas, or other descriptive data on all items of work which require materials for construction.

4.4.2 If additional copies are required by the Contractor, he shall provide the additional copies for approval as he needs.

4.4.3 The Contractor shall deliver to the Authority's Representative, with each truck load of materials delivered, batch plant daily mix certification/tonnage slips, executed by an authorized representative of the supplier.

4.5 MATERIAL AND CONSTRUCTION REQUIREMENTS

4.5.1 The Contractor shall provide materials and perform all construction in accordance with all applicable sections of the PennDOT Specifications Form 408 pertaining to the type of restoration work to be performed.

4.6 SUBGRADE PREPARATION

4.6.1 Prior to placing base course and/or paving course, the ditch shall be re-excavated to the limits and depths indicated on the standard drawings or as directed by the Authority's Representative to remove unsuitable material. Approved construction equipment shall be used for this operation. Where soft, spongy material unsuitable for proper compaction is encountered, such unsuitable material shall be removed, and spot subgrade reinforcement consisting of AASHTO No. 57 stone aggregate or suitable material from excavation or borrow shall be placed and compacted. Subgrade shall be brought to required line, grade, and cross section and thoroughly compacted, as determined by the Authority's Representative, using approved ditch rollers or mechanical vibrators.

4.6.2 Subgrade preparation shall include any reshaping and wetting required along with the rolling or tamping of the subgrade, to obtain proper compaction. All boulders or ledge stone encountered in the excavation shall be removed or broken off to a depth of not less than six inches (6") below the holes, or depressions shall be brought to the required grade with material approved by the Authority's Representative, and the entire subgrade shaped to line grade and cross-section and thoroughly compacted as herein provided and in accordance with the Pennsylvania Department of Transportation Specifications, Sections 210 and 350.

4.7 PAVEMENT REPLACEMENT

4.7.1 Bituminous Surface/Aggregate Base Pavement and Driveway Pavement

A. All pavement replacement on driveways with existing bituminous surface and crushed aggregate base over the trench area shall be replaced with a minimum six inches (6") crushed limestone aggregate (PennDOT 2A) base course and four and one half inches (4-1/2") bituminous binder and wearing course only at the direction of the Authority's Representative, as shown on standard drawing. If the existing driveway or roadway pavement section is greater than the above, the Contractor shall increase the thickness as required.

B. The six inch (6") crushed aggregate (2A) base course shall be in accordance with the Pennsylvania Department of Transportation Specifications (limestone only).

C. The three inch (3") Superpave HMA binder and one inch (1-1/2") Superpave HMA wearing course shall be in accordance with the Pennsylvania Department of Transportation Specifications, Sections 309 and 409.

D. Rolling equipment for pavement replacement shall be self-propelled and weigh not less than ten (10) tons.

E. Bituminous tack coat shall be applied over asphalt in the entire construction area as shown on the drawings. The tack coat shall be in accordance with the Pennsylvania Department of Transportation Specifications, Section 460.

F. One-inch (1-1/2") Superpave HMA wearing course shall be placed over the bituminous tack coat. The wearing course shall be in accordance with the Pennsylvania Department of Transportation Specifications, Section 409.

G. In Township roadways, pavement replacement shall be in accordance with Township requirements.

[END OF SECTION]

SECTION FIVE

MISCELLANEOUS ITEMS OF CONSTRUCTION

5.1 BLOW-OFF AND AIR RELIEF ASSEMBLIES

5.1.1 Blow-off connections shall be installed at all low-profile points or dead ends along water distribution and transmission lines. They shall, whether side or end connection conform to the details shown on the Standard Drawing.

5.2 METER PITS

5.2.1 Where required by the Authority, water service meters shall be installed exterior to the dwelling or building where the water will be used. Such installation shall be made in accordance with the Standard Details and, the final location in the field shall require the approval of the Authority's Engineer before installation work is commenced. Meters shall be installed in vault structures, based on size, similar or equal to that shown on the Standard Detail, as approved by the Authority. Meter pits shall remain the property and the responsibility of the property owner.

5.3 INSTALLATION OF SERVICE LINES

5.3.1 In general, all water service lines shall conform to the arrangement shown on the Standard Details. The Authority will tap the mainline and install the corporation stop, curb stop, curb box and copper or SDR 9 PEXa 3306 (in casing pipe installations only) service line unless special agreements are otherwise made with the Developer. Taps shall be located at least two feet (2') from any pipe joint.

5.3.2 The Developer shall install a 4" PVC (Schedule 80) casing pipe under all paved areas for installation of the service lines.

5.4 MARKING WATER AND SEWER SERVICES

5.4.1 All ends of service lines, if installed by Contractor, not permanently connected, shall be marked with minimum two inches (2") by two inches (2") lumber placed at the end and depth of said service and extending above the ground surface a minimum of two feet (2'). Water service markers shall be painted blue.

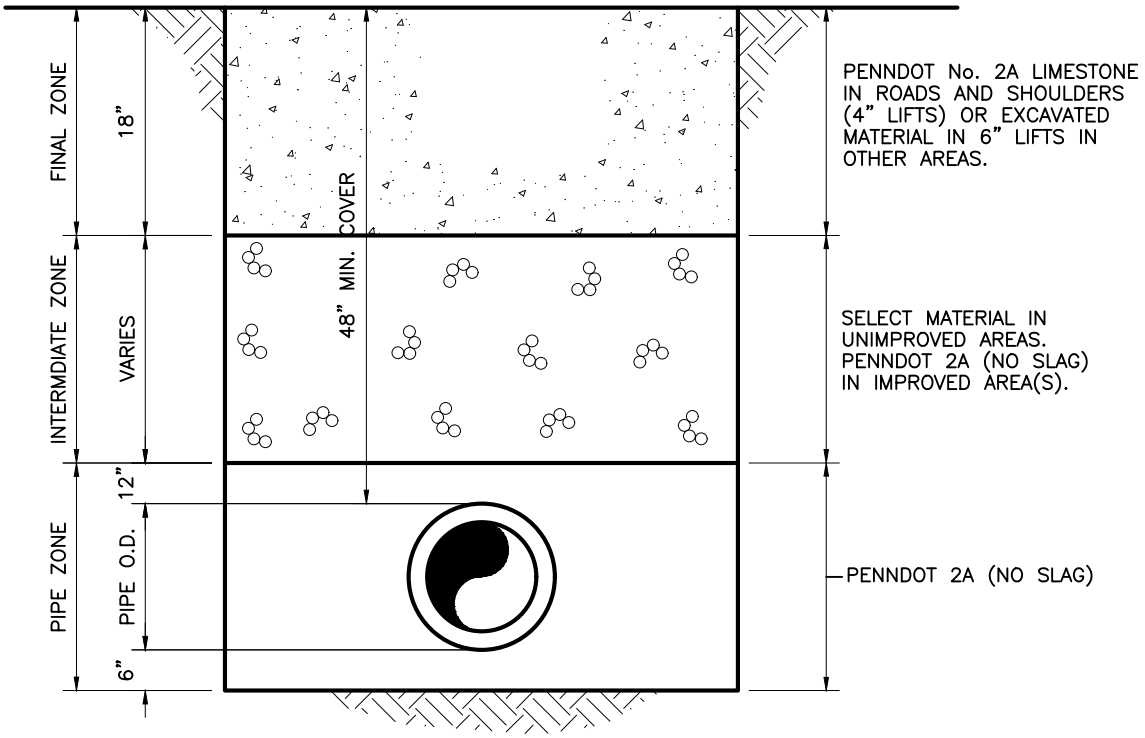
[END OF SECTION]

INDEX OF STANDARD DETAILS

Drawing No.	Description
BTMA-1	Trench Excavation and Backfill
BTMA-2	Waterline/Sanitary Utility Separation
BTMA-3	Pavement Replacement
BTMA-4	Casing Pipe Assembly
BTMA-5	Pressure Line Vertical Blocking
BTMA-6	Horizontal Thrust Blocking
BTMA-7	Laying Water Mains Under Obstructions
BTMA-8	Standard Hydrant Detail
BTMA-9	Water Main Long Connection to Existing Service Line
BTMA-10	Water Main Long Service Connection
BTMA-11	1" Air Relief for Water Main
BTMA-12	2" Blow-Off Assembly
BTMA-13	Air Vacuum Release Manhole
BTMA-14	Manhole Frame and Cover
BTMA-15	Meter Setting Detail – Inside Residence
BTMA-16	Meter Setting Detail – Residential Concrete Meter Pit
BTMA-17	Meter Setting Detail – Residential Plastic Meter Pit
BTMA-18	Meter Setting Detail – Commercial Meter Pit
BTMA-19	Private Fire Service for Residential Structure
BTMA-20	Water Main Short Service Connection

N O T E :

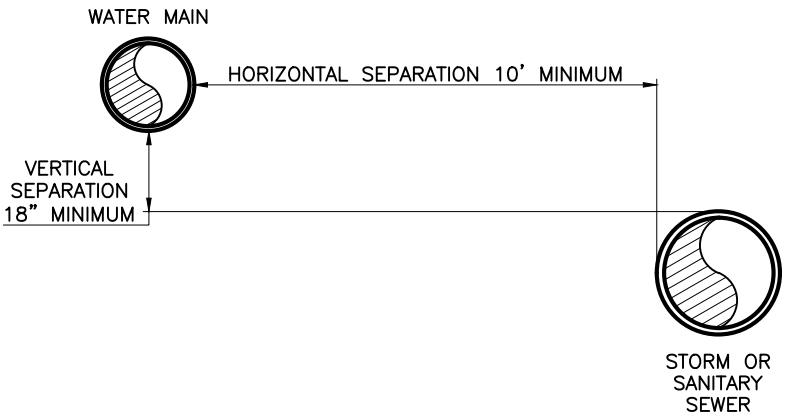
REFER TO WATERMAIN INSTALLATION OF THE SPECIFICATIONS FOR FURTHER DETAIL AND SPECIFICATIONS.



Trench Excavation And Backfill Detail

N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 08/21/17 FILE NAME: BTMA-1.dwg SCALE: N.T.S.	TRENCH EXCAVATION BACKFILL DETAIL



NOTES:

1. WHEN THE HORIZONTAL SEPARATION OF THE WATER MAIN AND SEWER LINE IS LESS THAN 10', THE VERTICAL SEPARATION BETWEEN THE TOP (CROWN) OF THE SEWER LINE AND THE BOTTOM (INVERT) OF THE WATER MAIN SHALL BE AT LEAST 18". WATERLINE SHALL BE ENCASED IN CONCRETE WHERE SEWER / WATERLINE CROSSINGS OCCUR AND, WHERE THE CONDITIONS PREVENT AN 18" VERTICAL SEPARATION.

2. NO OTHER UNDERGROUND UTILITIES, SUCH AS GAS, ELECTRIC, TELEPHONE, OR CABLE, SHALL BE PLACED ABOVE THE WATERLINE OR WITHIN FIVE FEET OF EACH SIDE OF THE WATERLINE.

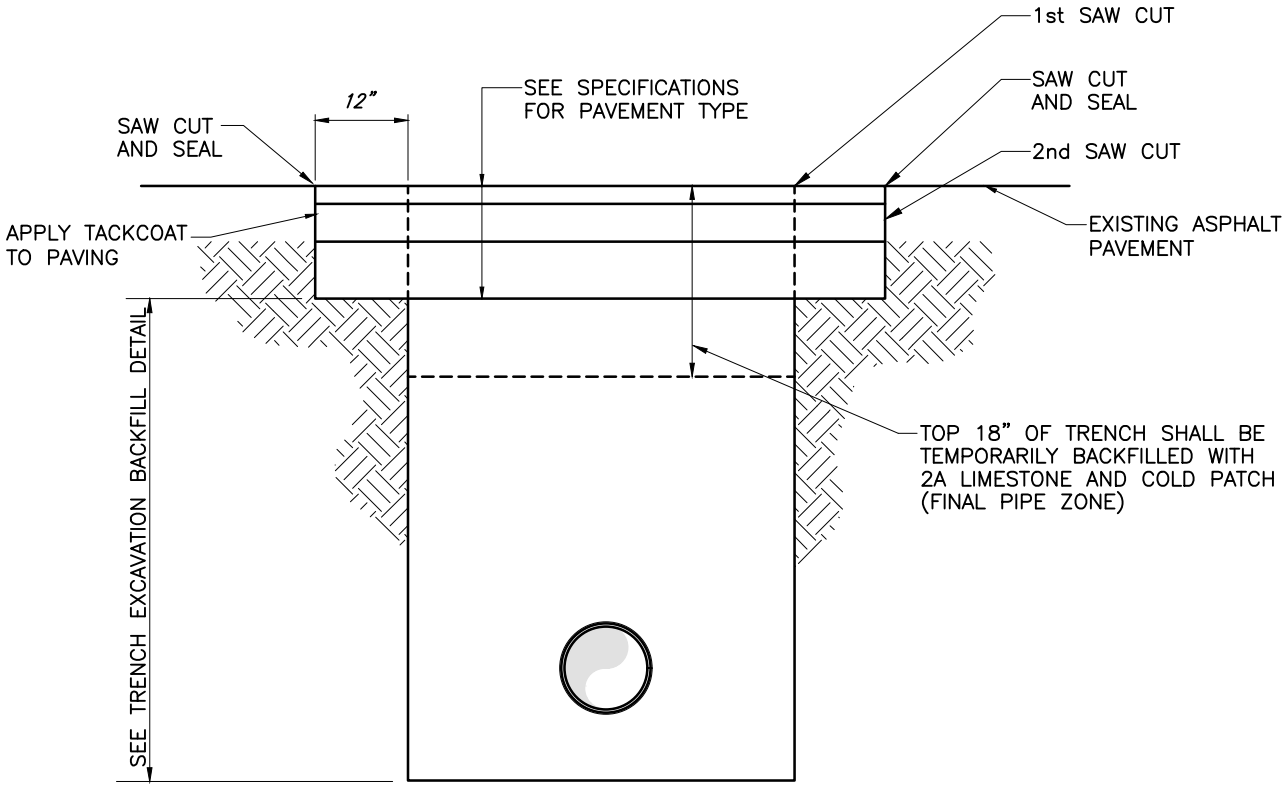
Utility Separation

N. T. S.

BRIGHTON TOWNSHIP
MUNICIPAL AUTHORITY
1300 Brighton Road
Beaver, Pennsylvania 15009

DATE:	11/11/04
FILE NAME:	BTMA-2.dwg
SCALE:	N.T.S.

UTILITY SEPARATION



NOTES:

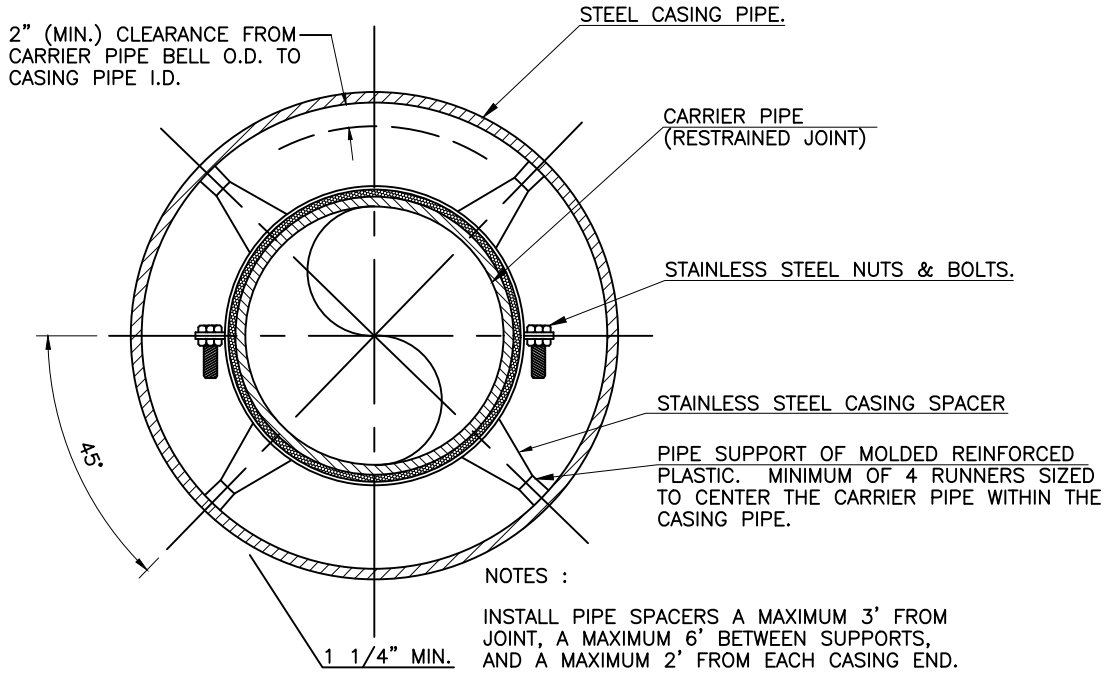
1) ALL ROADWAY TRAFFIC LINES AND MARKINGS SHALL BE REPLACED.

2) MAKE TWO SAW CUTS. ONE BEFORE EXCAVATION AND ONE PRIOR TO PAVING.

Pavement Replacement Detail

N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 12/04/14 FILE NAME: BTMA-3.dwg SCALE: N.T.S.	PAVEMENT REPLACEMENT DETAIL

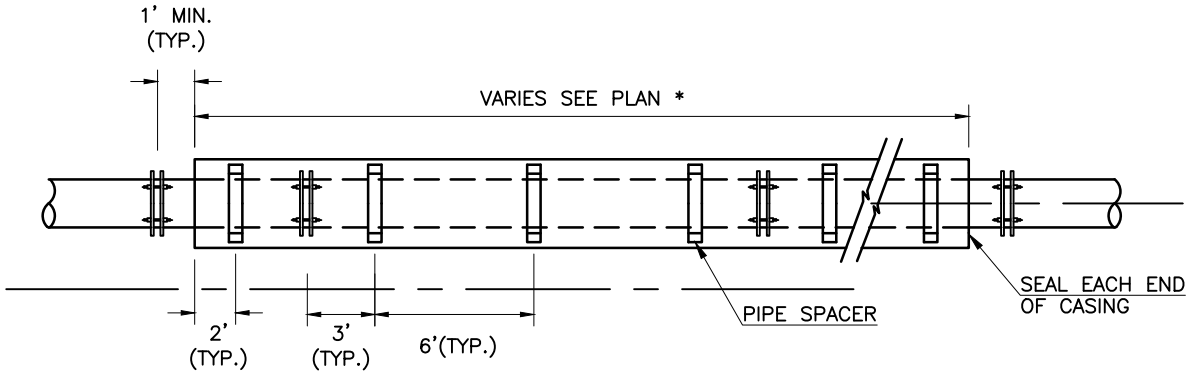


NOTES :

INSTALL PIPE SPACERS A MAXIMUM 3' FROM JOINT, A MAXIMUM 6' BETWEEN SUPPORTS, AND A MAXIMUM 2' FROM EACH CASING END.

LOCATE PIPE JOINT 1' MIN. OUTSIDE CASING.

EXACT LENGTH OF CASING PIPE TO BE DETERMINED IN FIELD.



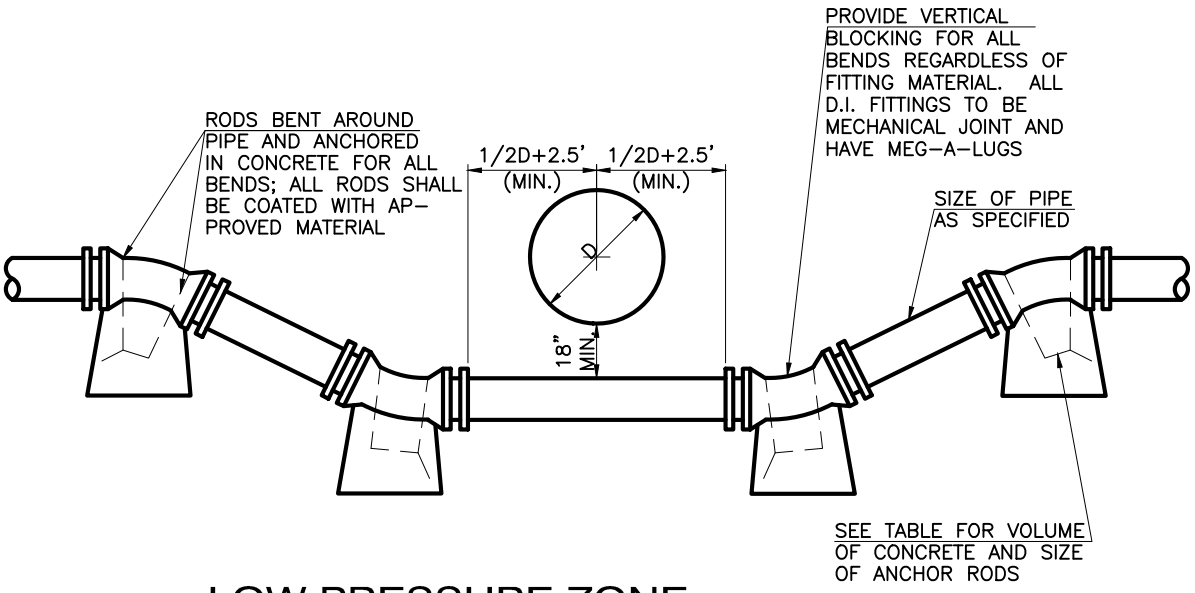
* EXACT LENGTH OF CASING PIPE TO BE DETERMINED IN THE FIELD.

Casing Pipe Assembly Detail

N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 12/04/14 FILE NAME: BTMA-4.dwg SCALE: N.T.S.

CASING PIPE ASSEMBLY DETAIL



LOW PRESSURE ZONE

PIPE SIZE	TOTAL PRESSURE IN POUNDS	VOLUME IN CUBIC FEET			SIZE AND No. OF ANCHORS		
		45° BENDS	22.5° BENDS	11.25° BENDS	45° BENDS	22.5° BENDS	11.25° BENDS
4	3900	20	10	5	1-#4	1-#4	1-#4
6	7200	37	19	9	2-#4	1-#4	1-#4
8	11800	60	31	15	2-#4	2-#4	1-#4
10	17100	87	45	22	2-#4	2-#4	2-#4
12	23700	122	62	31	2-#5	2-#4	2-#4

HIGH PRESSURE ZONE

PIPE SIZE	TOTAL PRESSURE IN POUNDS	VOLUME IN CUBIC FEET			SIZE AND No. OF ANCHORS		
		45° BENDS	22.5° BENDS	11.25° BENDS	45° BENDS	22.5° BENDS	11.25° BENDS
4	3900	40	20	10	1-#4	1-#4	1-#4
6	7200	74	36	18	2-#4	1-#4	1-#4
8	11800	120	62	36	2-#4	2-#4	1-#4
10	17100	174	90	44	2-#4	2-#4	2-#4
12	23700	244	122	62	2-#5	2-#4	2-#4

NOTES:

1. CONFIRM PRESSURE ZONE REQUIREMENTS WITH AUTHORITY PRIOR TO CONSTRUCTION.
2. APPLIED PRESSURE (LOW PRESSURE ZONE) = 150 P.S.I.
3. APPLIED PRESSURE (HIGH PRESSURE ZONE) – 300 P.S.I.
4. ALL BLOCKS SHALL BE REINFORCED WITH #4 AT 6" E.F. MINIMUM 3" FROM ALL SIDES.

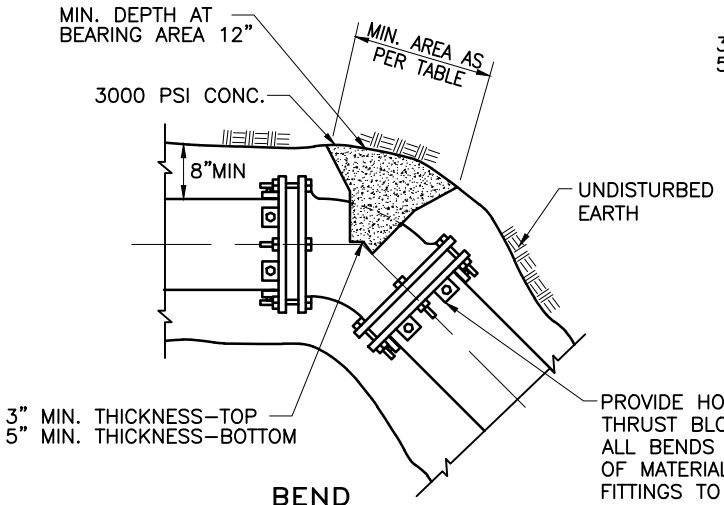
Pressure Line Vertical Blocking

N. T. S.

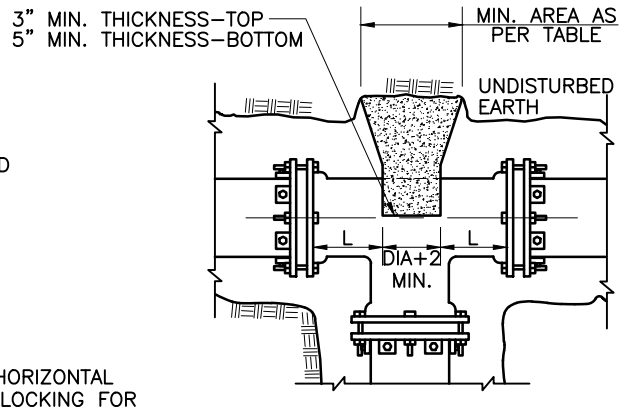
BRIGHTON TOWNSHIP
MUNICIPAL AUTHORITY
1300 Brighton Road
Beaver, Pennsylvania 15009

DATE: 12/04/14
FILE NAME: BTMA-5.dwg
SCALE: N.T.S.

PRESSURE LINE VERTICAL BLOCKING



BEND



TEE, CAP, VALVE AND WYE

LOW PRESSURE ZONE

PIPE SIZE (in)	L (in.)	MINIMUM BEARING AREA OF BLOCK(SQUARE FEET)				
		90° BENDS	45° BENDS	22.5° BENDS	11.25° BENDS	VALVE/TEE OR WYE
4	5	2.9	1.6	1.0	1.0	2.1
6	6	6.0	3.3	1.7	1.0	4.3
8	6.5	10.3	5.6	2.9	1.5	7.3
10	6.5	15.4	8.4	4.3	2.2	10.9
12	7	21.8	11.8	6.0	3.1	15.4

HIGH PRESSURE ZONE

PIPE SIZE (in)	L (in.)	MINIMUM BEARING AREA OF BLOCK(SQUARE FEET)				
		90° BENDS	45° BENDS	22.5° BENDS	11.25° BENDS	VALVE/TEE OR WYE
4	5	4.0	2.2	1.1	1.0	2.8
6	6	9.0	4.9	2.5	1.2	6.4
8	6.5	16.0	8.7	4.4	2.2	11.3
10	6.5	25.0	13.5	6.9	3.5	17.7
12	7	36.0	19.5	9.9	5.0	25.4

NOTES:

1. CONFIRM PRESSURE ZONE (HIGH/LOW) REQUIREMENTS WITH AUTHORITY PRIOR TO CONSTRUCTION.
2. EARTH PRESSURE = 2,000 LBS./SQ.FT.
3. APPLIED PRESSURE (LOW PRESSURE ZONE) = 150 P.S.I.+50% FOR WATER HAMMER OR SURGE
4. APPLIED PRESSURE (HIGH PRESSURE ZONE) = 300 P.S.I.
5. IF EARTH IN FIELD WILL NOT SUPPORT THE ABOVE EARTH PRESSURE, AREA OF BLOCK MUST BE INCREASED PROPORTIONATELY.
6. CONCRETE TO BE 3,000 P.S.I., PADOT CLASS A, 3" SLUMP
7. ALL MECHANICAL JOINT FASTENERS (I.E. BOLTS, NUTS, ETC.) SHALL BE FREE OF CONCRETE.
8. CONCRETE WITH BEARING AREAS GREATER THAN 3 S.F. TO HAVE W4 x W4 WELDED WIRE FABRIC.

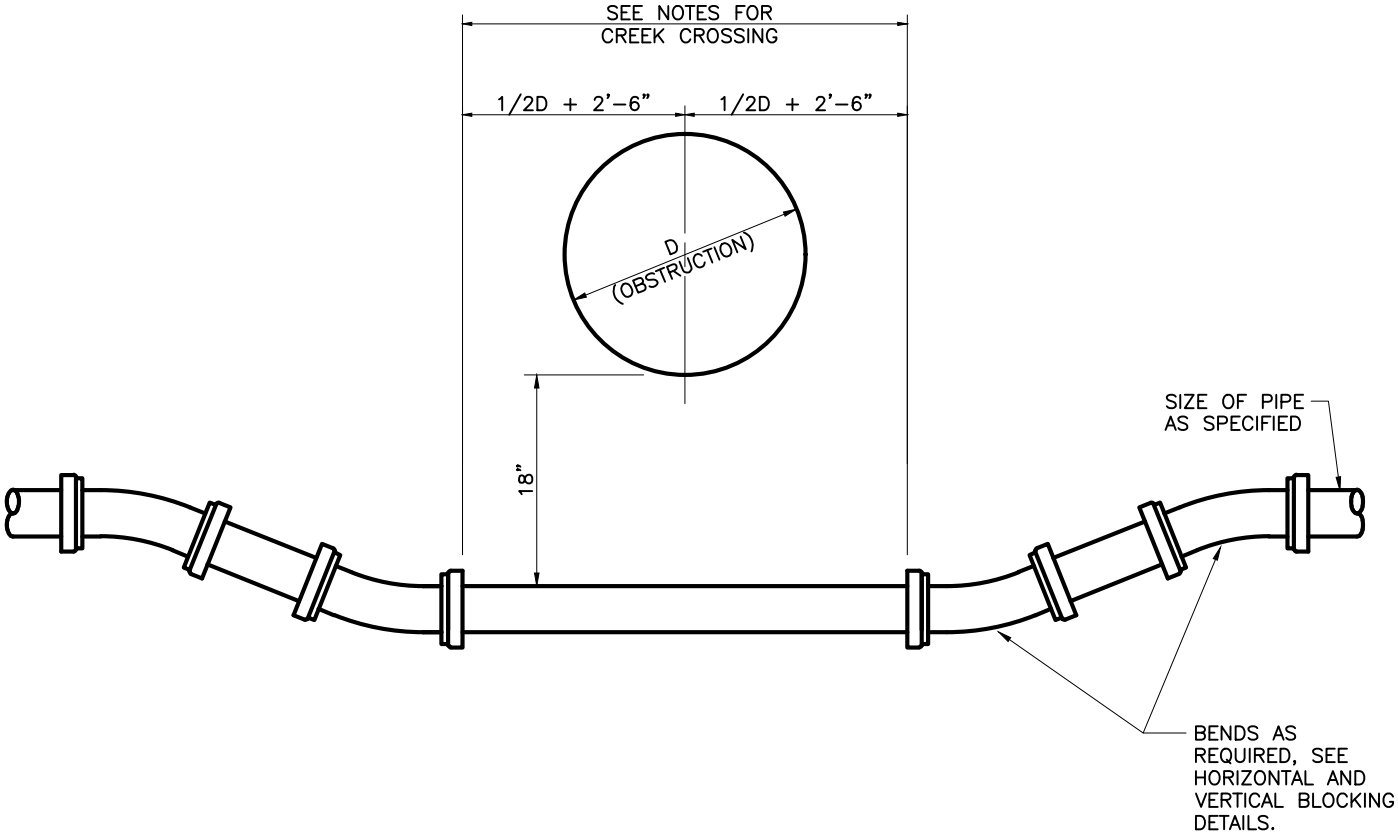
Horizontal Thrust Blocking Detail

N.T.S.

BRIGHTON TOWNSHIP
MUNICIPAL AUTHORITY
1300 Brighton Road
Beaver, Pennsylvania 15009

DATE: 12/04/14
FILE NAME: BTMA-6.dwg
SCALE: N.T.S.

HORIZONTAL THRUST BLOCKING DETAIL



N O T E S :

1. FOR CROSSING UNDER AN EXISTING GREEK, EXTEND A MINIMUM OF 20'-0" BEYOND THE TOP OF BANK ON EACH SIDE.
2. FOR CROSSING UNDER EXISTING PIPE OR OBSTRUCTIONS A MINIMUM OF 18" CLEARANCE SHALL BE MAINTAINED FROM THE BOTTOM OF THE EXISTING PIPE TO THE TOP OF THE PROPOSED WATER MAIN.
3. FOR CROSSING UNDER EXISTING PIPE THE CONTRACTOR MAY ELIMINATE FITTINGS, IF DEPTH CAN BE OBTAINED BY DEFLECTING PIPE JOINTS WITHIN ALLOWABLE LIMITS AND IN ACCORDANCE WITH MANUFACTURES RECOMMENDATIONS.

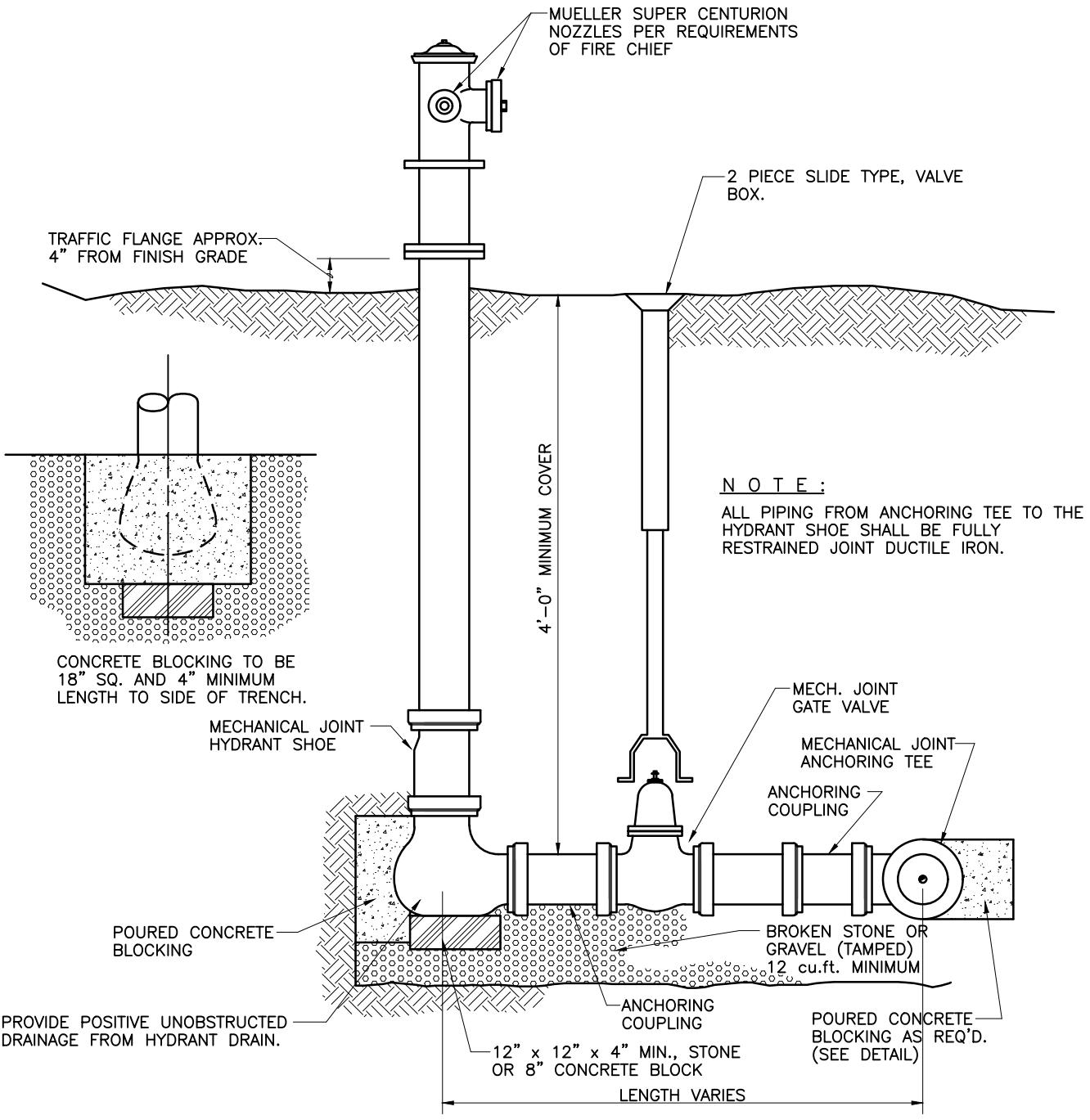
Laying Water Mains Under Obstructions

N. T. S.

BRIGHTON TOWNSHIP
MUNICIPAL AUTHORITY
1300 Brighton Road
Beaver, Pennsylvania 15009

DATE:	12/04/14
FILE NAME:	BTMA-7.dwg
SCALE:	N.T.S.

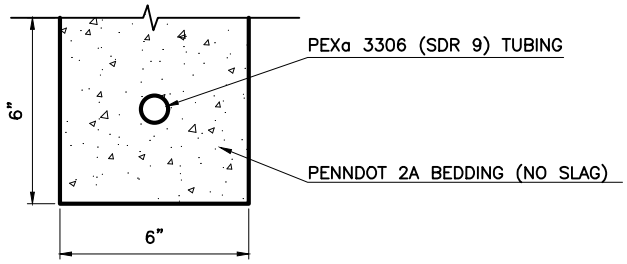
LAYING WATER MAINS UNDER OBSTRUCTIONS



Standard Hydrant Detail

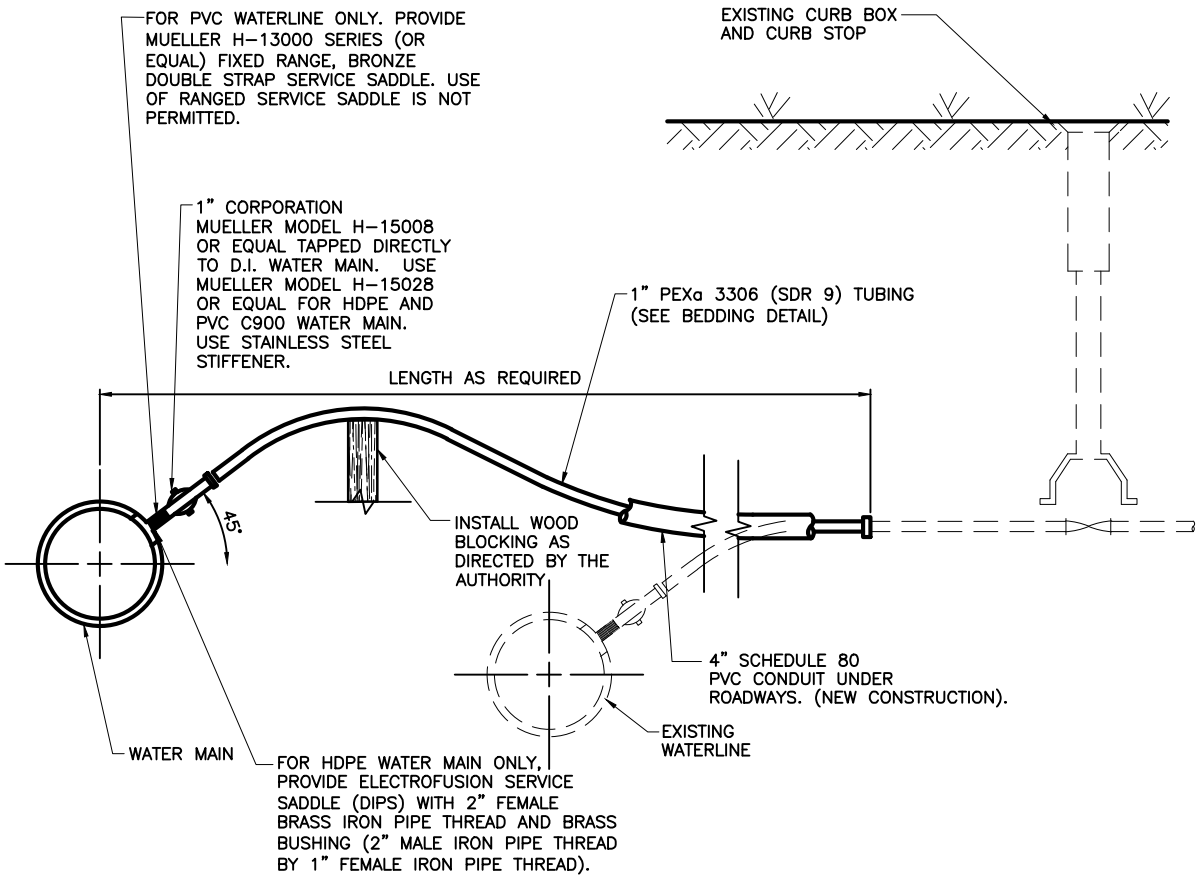
N.T.S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 12/04/14 FILE NAME: BTMA-8.dwg SCALE: N.T.S.	STANDARD HYDRANT DETAIL



Bedding Detail

N. T. S.



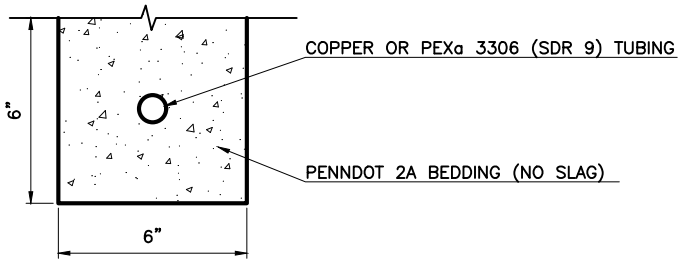
NOTES:

1. SIZE OF FITTINGS AND LINE SHALL BE 1" OR AS SHOWN ON THE DRAWINGS.
2. FOR 2" SERVICES ON DUCTILE IRON WATER MAIN USE MUELLER BRONZE DOUBLE STRAP THREADED SERVICE CLAMP OR EQUAL.
3. LAY PEXa 3306 (SDR 9) TUBING IN PENNDOT 2A BEDDING (NO SLAG).
4. IN AREAS OF DISTRIBUTION SYSTEM WHEN WORKING PRESSURE EXCEEDS 110 PSIG THE USE OF TYPE K COPPER IN LIEU OF PEXa 3306 (SDR 9) IS REQUIRED.

Water Main Long Service Connection

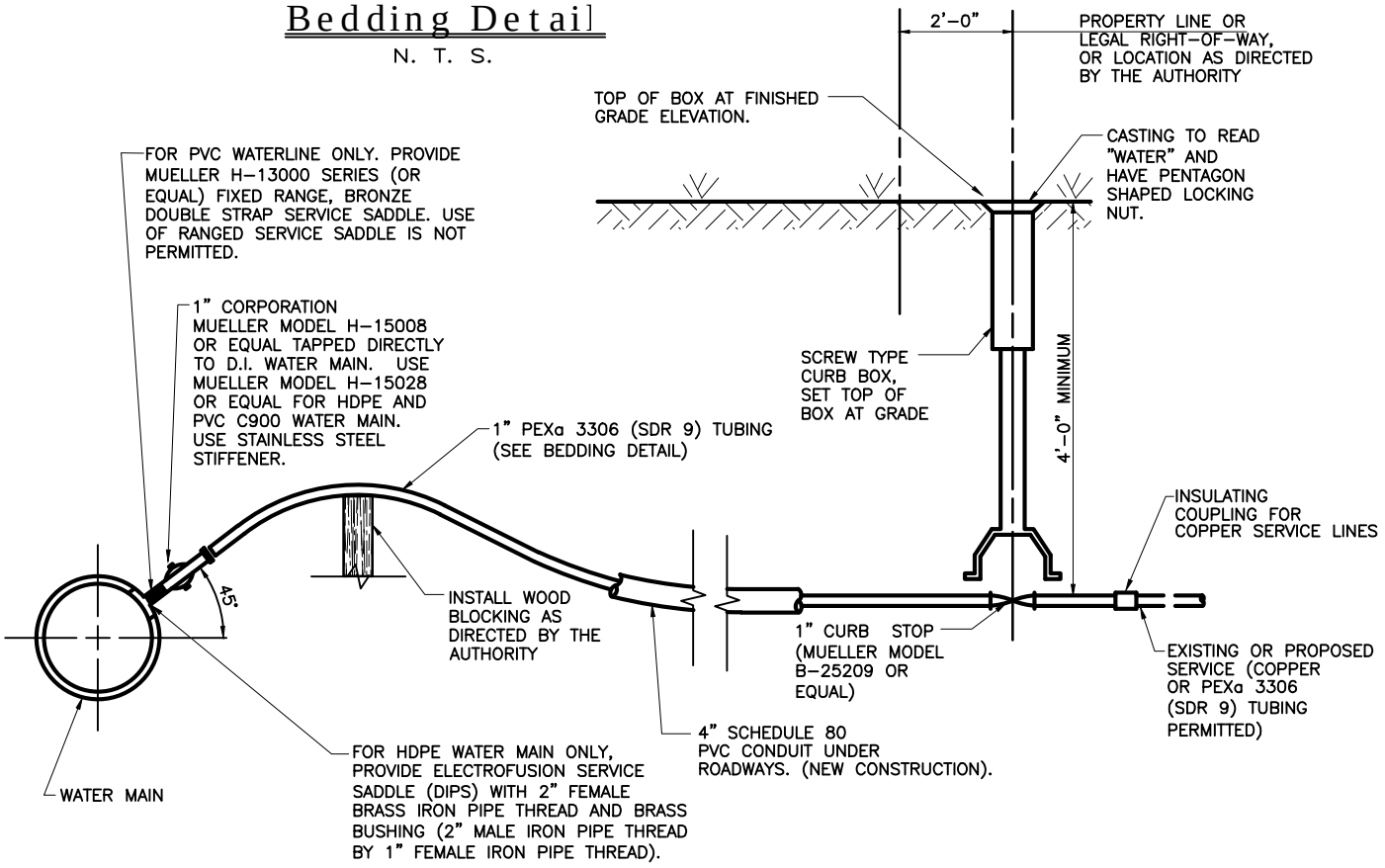
N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 08/21/17 FILE NAME: BTMA-9.dwg SCALE: N.T.S.	WATER MAIN LONG CONNECTION TO EXISTING SERVICE LINE



Bedding Detail

N. T. S.



NOTES:

1. SIZE OF FITTINGS AND LINE SHALL BE 1" OR AS SHOWN ON THE DRAWINGS.

2. FOR 2" SERVICES ON DUCTILE IRON WATER MAIN USE MUELLER BRONZE DOUBLE STRAP THREADED SERVICE CLAMP OR EQUAL.

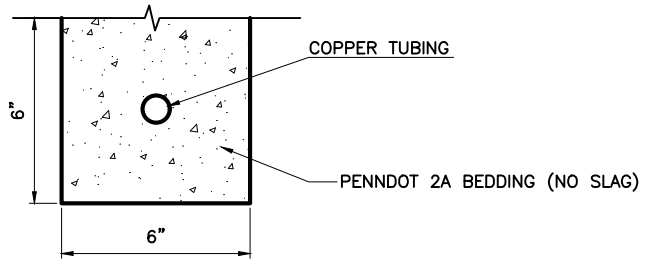
3. LAY PEXa TUBING IN PENNDOT 2A BEDDING (NO SLAG).

4. IN AREAS OF DISTRIBUTION SYSTEM WHEN WORKING PRESSURE EXCEEDS 110 PSIG THE USE OF TYPE K COPPER IN LIEU OF PEXa 3306 (SDR 9) IS REQUIRED.

Water Main Long Service Connection

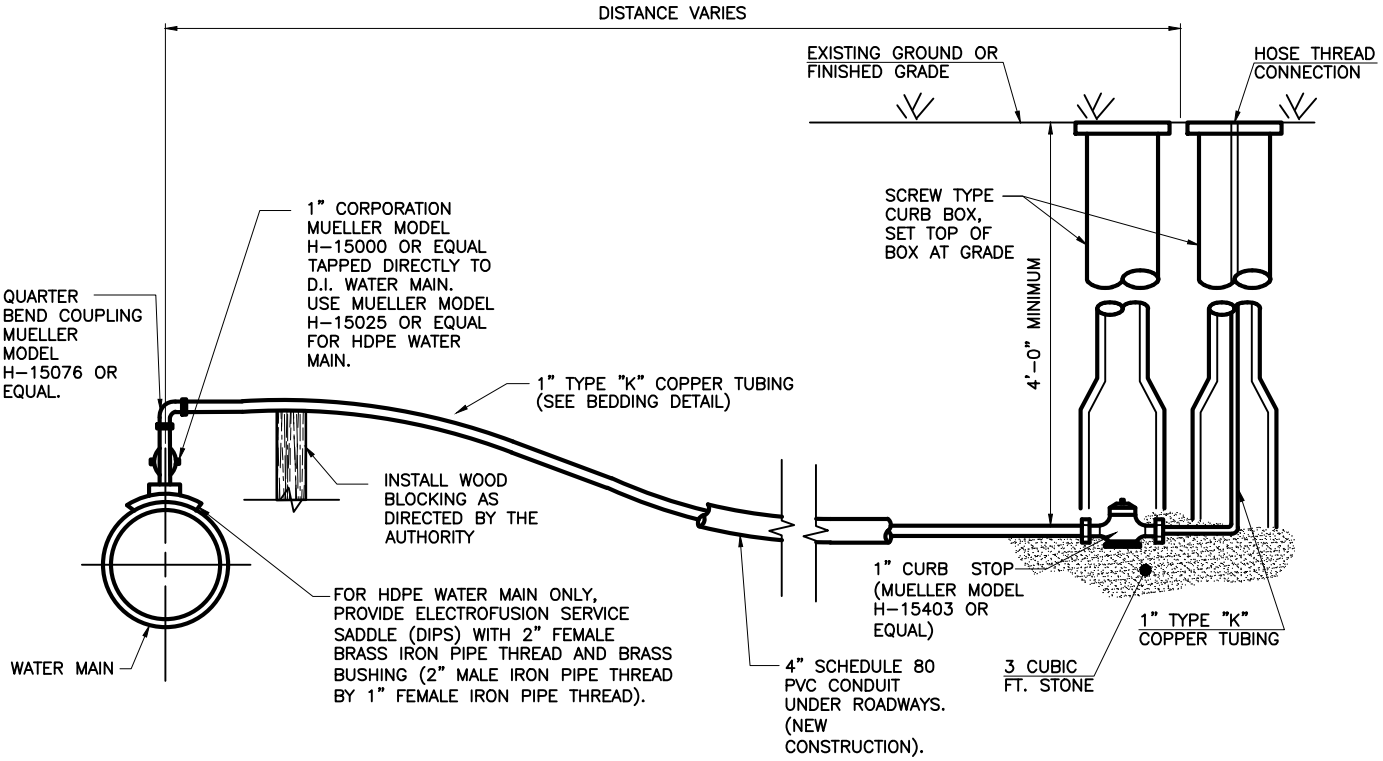
N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 08/21/17 FILE NAME: BTMA-10.dwg SCALE: N.T.S.	WATER MAIN LONG SERVICE CONNECTION



Bedding Detail

N. T. S.



NOTES:

1. SIZE OF FITTINGS AND LINE SHALL BE 1" OR AS SHOWN ON THE DRAWINGS.

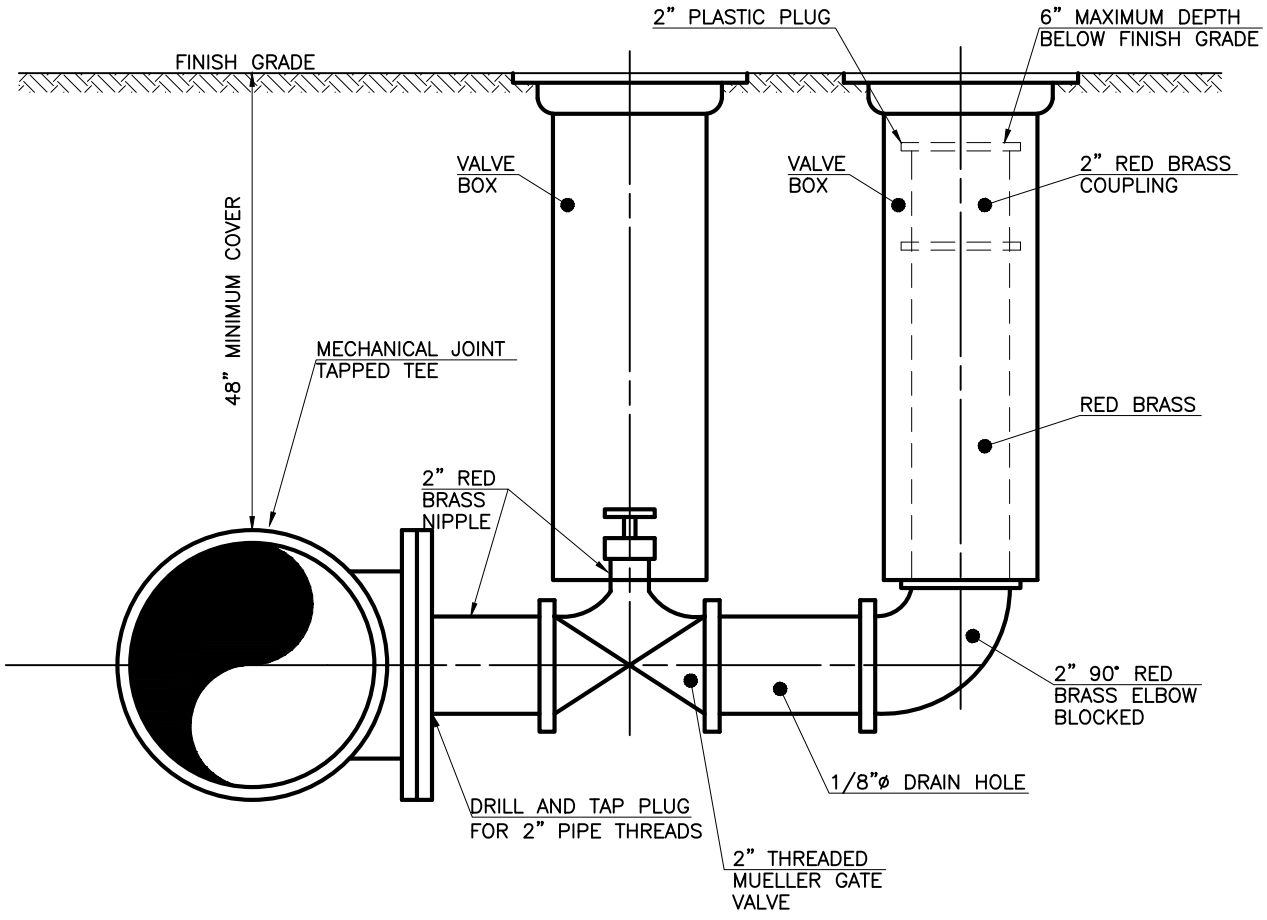
2. FOR 2" SERVICES ON DUCTILE IRON WATER MAIN USE MUELLER BRONZE DOUBLE STRAP THREADED SERVICE CLAMP OR EQUAL.

3. LAY COPPER TUBING IN PENNDOT 2A BEDDING (NO SLAG).

1" Air Relief for Water Main

N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 08/21/17 FILE NAME: BTMA-11.dwg SCALE: N.T.S.	1" AIR RELIEF FOR WATER MAIN



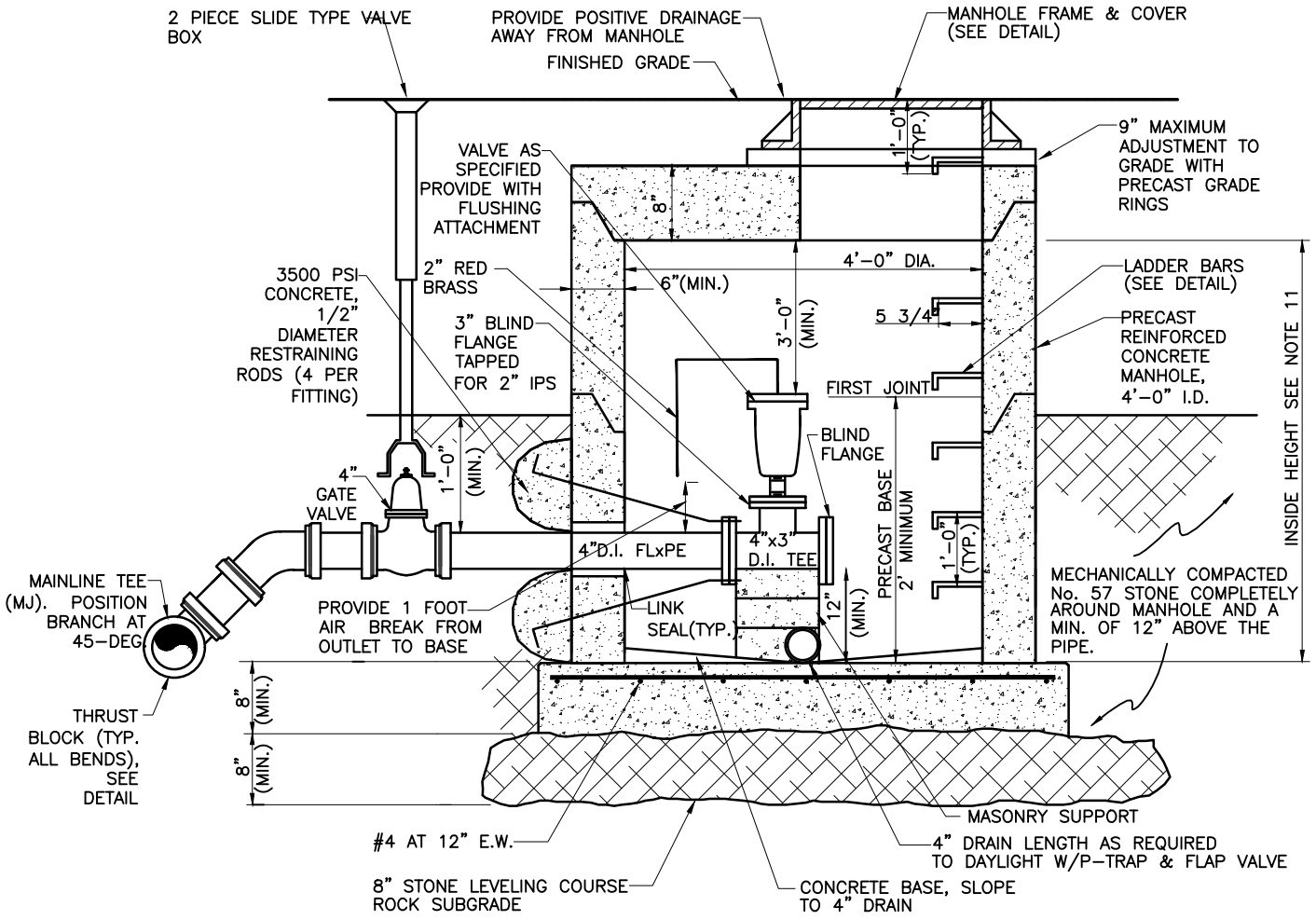
NOTES:

1. ALL PIPE AND FITTINGS TO BE RED BRASS.
2. PLACE 2 CU. FT. OF STONE UNDER DRAIN HOLE.

2" BLOW-OFF ASSEMBLY

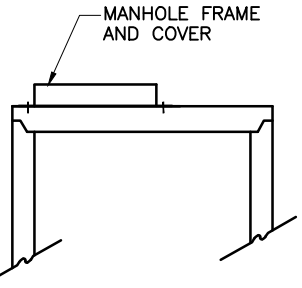
N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 12/04/14 FILE NAME: BTMA-12.dwg SCALE: N.T.S.	2" BLOW-OFF ASSEMBLY



NOTES:

1. ALL CONCRETE TO BE CLASS A CONCRETE, 4000 PSI, 5%± 1% AIR ENTRAINED.
2. MANHOLE BARREL JOINTS TO BE SEALED WITH 1"ø 2 FLEXIBLE BUTYL RUBBER JOINT SEALANT, USE 1/2"ø FOR FRAME AND COVER.
3. FRAME AND COVER TO BE ANCHORED WITH 2-3/4" DIA. S.S. ANCHOR BOLTS SET PERMANENTLY ANCHORED INTO CONCRETE.
4. LIFTING HOLES TO BE POINTED WITH NON-SHRINK GROUT, AND LEFT WATERTIGHT, NEAT AND SMOOTH.
5. MAXIMUM ADJUSTMENT TO FINISHED GRADE USING PRECAST GRADE RINGS SHALL NOT EXCEED NINE INCHES (9").
6. PRECAST SECTIONS SHALL CONFORM TO ASTM C-478 AS REVISED.
7. CAST EXTERIOR OF ALL MANHOLE BARREL SECTIONS WITH APPROVED BITUMINOUS COATING.
8. CAST LADDER BARS INTO BARREL SECTIONS AND CONFORM TO ASTM C-478, AS REVISED.
9. PROVIDE ALL RED BRASS AND DUCTILE IRON PIPING, UNLESS NOTED.
10. PROVIDE ALL NECESSARY PIPE, FITTINGS AND/OR ADAPTORS TO MAKE A COMPLETE WATER TIGHT CONNECTION.
11. INSIDE HEIGHT TO BE SET BASED ON VALVE INSTALLED. ADJUST PIPE DEPTH AS REQUIRED. MINIMUM HEIGHT IS 6'-6".



NOTE:
MANHOLE SLAB TOP SHALL MEET MINIMUM H-20 LOADING AND SHALL BE USED TO MEET GRADES AND/OR OTHER CONDITIONS AS MAY BE REQUIRED.

MANHOLE SLAB TOP

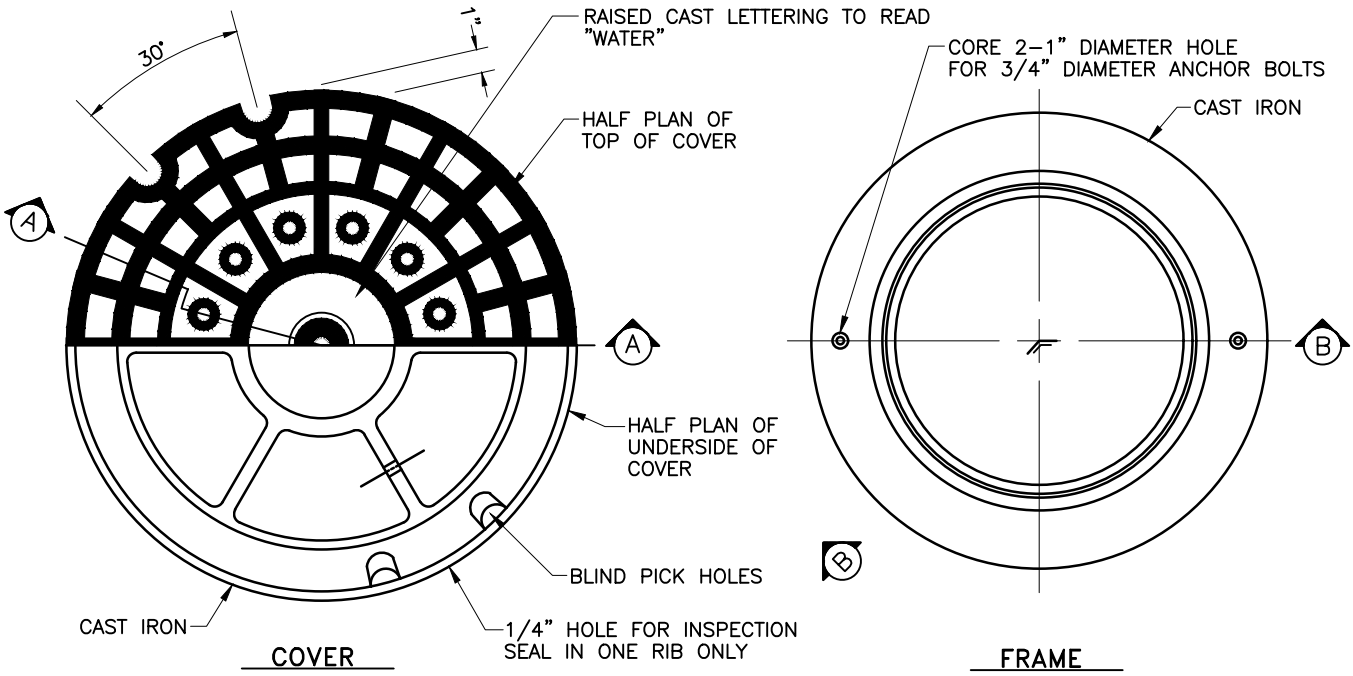
Air/Vacuum Release Manhole

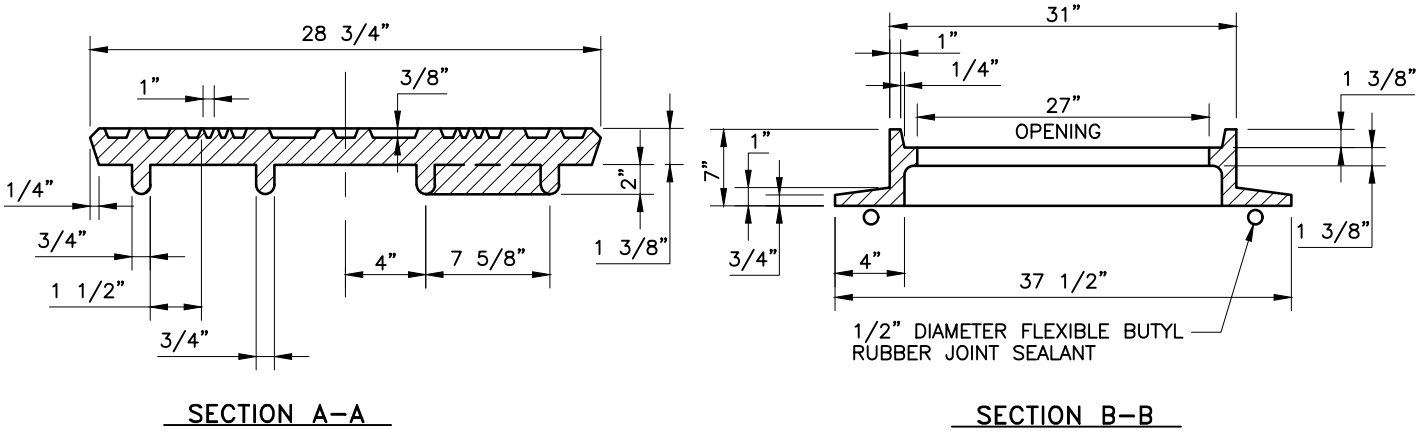
N. T. S.

BRIGHTON TOWNSHIP
MUNICIPAL AUTHORITY
1300 Brighton Road
Beaver, Pennsylvania 15009

DATE:	12/04/14
FILE NAME:	BTMA-13.dwg
SCALE:	N.T.S.

AIR/VACUUM RELEASE MANHOLE





Typical

Manhole Frame and Cover

N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 12/04/14 FILE NAME: BTMA-14.dwg SCALE: N.T.S.	MANHOLE FRAME AND COVER

N:\PROJ\124\124-04\DETAILS\ BTMA-14.dwg layout = Layout1 Username = jasonm Date = Aug 04, 2017 - 11:59am

1. 1"x 3/4" ANGLE METER VALVE
2. 3/4" BRASS NIPPLE
3. 3/4" PRESSURE REDUCING VALVE
4. 3/4" x 5/8" REMOTE WATER METER (SUPPLIED BY B.T.M.A.)
5. 3/4" BACKFLOW PREVENTER (DUAL CHECK BACKFLOW PREVENTER)
6. 3/4" x 5/8" SEWER METER (TO METER OUTSIDE WATER NOT ENTERING BRIGHTON TOWNSHIP SANITARY SEWER AUTHORITY SYSTEM.) THIS ITEM IS OPTIONAL AND SUBJECT TO APPLICATION APPROVAL AND PAYMENT OF APPLICABLE FEES.
7. 3/4" GATE VALVE

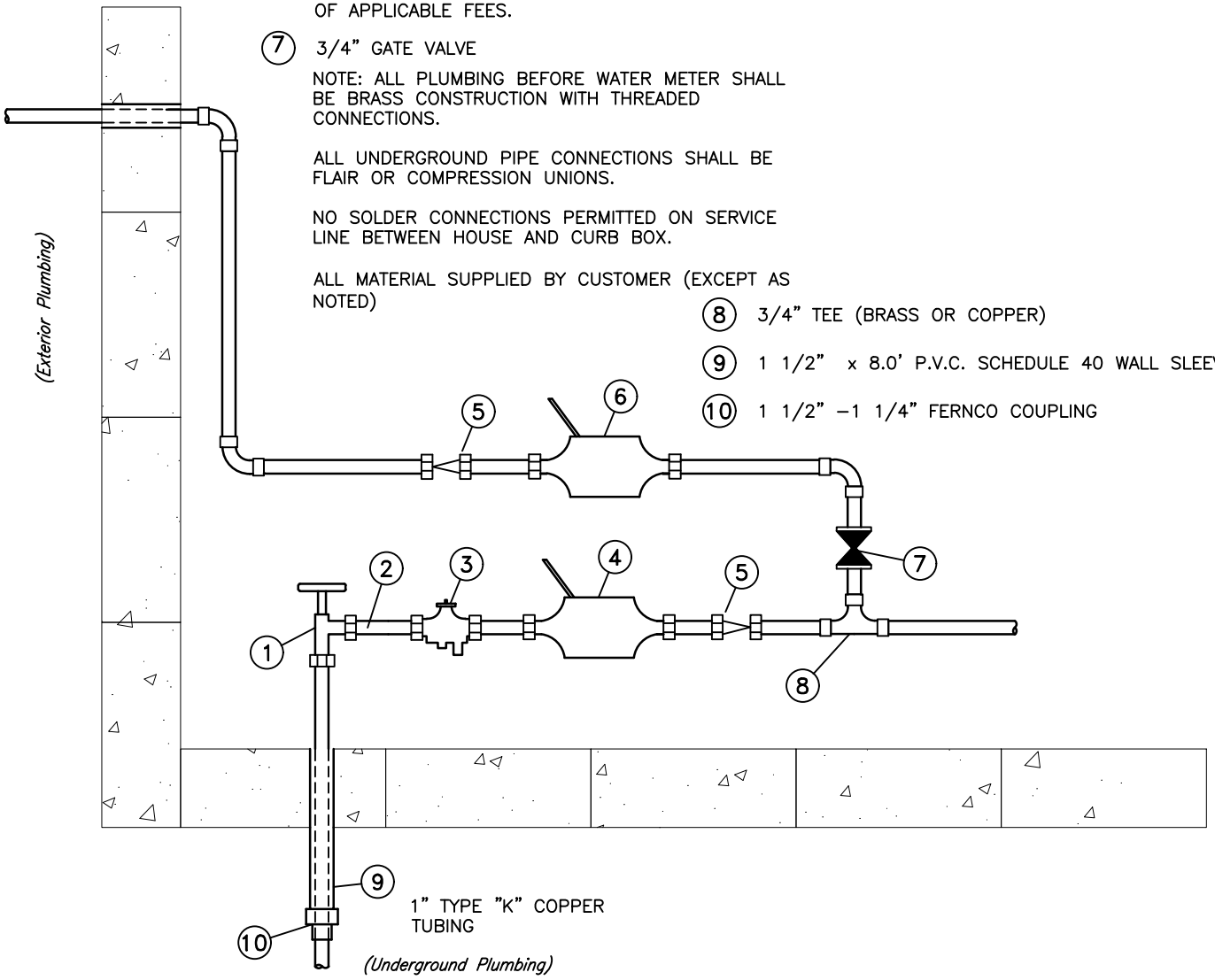
NOTE: ALL PLUMBING BEFORE WATER METER SHALL BE BRASS CONSTRUCTION WITH THREADED CONNECTIONS.

ALL UNDERGROUND PIPE CONNECTIONS SHALL BE FLAIR OR COMPRESSION UNIONS.

NO SOLDER CONNECTIONS PERMITTED ON SERVICE LINE BETWEEN HOUSE AND CURB BOX.

ALL MATERIAL SUPPLIED BY CUSTOMER (EXCEPT AS NOTED)

8. 3/4" TEE (BRASS OR COPPER)
9. 1 1/2" x 8.0' P.V.C. SCHEDULE 40 WALL SLEEVE
10. 1 1/2" –1 1/4" FERNCO COUPLING



NOTES:

1. AN EXPANSION TANK SHALL BE INSTALLED ON THE INLET SIDE OF THE WATER LINE TO THE WATER HEATER.
2. ALL METERS SHALL BE SET IN AN AREA WHICH IS ACCESSIBLE FOR REPAIR AND/OR REPLACEMENT AND SUITABLE FOR OPERATION AND READING.
3. PROVIDE FLOOR DRAIN WITHIN 10 FEET OF THE METER SETTING.
4. METER INSTALLATION WITHIN CRAWL SPACES OR GARAGES IS PROHIBITED.
5. PROVIDE 3/8" PVC WALL SLEEVE FOR REMOTE METERING EQUIPMENT. LOCATION AS DIRECTED BY THE AUTHORITY.
6. INSTALLATION OF UNMETERED SERVICE LINES UNDER CONCRETE FLOORS (BASEMENT, GARAGES OR SLAB ON GRADE BUILDINGS) IS PROHIBITED.

Meter Setting Detail

N. T. S.

BRIGHTON TOWNSHIP
MUNICIPAL AUTHORITY
1300 Brighton Road
Beaver, Pennsylvania 15009

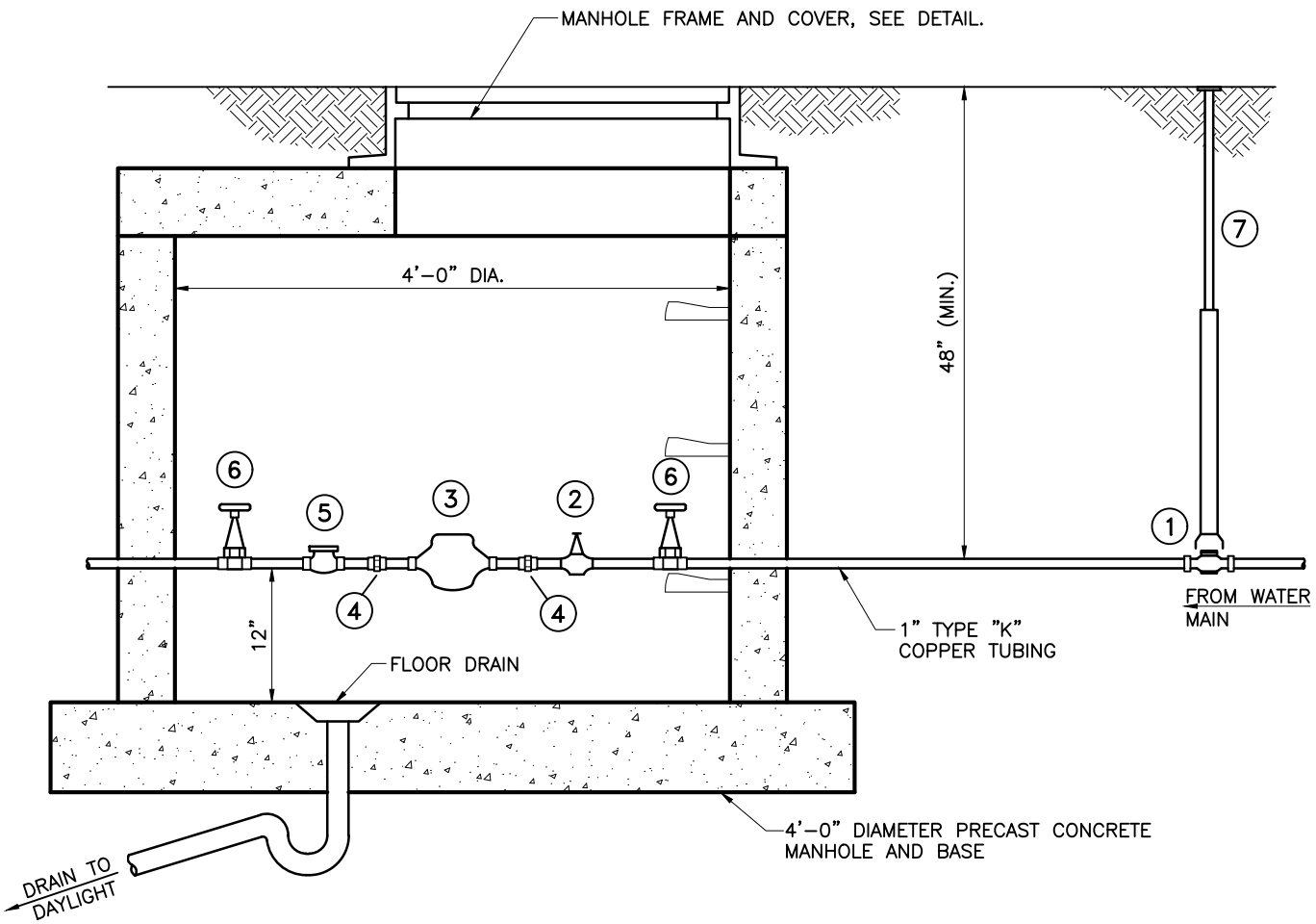
DATE:	08/21/17
FILE NAME:	BTMA-15.dwg
SCALE:	N.T.S.

METER SETTING DETAIL INSIDE RESIDENCE

1. MUELLER CURB BOX (FURNISHED AND INSTALLED BY BTMA).
2. PRESSURE REDUCING VALVE, AS REQUIRED.
3. SENSUS iPERL WATER METER (FURNISHED AND SET BY BTMA).
4. BRASS METER UNIONS.
5. WILKINS DUAL CHECK VALVE, MODEL 700, SERIAL #5491, FEMALE IPS OR APPROVED EQUAL.
6. FULL PORT BALL VALVE.
7. CURB BOX (FURNISHED AND INSTALLED BY BTMA).

NOTES:

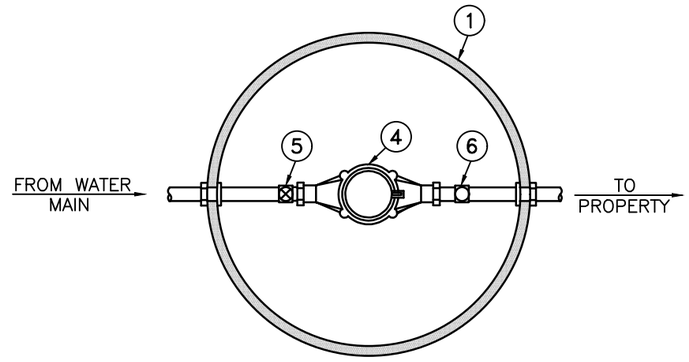
1. METER PIT IS TO BE LOCATED AT OR NEAR RIGHT OF WAY LINE IN NON-TRAFFIC AND NON-PARKING AREA.
2. METER PIT IS REQUIRED WHERE A WATER SERVICE LINE EXCEEDS 100 FT OR WHERE HOME IS BUILT ON SLAB.
3. AN EXPANSION TANK SHALL BE INSTALLED ON THE INLET SIDE OF THE WATER LINE TO THE WATER HEATER.
4. PRIOR TO STARTING WORK OR ORDERING MATERIALS, CONTACT BTMA TO REVIEW REQUIREMENTS. VERIFY ALL CONNECTION TYPES PRIOR TO ORDERING.
5. NO SOLDER CONNECTIONS PERMITTED ON SERVICE LINE BETWEEN HOUSE AND CURB BOX.
6. IN SOME INSTALLATIONS THE METER SIZE MAY DIFFER FROM THE WATER SERVICE TUBING DIAMETER. PROVIDE ALL REQUIRED FITTINGS BEFORE AND AFTER EACH METER PIT. ALL FITTINGS TO BE COMPRESSION TYPE AND RATED AT 300 PSI WORKING PRESSURE.



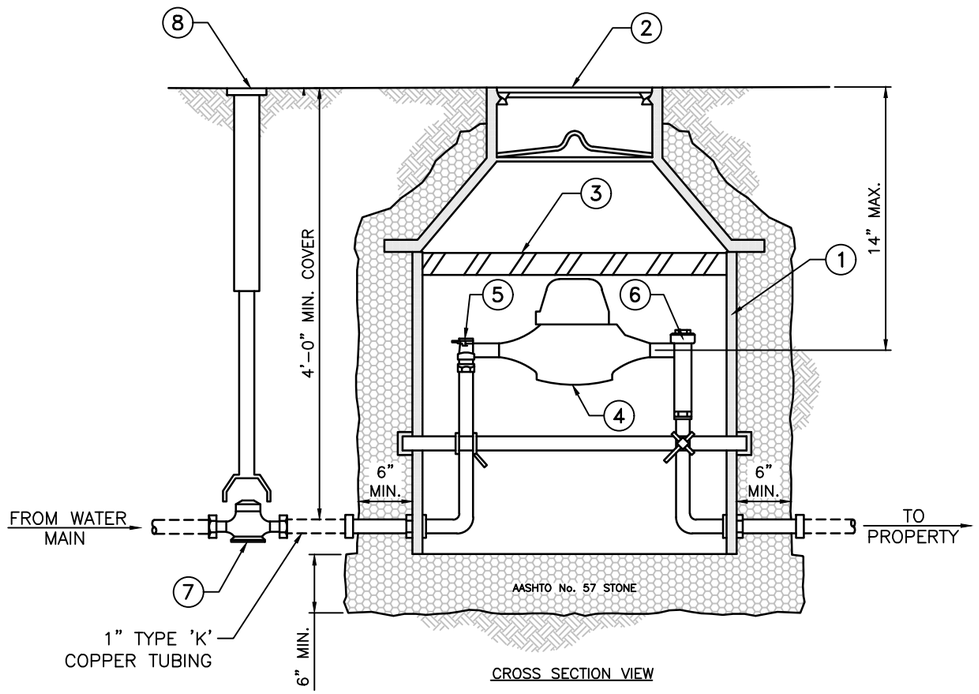
Meter Setting Detail

N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 12/04/14 FILE NAME: BTMA-16.dwg SCALE: N.T.S.	METER SETTING DETAIL RESIDENTIAL CONCRETE METER PIT



TOP VIEW



CROSS SECTION VIEW

Meter Setting Detail

N. T. S.

5/8" THROUGH 1" METER SETTING

1. 20" TILE SIZE ID FORD PLASTIC PIT SETTER (FURNISHED AND INSTALLED BY APPLICANT/PROPERTY OWNER).
2. FORD TYPE "W" DOUBLE LID COVER (10" DEPTH) WITH LOCKING LID AND INSULATION BLANKET (ELECTRONIC METER READING LIDS NOT PERMITTED) (FURNISHED AND INSTALLED BY APPLICANT/PROPERTY OWNER).
3. 2" INSULATING DISC
4. SENSUS iPERL WATER METER (FURNISHED AND SET BY BTMA).
5. 3/4" (MIN.) ANGLE BALL VALVE (FURNISHED AND INSTALLED BY APPLICANT/PROPERTY OWNER).
6. 3/4" (MIN.) ANGLE CARTRIDGE DUAL CHECK VALVE (FURNISHED AND INSTALLED BY APPLICANT/PROPERTY OWNER).
7. MUELLER CURB STOP (FURNISHED AND INSTALLED BY BTMA).
8. CURB BOX (FURNISHED AND INSTALLED BY BTMA).

1-1/2" THROUGH 2" METER SETTING

1. 36" TILE SIZE ID FORD PIT SETTER FOR 1-1/2" AND 2" METERS (FURNISHED AND INSTALLED BY APPLICANT/PROPERTY OWNER).
2. FORD CAST IRON MONITOR COVER WITH 20" LOCKING LID, INNER LID, AND INSULATION BLANKET (ELECTRONIC METER READING LIDS NOT PERMITTED) (FURNISHED AND INSTALLED BY APPLICANT/PROPERTY OWNER).
3. 2" INSULATING DISC
4. SENSUS OMNI C2 WATER METER (FURNISHED AND SET BY BTMA).
5. 3/4" (MIN.) ANGLE BALL VALVE (FURNISHED AND INSTALLED BY APPLICANT/PROPERTY OWNER).
6. 3/4" (MIN.) ANGLE CARTRIDGE DUAL CHECK VALVE (FURNISHED AND INSTALLED BY APPLICANT/PROPERTY OWNER).
7. MUELLER CURB STOP (FURNISHED AND INSTALLED BY BTMA).
8. CURB BOX (FURNISHED AND INSTALLED BY BTMA).

NOTES:

1. METER SETTER IS TO BE LOCATED AT OR NEAR RIGHT OF WAY LINE.
2. METER SETTER IS REQUIRED WHERE A WATER SERVICE LINE EXCEEDS 100-FT OR WHERE HOMES ARE BUILT ON SLABS.
3. AN EXPANSION TANK SHALL BE INSTALLED ON THE INLET SIDE OF THE WATER LINE TO THE WATER HEATER.
4. WHERE REQUIRED, A PRESSURE REDUCING VALVE SHALL BE INSTALLED ON THE INLET SIDE OF THE EXPANSION TANK.
5. METERS PITS SHALL BE LOCATED IN NON-TRAFFIC AND NON-PARKING AREAS.
7. PRIOR TO STARTING WORK OR ORDERING MATERIALS, CONTACT BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY TO REVIEW REQUIREMENTS. VERIFY ALL CONNECTION TYPES PRIOR TO ORDERING.
8. NO SOLDER CONNECTIONS PERMITTED ON SERVICE LINE BETWEEN HOUSE AND CURB BOX.
9. IN SOME INSTALLATIONS THE METER SIZE MAY DIFFER FROM THE WATER SERVICE TUBING DIAMETER. PROVIDE ALL REQUIRED FITTINGS BEFORE AND AFTER EACH METER SETTER. ALL FITTINGS TO BE COMPRESSION TYPE AND RATED AT 300 PSI WORKING PRESSURE.

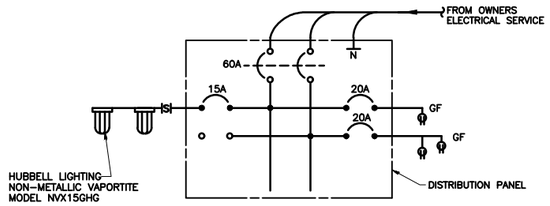
BRIGHTON TOWNSHIP
MUNICIPAL AUTHORITY
1300 Brighton Road
Beaver, Pennsylvania 15009

Drawn By	
Checked By	
Approved By	
Scale:	N.T.S.
Filename:	BTMA-17.dwg
Date:	November 17, 2014

RESIDENTIAL PLASTIC METER PIT

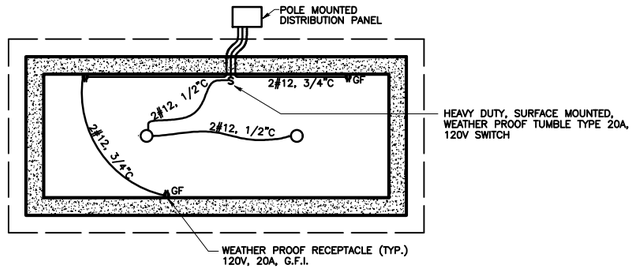
General Electrical Notes

1. GROUNDING WIRE(S) AND RELEATED APPURTENANCES ARE NOT SHOWN ON THE DRAWINGS. ALL GROUNDING SHALL BE PROVIDED PER SECTION 250 OF THE NATIONAL ELECTRICAL CODE (LATEST EDITION). EQUIPMENT GROUNDING WIRES SHALL BE INSTALLED IN ADDITION TO CONDUCTORS SHOWN (PER TABLE 250-122 IN 1999 NEC).
2. ALL POWER CONDUITS SHALL BE GALVANIZED RIGID STEEL HEAVY WALL. ALL CHANGES IN DIRECTION SHALL BE MADE USING LONG RADIUS BENDS.
3. ALL POWER WIRING INSULATION SHALL BE THHN-THWN. WIRE SIZE TO BE #12. MINIMUM CONDUIT SIZE TO BE 1/2".
4. CONTRACTOR TO PROVIDE PULL AND JUNCTION BOXES AS REQUIRED.

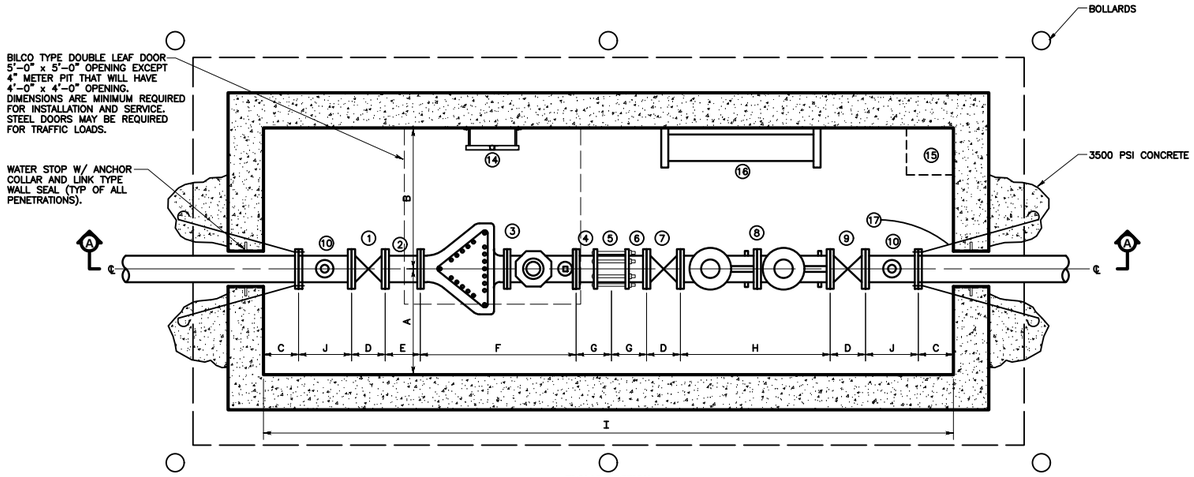


NEMA 4X (STAINLESS STEEL) ENCLOSURE

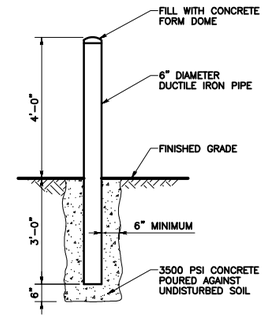
Electrical Single Line Schematic
N. T. S.



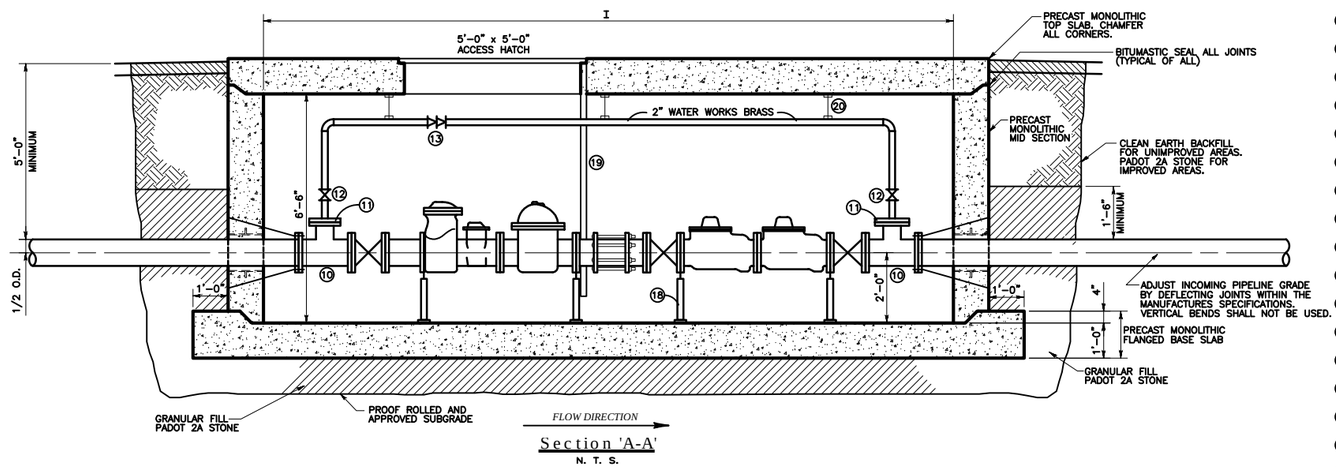
Water Meter Electrical Plan
N. T. S.



Water Meter Pit Plan
N. T. S.



Pipe Bollard Detail
N. T. S.



Section 'A-A'
N. T. S.

General Notes

1. ALL DUCTILE IRON PIPING SHALL BE CLASS 52 HAVING A MINIMUM WORKING PRESSURE OF 350 PSI.
2. THE PRECAST CONCRETE METER PIT SECTIONS SHALL BE FURNISHED TO THE DIMENSIONS SHOWN AND SHALL BE BE DESIGNED IN ACCORDANCE WITH THE FOLLOWING:
   CONCRETE – 4000 PSI @ 28 DAYS
   ENTRAINED AIR – 5% (±1%)
   STEEL – ASTM A496-A615
   – GRADE 60

   DESIGN LOADING – AASHTO HS-25 WITH 30% IMPACT AND EQUIVALENT SOIL PRESSURE OF 130 PSF.

   THE PRECAST CONCRETE METER PIT SHOP DRAWINGS SHALL BE ACCOMPANIED BY COMPLETE STRUCTURAL AND UPLIFT DESIGN CALCULATIONS. UPLIFT CALCULATIONS SHALL ASSUME COMPLETE SUBMERGENCE OF THE METER PIT. SOIL RESISTANCE TO UPLIFT SHALL BE EVALUATED IN A VERTICAL PLANE ONLY ABOVE THE FLANGED BASE. ALL DESIGN CALCULATIONS SHALL BEAR THE SEAL AND SIGNATURE OF A REGISTERED PROFESSIONAL ENGINEER LICENSED IN THE STATE OF PA.
3. ALL PRECAST METER PIT JOINTS SHALL BE BOLTED TOGETHER AND SEALED WATERTIGHT PER THE MANUFACTURER'S SPECIFICATIONS.
4. ALL PRECAST METER PIT SECTIONS SHALL HAVE A WATERPROOF BITUMASTIC COATING APPLIED TO ALL EXTERIOR SURFACES BELOW FINISHED GRADE.
5. ALL INTERIOR PIPING, FITTINGS, VALVES, ETC. SHALL BE PAINTED BLUE ACCORDING TO THE FOLLOWING OR APPROVED EQUIVALENT:
   TAR COATED APPURTENANCES.
   – ONE(1) COAT TNEMEC SERIES 1 OMNITHANE MIO-ZINC MCU @ 3.0-4.0 MILS DFT
   – TWO(2) COATS TNEMEC SERIES 446 PERMA-SHIELD MCU @ 6.0-8.0 MILS DFT PER COAT.

   PRIMED OR UNPAINTED APPURTENANCES
   – ONE(1) COAT TNEMEC SERIES 1 OMNITHANE MIO-ZINC MCU @ 3.0-4.0 MILS DFT.
   – ONE(1) COAT TNEMEC SERIES 27 TYPOXY POLYAMIDE EPOXY @ 2.0-3.0 MILS DFT.
   – ONE(1) COAT TNEMEC SERIES 73 ENDURA-SHIELD ALIPHATIC ACRYLIC URETHANE @ 2.0-3.0 MILS DFT.
6. PIPE SUPPORTS, TIE RODS, ANCHORS AND THRUST RESTRAINT AT FITTINGS AND VALVES SHALL BE PROVIDED SUFFICIENT, TO ALLOW PIPING TO STAND WITH REMOVAL OF METERS. FRICTION CLAMPS ARE NOT PERMITTED FOR RESTRAINT OF PIPING SYSTEMS.
7. 2" VALVES AND UNDER ARE I.P.S. 4" VALVES AND OVER ARE FLANGED – 125 P.S.I. CLASS FLANGE W/125 P.S.I. DRILLING.
8. IT WILL BE NECESSARY FOR THE CUSTOMER TO INSTALL PROPER GRAVITY DRAINAGE OR OTHER MECHANICAL MEANS TO KEEP VAULT DEWATERED.
9. GATE VALVES AND PIPING SHOULD BE SAME SIZE AS METER.
10. ALL VALVES AND BACK FLOW PREVENTORS TO BE MAINTAINED BY CUSTOMER.
11. BILCO TYPE DOOR TO BE CENTERED OVER METER ASSEMBLY AND ACCESS LADDER.
12. TIE RODS TO BE EMBEDDED IN CONCRETE OR BOLTED TO STEEL PLATES ON EXTERNAL WALLS. WATER COMPANY TO INSPECT BEFORE BACKFILLING.
13. INSTALL PIPE BOLLARDS AROUND PERIMETER OF METER PIT TO PREVENT VEHICULAR TRAFFIC FROM TRAVELING OVER PIT.
14. TOUCH READ PAD TO BE INSTALLED ON DOUBLE LEAF DOOR
15. METER SIZE TO BE DETERMINED BY THE WATER AUTHORITY BASED ON ACTUAL WATER REQUIREMENTS.
16. ALL FLANGE BOLTS TO BE STAINLESS STEEL.

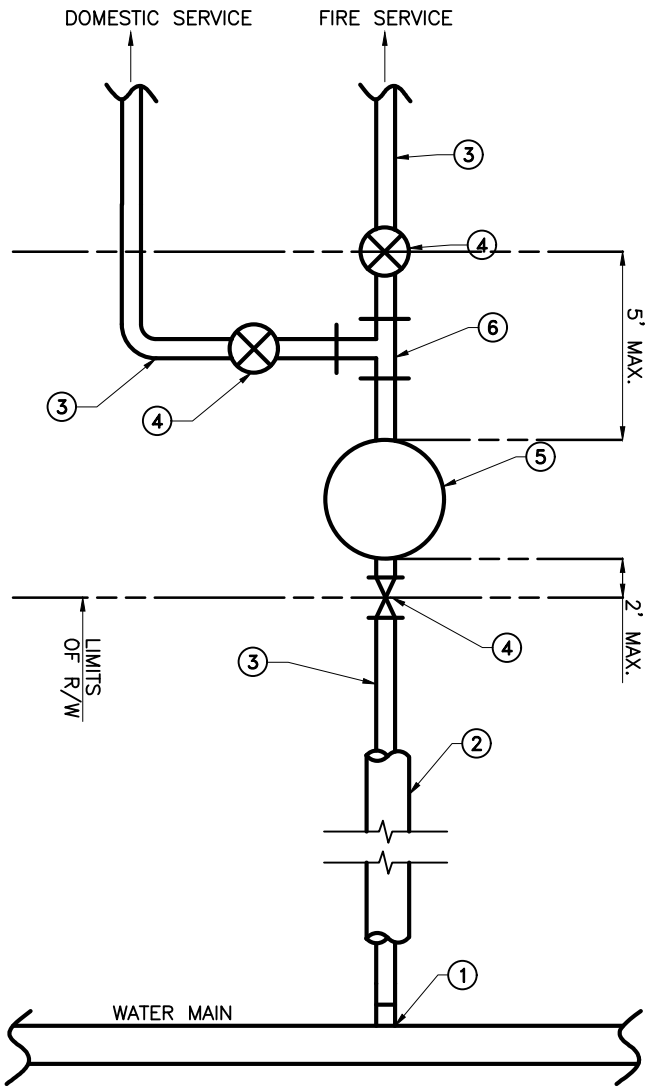
VAULT AND PIPING LENGTHS

METER SIZE	A	B	C	D	E	F	G	H	J	I TOTAL LENGTH OF VAULT
2" OR 4"	2'-6"	3'-6"	1'-0"	9"	1'-0"	2'-9"	1'-0"	2'-6"	1'-1"	14'-8"
6"	3'-0"	4'-0"	1'-0"	10-1/2"	1'-0"	3'-9"	1'-0"	3'-4"	1'-4"	17'-5"
8"	3'-0"	4'-0"	1'-0"	11-1/2"	1'-0"	4'-5"	1'-0"	4'-3"	1'-6"	19'-7"

Fitting and Equipment Schedule

1. RESILIENT SEATED FLG x FLG GATE VALVE WITH RISING STEM
2. FLG x FLG SPOOL PIECE
3. SENSUS OMNI F2 METER ASSEMBLY WITH WATERPROOF REGISTER AND TOUCH READ PAD
4. FLG x PE SPOOL PIECE (ACTUAL LENGTH 11")
5. DRESSER STYLE FULL BODY COUPLING
6. PE x FLG SPOOL PIECE
7. RESILIENT SEATED FLG X FLG GATE VALVE WITH RISING STEM
8. DOUBLE CHECK BACK FLOW PREVENTOR (CLA-VAL MODEL D-4)
9. RESILIENT SEATED FLG X FLG GATE VALVE WITH RISING STEM
10. FLG x FLG TEE
11. REDUCING FLANGE
12. LOCKING GATE VALVE
13. DOUBLE CHECK BACK FLOW PREVENTOR
14. STAINLESS STEEL LADDER WITH SAFETY POST (HALLIDAY PRODUCTS)
15. SUMP FOR PUMP (IF REQUIRED)
16. FLG x FLG SPOOL PIECE TO MATCH LENGTH OF METER ASSEMBLY
17. RESTRAINING RODS 1/2" DIA. – 8 REQUIRED (4 PER FITTING)
18. ADJUSTABLE GALVANIZED STEEL PIPE SUPPORT (TYPICAL OF 4) WITH 8" x 8" WELDED STL. BASE PLATE
19. 1" PVC DRAIN FOR GUTTER OF HATCH
20. PIPE HANGERS

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009-9211	DRAWN BY: CHECKED BY: APPROVED BY:	SCALE: N.T.S. DATE: December 4, 2014	METER SETTING DETAIL COMMERCIAL METER PIT	FILE NAME: BTMA-18.DWG DWG. NO. 0124-02-01 SHEET NO. 1 of 1



PRIVATE FIRE SERVICE
FOR RESIDENTIAL STRUCTURE
N. T. S.

(1) MUELLER MODEL H-15008 CORPORATION STOP (FURNISHED AND INSTALLED BY BTMA).
(2) SCHEDULE 80 PVC CASING PIPE UNDER ROADWAYS. (SEE NOTE 2).
(3) TYPE "K" COPPER TUBING (1" MINIMUM)
(4) MUELLER MODEL H-15209 CURB STOP AND VALVE BOX (FURNISHED AND INSTALLED BY BTMA).
(5) MUELLER HUNT METER BOX (SEE METER SETTING DETAIL)
(6) MUELLER MODEL H-15391 TEE (FURNISHED AND INSTALLED BY BTMA).
(5) MUELLER HUNT METER BOX (SEE METER SETTING DETAIL)
(6) MUELLER MODEL H-15391 TEE (FURNISHED AND INSTALLED BY BTMA).

NOTES:

1. SIZE OF ALL FACILITIES TO BE DETERMINED BY APPLICANT'S/PROPERTY OWNER'S SPRINKLER DESIGNER.

2. THE APPLICANT/PROPERTY OWNER IS RESPONSIBLE FOR THE CONSTRUCTION (INCLUDING PIT EXCAVATION) AND COST FOR ALL BORES HAVING COPPER TUBING/CASING PIPE DIAMETER GREATER THAN 1". ALL NEW DEVELOPMENT CONSTRUCTION REQUIRES SCHEDULE 80 PVC CASING PIPE BENEATH ROADWAYS. BTMA TO FURNISH AND INSTALL COPPER TUBING WITHIN PVC CASING PIPE.

3. WHERE A TWO INCH DIAMETER SERVICE CONNECTION IS REQUIRED ON A 4 INCH DIAMETER EXISTING WATER MAIN – A CONNECTION WILL BE MADE USING A DUCTILE IRON TEE IN LIEU OF A CORPORATION. ALL CONNECTIONS TO WATER MAIN WILL BE DONE BY BTMA.

4. THE LENGTH OF COPPER TUBING BENEATH ROADWAY SHALL BE PROVIDED SUCH THAT ONE (1) CONTINUOUS PIECE IS INSTALLED WITHIN SCHEDULE 80 PVC CASING WITHOUT THE NEED OF FITTINGS, FASTENERS, COUPLINGS, ETC.

5. THE CURB BOX LID FOR DOMESTIC SERVICE SHALL READ "WATER". THE CURB BOX LID FOR FIRE SERVICE SHALL READ "FIRE".

6. AN EXPANSION TANK SHALL BE INSTALLED ON THE INLET SIDE OF THE WATER LINE TO THE WATER HEATER.

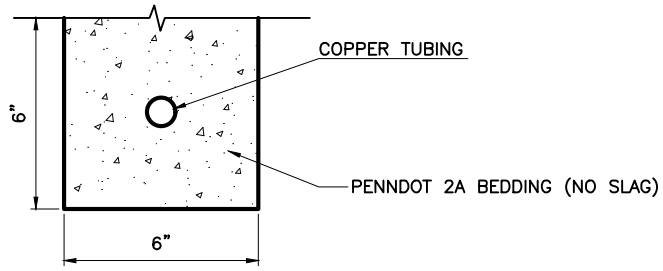
7. THE NEED FOR A PRESSURE REDUCING VALVES IS THE RESPONSIBILITY OF THE APPLICANT/PROPERTY OWNER. INSTALLATION OF PRESSURE REDUCING VALVES SHALL BE INSTALLED BY THE APPLICANT/PROPERTY OWNER.

8. BTMA TO FURNISH AND INSTALL TYPE "K" COPPER TUBING FROM THE WATER MAIN TO THE LIMIT OF R/W (SEE NOTE 2 FOR EXCEPTIONS). THE APPLICANT/PROPERTY OWNER TO FURNISH AND INSTALL REMAINING FIRE AND DOMESTIC SERVICE TYPE "K" COPPER TUBING FROM LIMIT OF R/W TO RESIDENTIAL STRUCTURE.

BRIGHTON TOWNSHIP
MUNICIPAL AUTHORITY
1300 Brighton Road
Beaver, Pennsylvania 15009

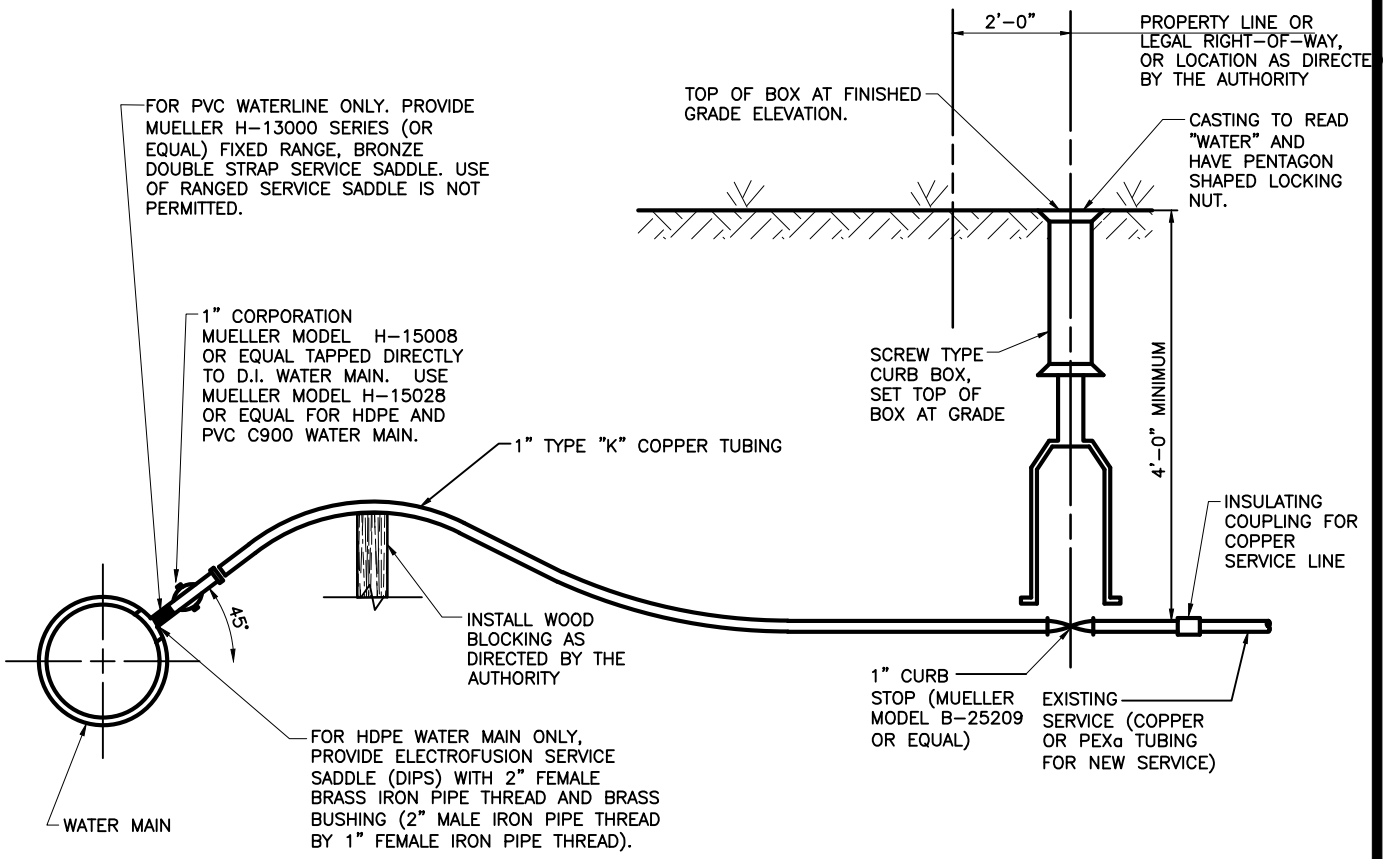
Drawn By	
Checked By	
Approved By	
Scale:	N.T.S.
Filename:	BTMA-19.dwg
Date:	June 23, 2011

PRIVATE FIRE SERVICE FOR RESIDENTIAL STRUCTURE



Bedding Detail

N. T. S.



NOTES:

1. SIZE OF FITTINGS AND LINE SHALL BE 1" OR AS SHOWN ON THE DRAWINGS.

2. FOR 2" SERVICES ON DUCTILE IRON WATER MAIN USE MUELLER BRONZE DOUBLE STRAP THREADED SERVICE CLAMP OR EQUAL.

3. LAY COPPER TUBING IN PENNDOT 2A BEDDING (NO SLAG).

Water Main Short Service Connection

N. T. S.

BRIGHTON TOWNSHIP MUNICIPAL AUTHORITY 1300 Brighton Road Beaver, Pennsylvania 15009	DATE: 08/21/17 FILE NAME: BTMA-20.dwg SCALE: N.T.S.	WATER MAIN SHORT SERVICE CONNECTION

N:\PROJ\124\124-04\DETAILS\BTMA-20.dwg layout = Short Service Connection Detail Username = davidm Date = Sep 11, 2017 - 1:11pm