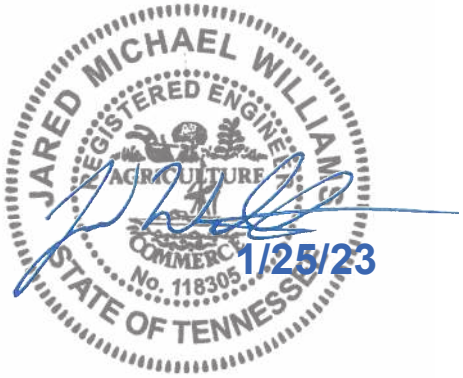
STANDARD SPECIFICATIONS FOR WATER LINES

HARPETH VALLEY
UTILITIES DISTRICT



DW20221427
APPROVED WATER SPECIFICATIONS
THE DOCUMENT BEARING THIS STAMP HAS BEEN RECEIVED AND REVIEWED BY THE
TENNESSEE DEPT. OF ENVIRONMENT & CONSERVATION
DIVISION OF WATER RESOURCES
AND IS HEREBY APPROVED FOR USE IN CONSTRUCTION BY THE COMMISSIONER
01/27/2023
THISAPPROVAL SHALL NOT BE CONSTRUED AS CREATING A PRESUMPTION OF CORRECT OPERATION OR AS WARRANTING BY THE COMMISSIONER THAT THE APPROVED FACILITIES WILL REACH THE DESIGNED GOALS.
APPROVAL EXPIRES FIVE YEARS FROM ABOVE DATE

Date: December 2022

Revised: January 2023

TABLE OF CONTENTS

HARPETH VALLEY UTILITIES DISTRICT
SPECIFICATIONS FOR WATER LINES

These specifications give the minimum requirements for installation of water lines in the Harpeth Valley Utilities District. Any special construction problems or conditions not covered under these specifications shall be submitted to the District for approval.

The Standard Drawings are part of these specifications, and all construction shall conform to the details shown on these drawings.

STANDARD DRAWINGS (Continued)

HARPETH VALLEY UTILITIES DISTRICT
OF
DAVIDSON AND WILLIAMSON COUNTIES, TENNESSEE

GENERAL GUIDELINES
COVERING THE INSTALLATION OF WATER MAINS AND APPURTENANCES

December 2022 – Revised January 2023

1. GENERAL GUIDELINES

The purpose of these guidelines and specifications is to provide a guide to the Developers and their Engineers and Contractors to achieve an acceptable installation of water service to subdivisions and other developments. The word "District" refers to the Harpeth Valley Utilities District.

The inspection service provided by the District is limited only for the installation of water lines and their appurtenances and small booster stations. The District's inspection should not be construed to be comprehensive in nature. Inspection by the District does not relieve the Contractor's responsibility to comply with the specifications nor does it guarantee against any failure during the construction phase or the one-year warranty period due to inferior material or workmanship of the Contractor.

Harpeth Valley Utilities District reserves the right to approve engineering firms selected by the Developer for the preparation of plans and specifications. The District may require the developer to request design task orders from the District's design firm for projects.

A. No valve or cutoff shall be operated except by the District Representative. Contractor shall make no tie to the existing water line until new lines have been tested and tie in is recommended by the project inspector. "Cut-ins" to live mains shall be made only by the District or its Contractor. To shut down a live main for a "cut-in" the Contractor shall make the request a minimum of seventy-two (72) hours in advance

of the proposed shut down and the District has the right to approve or deny this request. The District will approve the request unless the water usage at that time is such that a shutdown would cause a burden on the water system. Taps or cut ins shall be made by the District at the Developer's expense.

B. No utility plans will be reviewed until the development plans have received preliminary approval by the planning commission having jurisdiction.

C. Five sets of plans and specifications and one digital set, including a vicinity map, shall be submitted to the District for the initial review. If the plans are in order, with no major changes, the Developer or his Engineer will submit the number of additional sets of plans needed for the project for approval.

D. After approval by the District, approval of the plans and specifications by the Metropolitan Planning Commission for projects in Davidson County, by the Williamson County Planning Commission for projects in Williamson County, and by the Tennessee Department of Environment and Conservation, Tennessee Department of Transportation, Railroads, Corps of Engineers, Tennessee Valley Authority, and any other agency having jurisdiction, is required before beginning construction. One approved set of plans and a copy of the approval letter from the Tennessee Department of Environment and Conservation are to be provided to the District before any construction begins.

E. Sizes and locations of mains, valves, fittings, plugs, hydrants, and blow-offs shall be in accordance with the plans approved by the District. Standard pipe sizes are 6, 8, 12, 16, 20, 24, 30, 36, 42, and 48 inch; all other sizes will need to be approved by the District. Reduced-pressure principle backflow prevention devices shall be provided and installed in accordance with the District's criteria. A double check valve assembly may be used as a backflow prevention device serving a private fire hydrant when approved by the District. A “Hot Box”, “Safe-T-Cover”, “Water Safe”, or “Windbreaker” of approved size shall be used to enclose each preventer, unless otherwise approved by the District. Provide

insulation and/or electric heater as required to protect system from freezing.

F. Detailed plans and specifications shall be submitted by the Engineer employed by the Developer for any special condition or structures such as pump stations, creek crossings, etc., and shall be approved by the District and other agencies as required before the pre-construction conference.

G. Permits for pavement cuts or crossing of public roads, including any special backfill and pavement repair as required by the agency having jurisdiction, are the responsibility of the Developer. A bond shall be provided to the District by the Developer to cover all costs of repair and maintenance for a period of one year from the date of acceptance of the project for all work performed in existing rights-of-way of all roads in Williamson County and all State highways. The amount of this bond shall be determined by the District after it receives all requirements for repairs from the Williamson County Highway Department or the Tennessee Department of Transportation.

H. Backfill requirements for utilities in proposed roads and adjacent to proposed roads must meet the requirements of the agency having jurisdiction of the roads upon completion of the project.

I. All applicable Federal and State laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout.

J. If construction has not started within one year from the date of approval, utility plans shall be resubmitted to renew approval.

K. Meters 5/8-inch x 3/4-inch shall be purchased by the Developer from the District for each lot or for each unit if a duplex or triplex is built on an individual lot at the current established price. The meter will be installed by the District in the meter box installed by the Contractor. The meter assembly is to be installed as near to the property line as possible, and outside of any driveways.

L. Laboratory and mill tests reports may be required on all pipes to assure that it meets the requirements of the District's specifications.

M. Shop drawings for pipe, valves, etc. shall be submitted to the District a minimum of fourteen (14) calendar days prior to the preconstruction conference for review and approval after being thoroughly checked by the Contractor and stamped with his approval.

N. Water lines and appurtenances connected to the district's system, both public and private, shall be in accordance with specifications of the Harpeth Valley Utilities District. Since the capacity and operation of water booster stations, pressure tanks and standpipes or elevated tanks affect the overall operation of the District's system, the sizes, capacity, material, and construction shall be approved by the District.

O. All grading work shall be completed, all roads constructed to sub grade, and lot corners are to be marked prior to the installation of water mains.

P. The Contractor shall be responsible for locating and verifying the elevations of existing utilities prior to construction.

Q. Contractor shall provide competent, suitably qualified personnel to survey, lay out and construct the work. Contractor shall always maintain good discipline and order at the site. Except as otherwise required for the safety or protection of persons or the work or the property at the site or adjacent thereto, all work at the site shall be performed during regular working hours and Contractor will not permit overtime work or the performance of work on Saturday, Sunday, or any legal holiday without the District's approval. A request to work outside regular working hours must be made two (2) working days prior to the time they propose to do this work.

R. The Developer's Engineer shall provide a complete set of Record Drawings (including private developments), upon completion of construction and they shall include the distance of the meter box to the nearest property

line and to the right of way. This record drawing must be completed and submitted prior to acceptance of the water mains into the public system and any connections being made thereto. The record drawings are to be submitted on the construction drawings. Submit one (1) copy on Mylar, two (2) paper copies, and one (1) digital copy in both DWG and PDF format. These and a copy of the recorded plat shall be provided prior to the final inspection of the project.

S. Temporary construction water service may be provided from a metered fire hydrant after new lines have had preliminary pressure and leakage tests and satisfactory bacteriological results.

T. All proposed lot corners shall be field staked prior to construction of water lines.

U. The binder pavement shall be placed prior to the semi-final inspection.

V. When the Developer completes the construction of lines a semi-final inspection will be held by the District and the Contractor. Upon completion of the "punch list" by the Contractor from this semi-final inspection, a final inspection with the Developer or his representative, the Contractor, and the District will be held.

W. A one-year warranty period will begin upon the date of acceptance of the project by the District.

X. All excavated areas prone to washing must be sodded.

Y. On offsite work, all driveways and other private properties must be restored to their original condition or better.

Z. Backflow prevention devices must be installed in accordance with the Tennessee Department of Environment and Conservation's criteria, and the District's.

2. INITIAL PLAN SUBMITTALS

The plans must be submitted at least 30 days prior to the date on which action is desired. The initial submittal should include, but not be limited to the following:

A. 1 digital set of the plan.

B. 5 sets of the plan.

C. Preliminary plat.

D. Specifications.

E. Engineering reports including hydraulic calculations and design criteria used in sizing mains, pumping stations, and/or storage facilities.

3. EASEMENTS

A. Water mains: When required, permanent easements must be provided with a minimum width of 20-feet for a main 24-inches and smaller and 30-feet for mains 30-inches and larger. When a main is proposed in a developed area, a minimum of 20 feet wide temporary construction easement on each side of the permanent easement must also be provided.

B. Easements for water line extensions may be provided in either of two ways.

1. Easement Document on forms provided by the District, which must include legal description of the easement(s), legal Owner's name, map and parcel, and must be signed by the Owner, and then notarized and recorded.

2. Record with Subdivision Plat - If this method of recording easements is chosen, a preliminary plat of the subdivision must be provided at the time of plans submittal, which clearly defines the easements to be recorded.

C. All easements for offsite work must be obtained and recorded before construction can begin. In new subdivisions the letter of intent and preliminary plat showing the easements will be sufficient to start construction. However, the Final Plat must be

recorded and delivered to the District prior to final inspection of the new facilities.

D. Special permits such as Aquatic Resource Alteration Permits, Railroad Crossings, T.V.A. crossings and State Highway crossings must be prepared by the Developer's Engineer. The District will submit the permit application to the railroad or state highway as applicable.

4. WATER EXTENSION PLANS

The following are guidelines for the preparation of water extension plans and should not be construed as being the total requirements. The District may at its option require additions to be made in the plans where circumstances warrant.

A. Plans shall be drawn on a standard 24-inch x 36-inch sheet.

B. A cover sheet shall be made a part of all plans and shall incorporate a location map on an approximate scale not less than 1 inch = 1,200 feet, the name of the project and, the names, addresses and telephone numbers of the Developer and the Engineer.

C. All plans shall be stamped by a Tennessee Licensed Professional Engineer.

D. Show all existing and proposed utilities, including sewer, gas, electric, telephone, cable TV, and storm sewers on the plans with measurements and/or details of proposed clearances of same.

E. The plan scale will be: Plan 1 inch = 50 feet or 1 inch = 100 feet, profile where applicable 1 inch = 5 feet or 1 inch = 10 feet vertical.

F. Show the limits of all proposed easements.

G. The direction of North should be clearly shown on all plans.

H. Show all topographic features such as driveways, pavements, right-of-ways, property lines, storm drainage, structures, etc.

I. Provide grading and drainage plans of subdivisions including typical section of roadway.

J. Provide detailed drawings for unusual conditions such as stream crossing, etc.

K. A fire hydrant shall be installed at the end of 6" and larger dead end water mains.

L. Water valves should generally be spaced a maximum of 1,000 feet along a water main, on all lines at each intersection, and should be located at the end of the tangent point of radius.

M. Generally, the following locations should be utilized unless field conditions such as other utilities, etc. make it impractical to do so.

1. New Subdivisions - New mains are to be outside of the right-of way parallel to the property line in a utility easement unless approved otherwise by the District and shall not be located under sidewalks.

2. In older roads in existing subdivisions which have open ditches, the main shall be located in easements unless approved otherwise by the District.

3. The Developer is required to include easements to allow for the extension of lines across the property being developed to allow service to be available to the adjoining properties. The District may require extension of lines in these easements by the Developer.

4. Where underground electrical exists or is proposed, the water line must be located on the opposite side of the road. If conditions cannot be met, a minimum of 10 feet horizontal separation between water line and electric line must be maintained.

5. Where gas lines exist or are proposed there must be at least 10 feet horizontal separation between

the water line and gas line and a minimum 12 inches vertical separation between the two lines.

N. On proposed transmission mains, an automatic air release valve at high points must be provided along the main where the elevation differential is more than 40 vertical feet and there are no connections. Automatic air valves shall also be installed on distribution mains at locations as directed by the District.

O. The fire hydrant location in subdivisions must be approved by the Metro Fire Department as well as the District for lines in Davidson County.

P. When water extensions are proposed in new subdivisions, provide Master plan or Preliminary Plat as approved by the Metropolitan Planning Commission or the Williamson County Planning Commission, as applicable.

Q. Hydraulic calculations and data should be submitted for the proposed system including estimated flow demands for both domestic and fire flows based on State Design criteria, plumbing code, or NFPA (whichever is applicable).

R. Clearly define which roads in proposed subdivisions are to be public and which are to be private. After plans have been approved by the District, they will be returned to the Developer's Engineer for submittal to the State Department of Environment and Conservation. The Developer's Engineer will pay all state required fees.

5. PRE-CONSTRUCTION CONFERENCE

Before beginning any construction, the Developer shall contact the District and execute a contract with the District paying all fees as required. After this contract is executed and before beginning any construction, the Developer or his Engineer shall schedule a preconstruction conference to be held between the Contractor, Developer, Developer's Engineer, and the District and their Engineer. At this meeting, the Contractor will be informed of the District's policies and any special requirements. Listed below is a CHECK LIST of items relating to the project:

A. BEFORE Pre-Construction Conference:

1. Developer is to coordinate conference.

2. Developer, or his engineer, is to have project plans approved by all agencies.

3. Developer is to have a contract with the utility contractor, in order to determine the administration, engineering, and inspection fees.

4. Developer to submit a copy of Contractor's contract both off-site and on-site to the District.

5. Contractor is to have shop drawings approved by the District. (The District may waive these requirements on pump stations or plants).

6. When submitting plans and shop drawings to the District the District will retain two copies. Shop drawings, including but not limited to, pipe, valves and valve boxes, fittings, fire hydrants, corporation stop, meter box, and service pipe will not be reviewed unless they have been checked by the contractor and stamped by him to indicate that they meet the specifications.

7. Developer must sign a contract with the District and produce a check to the District for tapping privilege fees, and other administrative fees (All Contracts are subject to final approval by Harpeth Valley Utilities District's Board of Commissioners).

B. Developer is to have at conference:

1. Must have plans that have been approved by the District, the Tennessee Department of Environment and Conservation, and a copy of the States approval letter.

C. To Attend Conference:

1. The Developer.

2. The Developer's Engineer.

3. The Developer's Contractor.

4. Representative of Harpeth Valley Utilities District.

6. ABILITY TO PERFORM

The Developer shall be asked to establish to the satisfaction of the District that the Contractor, including all subcontractors, proposed to be used on any project which is to be approved by the District is one who has the ability to perform the Contract and meets at least the minimum standards set forth. Such factors as judgment, skill, and integrity will play an important part in the overall determination. Although additional criteria may be used, a responsible Contractor must at least:

A. Have adequate financial resources or the ability to secure such resources;

B. Have the necessary experience, organization, and technical qualifications and have or show proof that he can acquire the necessary equipment to perform the proposed Contract;

C. Be able to comply with all required performance schedules or completion dates, taking into account all existing commitments;

D. Have a satisfactory record of performance, integrity, judgment, and skills;

E. Be otherwise qualified and eligible to receive an award under the applicable laws and regulations; and

F. Maintain a permanent place of business.

G. The District reserves the right to approve all contractors and subcontractors.

The Developer may be required to furnish the District information sufficient to show that the proposed Contractor and its subcontractors and supplies currently meet these minimum standards.

7. FINAL INSPECTION

A. Before a final inspection is scheduled, the following must take place:

1. Project Engineer must submit to the District the "as built" plan.

2. A copy of the recorded plat shall be provided.

3. The Project Inspector will coordinate a semi-finial inspection and prepare a punch list of items if there are any that need attention.

4. Binder pavement must be in place in road sections.

5. When the lists of deficiencies, if any, are corrected, the Project Inspector will arrange for the District's Inspection Manager to set up a final inspection.

6. After the final inspection and all deficiencies have been corrected, the District shall send the Developer a letter stating their Approval.

8. ANNUAL INSPECTION

Twelve (12) months following acceptance of the water line, a follow-up inspection will be made to determine if any failures/ deficiencies have occurred as a direct result of the Contractor's work and/or materials. Present at this inspection will be a Representative(s) of the District, and the Developer and/or Contractor. The Developer and/or Contractor will be responsible for correction of all failures/deficiencies that have occurred during the first year after acceptance.

9. EROSION CONTROL

It is the Contractor's responsibility to ensure that construction activities do not harm the Waters of Tennessee. It is the Developer's and/or Contractor's responsibility to take all measures necessary to provide temporary pollution control provisions. The Developer

and/or Contractor shall ensure that State and local storm water regulations are met. The Developer and Contractor shall also ensure that the requirements of Tennessee General Permit No. TNR100000, Storm Water Discharges from Construction Activities, are met.

10. JOBSITE SAFETY

Neither the professional activities of the Engineer nor the presence of the Engineer or his or her employees and sub consultants or the District's personnel at a construction site, shall relieve the General Contractor and any other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. Neither the Engineer nor the district and their personnel have authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The District agrees that the General Contractor is solely responsible for jobsite safety. The District also agrees that the District, the Engineer, and the Engineer's consultants shall be indemnified and shall be made additional insured under the General Contractor's general liability insurance policy.

11. INTERPRETATION OF THESE STANDARDS AND DESIGN CRITERIA

Interpretations of these Standard Specifications or the determination of any other standards and design criteria not covered under these Standards shall be at the discretion of the General or Assistant General Manager of the Harpeth Valley Utilities District. The decision of the General or Assistant General Manager shall be based on past practices, traditional policies, widely accepted professional principles and practices of the industry.

END OF SECTION

SPECIFICATIONS

SECTION 02222

UNCLASSIFIED EXCAVATION FOR UTILITIES

PART 1 GENERAL

1.1 The work called for by this section shall consist of clearing and grubbing, loosening, loading, removing, and disposing of, in the specified manner, all wet and dry materials (including rock) encountered that must be removed for construction purposes; furnishing, placing, and maintaining all sheeting, shoring, bracing, and timbering necessary for the proper protection and safety of the work, the workmen, the public, and adjacent property and improvements; the dewatering of trenches and other excavations; the preparation of satisfactory pipe beds; the backfilling and tamping of trenches, foundations, and other structures; the preparation of fills and embankments; the removal of unsuitable material from outside the normal limits of excavation and, where ordered by the District, their replacement with suitable materials; and all other grading or excavation work incidental to or necessary for the work. This work shall be performed as specified below.

PART 2 PRODUCTS

A. Not Used.

PART 3 EXECUTION

3.1 PREPARATION OF THE SITE

A. Before starting construction, remove from the work site all vegetable growth (except as hereinafter excluded), debris, and/or other objectionable matter as well as any buildings and/or other structures that the drawings and/or the District specifically indicate are to be removed. Dispose of this refuse material in an acceptable manner.

B. Take reasonable care during construction to avoid damage to vegetation. Where the area to be excavated is occupied by trees, brush, or other uncultivated vegetable growth, clear such growth from the area, and dispose of it in a satisfactory manner. Leave undisturbed any trees, cultivated shrubs, flowers, etc., situated within public rights-of-way and/or easements through private property but not located directly within excavation limits. Transplant

small ornamental trees, cultivated shrubs, flowers, etc., located directly within excavation limits so they may be replaced during property restoration operations. Do not remove or disturb any tree larger than six inches in diameter without the permission of the District. Take special precautions (including the provision of barricades and the temporary tying back of shrubbery and tree branches) for the protection and preservation of such objects throughout all stages of construction; the Contractor will be held liable for any damage that may result to said objects from excavation or construction operations. Trim any limbs or branches of trees broken during construction operations with a clean cut, and paint with an approved tree pruning compound. Treat tree trunks receiving damage from equipment with a tree dressing.

C. If the area to be excavated is occupied by trees, brush, or other vegetable growth, clear such growth and grub the excavated area, and remove all large roots to a depth of not less than 2 feet below the bottom of the proposed construction. Dispose of the growth removed in a manner satisfactory to the District. Fill all holes or cavities created during this work that extend below the sub-grade elevation with suitable material, and compact to the same density as the surrounding material.

3.2 UNSUITABLE MATERIALS

A. Wherever muck, quicksand, soft clay, swampy ground, or other material unsuitable for foundations, sub-grade, or backfilling is encountered, remove it and continue excavation until suitable material is encountered. The material removed shall be disposed of in the manner described below. Then refill the areas excavated for this reason with 1 inch to 2 inch crushed stone up to the level of the lines, grades, and/or cross sections shown on the drawings. The top 6 inches of this refill shall be 1/2 inch to 3/4 inch crushed stone for bedding.

3.3 ROCKS AND BOULDERS

A. Any material that is encountered within the limits of the required excavation that cannot be removed except by drilling and/or blasting, including rock, boulders, masonry, hard pan, chert, shale, street and sidewalk pavements, and/or similar materials, shall be considered as unclassified excavation.

B. Should rock be encountered in the excavation, remove it by blasting or otherwise. Where blasts are made, cover the excavation with enough excavation material and/or timber or steel matting to prevent danger to life and property. The Contractor shall secure, at his own expense, all permits required by law for blasting operations and the additional hazard insurance required. Observe all applicable laws and ordinances pertaining to blasting operations.

C. Excavate rock over the horizontal limits of excavation and to a depth of not less than 6 inches below the bottom of pipe up to 30 inches diameter and not less than 12 inches below the bottom of larger pipes if rock extends to such depth. Then backfill the space below grade with 1/2 inch to 3/4 inch crushed stone or other approved material, tamp to the proper grade, and make ready for construction.

3.4 DISPOSAL OF MATERIALS

A. Whenever practicable, all materials removed by excavation that are suitable for backfilling pipe trenches or for other purposes shown on the drawings or directed by the District shall be used for these purposes. Any materials not so used shall be considered waste materials and disposed of by the Contractor as specified below.

B. Waste materials may be deposited in spoil areas at approved locations. Do not leave in unsightly piles but instead spread in uniform layers, neatly level, and shape to drain. Seed as specified in Section 02485, Seeding.

C. Once any part of the work is completed, properly dispose of all surplus or unused materials (including waste materials) left within the construction limits of that work. Leave the surface of the work in a neat and workmanlike condition, as described below.

D. The disposal of waste materials shall be considered an integral part of the excavation work and one for which no separate payment shall be allowed.

3.5 EXCAVATION FOR TRENCHES, MANHOLES, AND STRUCTURES

A. Unclassified excavation for pipelines shall consist of the excavation necessary for the construction of water, sewer, and other pipes and their appurtenances (including manholes, inlets, outlets, headwalls, collars, concrete saddles, and pipe protection) that are called for by the

drawings. It shall include clearing and grubbing where necessary, backfilling and tamping pipe trenches and around structures, and disposing of waste materials, all of which shall conform to the applicable provisions set forth elsewhere in these specifications.

B. Unless the construction of lines by tunneling, jacking, or boring is called for by the drawings or specifically authorized by the District, make excavation for pipelines in open cut and true to the lines and grades shown on the drawings or established by the Developer's Engineer on the ground. From the bottom of the trench to 1 foot above the top of the pipe cut the bank of trenches between vertical parallel planes equidistant from the pipe centerline. The horizontal distance between the vertical planes (or, if sheeting is used, between the inside faces of that sheeting) shall vary with the size of the pipe to be installed, but shall be a minimum of 8 inches and a maximum of 12 inches on each side of the pipe. Any cut made in excess of 12 inches on both sides of the pipe may be cause for the District to require stronger pipe and/or a higher class of bedding. From a distance of 1 foot above the top of the pipe to the surface of the ground, comply with all OSHA standards.

C. Shape the bottom of all trenches to provide uniform bearing for the bottom of the pipe barrel.

D. Excavate bell holes for bell and spigot pipe at proper intervals so that the barrel of the pipe will rest for its entire length upon the bottom of the trench. Bell holes shall be large enough to permit proper jointing of the pipe. Do not excavate bell holes more than 2 joints ahead of pipe laying.

E. Excavation for manholes, inlets, and other incidental structures shall not be greater in horizontal area than that required to allow a 2 foot clearance between the outer surface of the structure and the walls of the adjacent excavation or of the sheeting used to protect it. The bottom of the excavation shall be true to the required shape and elevation shown on the drawings. No earth backfilling will be permitted under manholes, inlets, headwalls, or similar structures. Should the Contractor excavate below the elevations shown or specified, he shall, at his own expense, fill the void with either concrete or clean 1/2 inch to 3/4 inch crushed stone.

F. Do not excavate pipe trenches more than 200 feet ahead of

the pipe laying, and perform all work so as to cause the least possible inconvenience to the public. Construct temporary bridges or crossings when and where the District deems necessary to maintain vehicular or pedestrian traffic.

G. In all cases where materials are deposited along open trenches, place them so that in the event of rain no damage will result to the work and/or to adjacent property.

H. Excavation for manholes and other structures may be performed with non-vertical banks except beneath pavements or adjoining existing improvements. Do not permit the horizontal area of the excavation to exceed that required to allow a 2 foot clearance between the outer surface of the structure and the banks of the excavation or the sheeting used to protect the embankments. The bottom of the excavation shall be true to the required shape and elevation shown on the drawings.

3.6 THE DEWATERING OF EXCAVATION

A. Provide and keep in operation enough suitable pumping equipment whenever necessary or whenever directed to do so by the District. Give special attention to excavations for those structures that, prior to proper backfilling, are subject to flotation from hydrostatic uplift.

3.7 BORROW EXCAVATION

A. Whenever the backfill of excavated areas or the placement of embankments requires more material than is available from authorized excavations, or whenever the backfill material from such excavations is unsuitable, than obtain additional material from other sources. This may require the opening of borrow pits at points accessible to the work. In such cases, make suitable arrangements with the property owner and pay all incidental costs, including any royalties, for the use of the borrowed material. Before a borrow pit is opened, the quality and suitability of its material shall be approved by the District.

B. Excavate borrow pits in such a way that the remaining surfaces and slopes are reasonably smooth and that adequate drainage is provided over the entire area. Construct drainage ditches wherever necessary to provide outlets for water to the nearest natural channel, thus preventing the formation of pools in the pit area. Leave the sides of borrow pit cuts at a maximum slope of 2:1 unless otherwise

directed by the District.

C. Properly clear and grub borrow pits, and remove all objectionable matter from the borrow pit material before placing it in the backfill.

D. The takings of materials from borrow pits for use in the construction of backfill, fills, or embankments shall be considered an incidental part of the work.

3.8 BACKFILLING

A. Begin backfilling after the line construction is completed and then inspected and approved by the District. On each side of the line, from the bottom of barrel to 1 foot above the top of the pipe, the backfill material shall consist either of fine, loose earth like sandy soil or loam or of granular material that is free from clods, vegetable matter, debris, stone, and/or other objectionable materials that has a size of no more than 2 inches. Place this backfill simultaneously on either side of the pipe in even layers that before compaction are no more than 6 inches deep. Thoroughly and completely tamp each layer into place before placing additional layers. At locations beneath or closely adjacent to existing pavement this backfill shall consist of clean 1/2 inch to 3/4 inch crushed stone properly consolidated. Backfill in proposed streets shall meet the requirements of Metro Davidson, or Williamson County.

B. From 1 foot above the pipe upward, the backfill material may contain broken stones that make up approximately 3/4 of the backfills total volume. However, if this type of backfill is used, there must be enough spalls and earth materials to fill all voids completely. The maximum dimension of individual stones in such backfill shall not exceed 6 inches, and the backfill material shall be placed and spread in even layers not more than 12 inches deep. At locations beneath or closely adjacent to existing pavement or at locations of improvements subject to damage by displacement, backfill material shall consist of clean 1/2 inch to 3/4 inch crushed stone properly consolidated. In other areas, including areas beneath or closely adjacent to proposed pavement, the backfill for the upper portion of the trenches may be placed without tamping, but shall be compacted to a density equivalent to that of adjacent earth material as determined by laboratory tests. Use special care to prevent the operation of backfilling equipment from causing any damage to the pipe.

C. If earth material for backfill is too dry to allow thorough compaction, then add enough water so that the backfill can be properly compacted. Do not place earth backfill material that is too wet or otherwise unsuitable.

D. Wherever excavation has been made within easements across private property, within the top 2 feet backfill material shall consist of 1.5 feet of fine loose earth free from large clods, vegetable matter, debris, stone, and/or other objectionable materials, covered with 6 inches (0.5 foot) of topsoil.

E. Wherever trenches have been cut across or along existing pavement, temporarily pave the backfill of such trenches by placing 12 inches of Class A, Grade D, crushed stone and 3 inches of cold mix at the top of the backfill. Maintain this temporary pavement either until the permanent pavement is restored or until the project is accepted by the District.

F. Conduct backfilling around manholes, inlets, outfalls, and/or structures in the same manner as specified above for pipelines except that even greater care is necessary to prevent damage to the utility structure.

G. Wherever pipes have diameters of 12 inches or less, do not use power operated tampers to tamp that portion of the backfill around the pipe within 1 foot above the pipe.

H. Perform backfilling so as not to disturb or injure any pipe and/or structure against which the backfill is being placed. If any pipe or structure is damaged and/or displaced during backfilling, open up the backfill and make repairs as necessary.

I. Backfilling and clean-up operations shall closely follow pipe laying; failure to comply with this provision will result in the District requiring that the Contractor's other activities be suspended until backfilling and clean-up operations catch up with pipe laying.

3.9 MAINTENANCE

A. Seed and maintain in good condition all excavated areas, trenches, fills, embankments, and channels until final acceptance by the District.

B. Maintain trench backfill at the approximate level of the

original ground surface by periodically adding backfill material wherever necessary and whenever directed to do so by the District. Continue such maintenance until one year after final acceptance of the project, or until the District issues a written release.

3.10 SLOPES

A. Neatly trim all open cut slopes, and finish conforming either to the slope lines shown on the drawings or the directions of the District. Leave the finished surfaces of bottom and sides in reasonably smooth and uniform planes like those normally obtainable with hand tools, though the Contractor will not be required to use hand methods if he is able to obtain the required degree of evenness with mechanical equipment. Conduct grading operations so that material is not removed or loosened beyond the required slope.

END OF SECTION

SECTION 02260

FINISH GRADING

PART 1 GENERAL

1.1 The work called for by this section shall include, but not necessarily be limited to, finish grading and the spreading and shaping of topsoil to the finished contour elevations indicated by the Drawings.

1.2 Refer to other sections for work related to that specified under this heading. Coordinate this work with that specified by other sections for timely execution.

PART 2 PRODUCTS

2.1 TOPSOIL: Use stripped topsoil that has been stockpiled as specified elsewhere. If the quantity of topsoil on the job is inadequate, furnish enough additional topsoil. Topsoil furnished shall be natural, fertile, friable soil possessing characteristics of representative productive soils in the vicinity. It shall be obtained from naturally well drained areas. It shall not be excessively acid or alkaline nor contain toxic substances that may be harmful to plant growth. Topsoil shall be without admixture of subsoil and shall be cleaned and reasonably free from clay lumps, stones, stumps, roots, or similar substances 2 inches or more in diameter, debris, or other objects that are a hindrance to planting operations. Such material shall be subject to testing.

PART 3 EXECUTION

3.1 Do not begin work until the earth is dry enough to be tillable.

3.2 Inspect sub-grades to see that they generally conform to the standards called for elsewhere in these specifications, particularly with regard to the approximate depths required for the work. After work is completed, inspect it to ensure that all finish grading complies with design requirements.

3.3 Place finished grade stakes wherever necessary to bring the work accurately to the elevations required by the Drawings.

3.4 Finish grade all areas outside the building line to the depths required for the work as follows:

A. Grade uniformly with rounded surfaces at the tops and bottom of abrupt changes of planes.

B. Hand grade steep slopes and areas that are inaccessible for machine work.

C. Protect graded areas from undue erosion, and repair and regrade areas where erosion does occur.

D. Refill areas where noticeable settlement has occurred.

E. Finish grade areas that are to receive topsoil up to 6 inches below the finished contour elevations called for by the Drawings or, over rock, to 12 inches below the finished contour elevations.

3.5 Place topsoil uniformly over disturbed areas that do not receive other work as follows:

A. Obtain approval of the finish grading from the District before starting to place topsoil.

B. Scarify sub-grade to a depth of 3 inches.

C. Place the topsoil to a depth of 6 inches when lightly rolled or, on rock, to a depth of 12 inches.

D. Level the topsoil so that it slopes uniformly and has no water pockets.

E. Carefully rake the topsoil by hand to remove all clods, roots, sticks, stones over 1 inch in diameter, and other foreign materials from the surface.

3.6 Dispose of excess excavated materials and debris away from the site.

END OF SECTION

SECTION 02271

RIPRAP

PART 1 GENERAL

1.1 This item consists of furnishing and placing riprap slope protection in accordance with the Drawings and Specifications.

PART 2 PRODUCTS

2.1 The riprap material shall be durable and of hard natural stone, free from cracks, seams, or other defects that would tend to cause increased deterioration because of freezing and thawing or other natural causes. Riprap material shall be reasonably well graded from the minimum size stone. At least 90 percent of the riprap stone shall be not less than 8 inches wide by 12 inches long by 12 inches deep and shall be approximately rectangular in shape. Fragments or spalls shall be used to fill the voids between the larger rocks. The inclusion of appreciable quantities of dirt, sand, clay, or rock fines will not be accepted. All materials considered for use as riprap shall be approved by the District.

PART 3 EXECUTION

3.1 Earth surface on which riprap is to be placed shall be trimmed and graded so as to provide for the thickness of riprap shown on the Drawings. Surfaces that are below grade shall be brought to grade by fillings with well compacted materials similar to the adjacent materials. Prior to placement of riprap, the prepared earth foundation will be inspected and no materials shall be placed thereon until approved by the District.

3.2 Place riprap to the full course thickness at 1 operation and in such a manner as to avoid serious displacement of the underlying materials. Deliver and spread the material so that the mass of pieces in place shall be reasonably well graded, with the larger pieces uniformly distributed and the smaller pieces and spalls filling the voids between the larger pieces. The finished riprap shall be free from objectionable concentration of large or small pieces.

3.3 A tolerance of +12 inches or -6 inches from slope lines and grades shown on the Drawings will be permitted in the finished surface of the riprap, except that the extreme minus tolerance shall not be continuous over an area exceeding 200 square feet.

END OF SECTION

SECTION 02485

SEEDING

PART 1 GENERAL

1.1 This work shall be performed in all disturbed areas not receiving such site improvements as buildings, roads, walks, sod, planting, etc., and shall include, but not necessarily be limited to, all seed bed preparation, the supplying and placing of soil additives, seed, and mulch wherever required by the drawings or directed by the District, and maintenance.

1.2 Unless otherwise approved in writing by the District, seeding operations shall be limited to the following planting periods:

Spring - March 1 through May 30

Fall - August 15 through October 31

1.3 Refer to other sections for items affecting seeding. Coordinate this work with that specified by other sections for timely execution.

PART 2 PRODUCTS

2.1 GRASS SEED: Kentucky 31 Fescue (Festuca Elatior) and annual rye meeting the requirements of the State Department of Agriculture and furnished in new bags or bags that are sound and not mended; no "below standard" seed accepted. Where lawns or fields have special grass, then replace in kind.

2.2 FERTILIZER: Commercially manufactured; Grade 10-10-10; furnished in standard containers that are clearly marked with the name, weight, and guaranteed analysis of the contents and that ensure proper protection in transportation and handling; and in compliance with all local, state, and federal fertilizer laws.

2.3 AGRICULTURAL LIMESTONE: Containing a minimum of 85% calcium carbonate and magnesium carbonate combined, 85% of which passes a No. 10 mesh sieve.

2.4 MULCH: Stalks of rye, oats, wheat, or other approved grain crops properly cured prior to baling, air dried, and reasonably free of noxious weeds and weed seeds or other material detrimental to plant growth.

PART 3 EXECUTION

3.1 Perform all seeding and related work as a continuous operation. Sow seed as soon as the seed bed has been prepared, and perform subsequent work in a continuous manner.

3.2 Before beginning seeding operations in any area, complete the placing of topsoil and final grading, and have the work approved by the District.

3.3 Scarify, disk, harrow, rake, or otherwise work each area to be seeded until the soil has been loosened and pulverized to a depth of not less than 2 inches. Perform this work only when the soil is in a tillable and workable condition.

3.4 Apply fertilizer and agricultural limestone uniformly over the seed bed, and lightly harrow, rake, or otherwise incorporate them into the soil for a depth of approximately 1 inch at the following rates:

Fertilizer: 40 pounds per 1,000 square feet

Agricultural Limestone: 80 pounds per 1,000 square feet

3.5 Sow seed uniformly with a rotary seeder, wheelbarrow seeder, or hydraulic equipment or by other satisfactory means.

3.6 The seeding rate shall be 5 pounds per 1,000 square feet for Kentucky 31 Fescue (Festuca Elatior).

3.7 When seeding during March 1 through April 1 and October 1 through November 20, add an additional 3 pounds per 1,000 square feet of annual rye grass.

3.8 Perform no seeding during windy weather or when the ground surface is frozen, wet, or otherwise un-tillable.

3.9 When seeding with mulch is specified, spread the mulch material evenly over the seeded areas immediately following the seeding operation at the specified rate below:

Mulch Rate: 2 bales (100 pound minimum) per 1,000 square feet

3.10 The mulch rate may be varied by the District, depending on the texture and condition of the mulch material and the characteristics of the area seeded. Cover all portions of the seeded areas with a uniform layer of mulch so that approximately 25% of the ground is visible.

3.11 No equipment, material storage, construction traffic, etc., will be permitted on newly seeded ground.

3.12 Dispose of all surplus materials.

PART 4 INSPECTIONS

4.1 The District shall inspect the seeding within 60 days after planting and determine if it is acceptable.

PART 5 GUARANTEE

5.1 Secure an acceptable growth of grass in all areas designated for seeding, and maintain these areas during the full warranty period.

5.2 An area is considered acceptable if it is represented by a minimum of 100 seedlings per square foot of the permanent species of grass representative of the seed mixture. If an acceptable growth is not obtained on the first planting, reseeding and remulching will be required.

5.3 If the planting is less than 50% successful, rework the ground, refertilize, reseed, and remulch.

END OF SECTION

SECTION 02486

SODDING

PART 1 GENERAL

1.1 This work shall include all soil preparation and the storage, transportation, placing, and maintenance of sod at all locations shown on the drawings or as directed by the District.

1.2 Temporary storage of sod is permitted; however, take care to maintain the sod in a live, growing condition. Sod shall be rejected if it is permitted to decay or dry out to the extent that, in the judgment of the District, its survival is doubtful. Dispose of rejected sod as directed at no expense to the District.

1.3 Set sod between October 1 and April 1 when the soil is in a workable condition.

1.4 Do not set sod out of season unless soil conditions are favorable and written permission is obtained from the District.

1.5 Refer to other sections for items affecting sodding. Coordinate this work with that specified by other sections for timely execution. The Contractor shall be wholly responsible for the scheduling, ordering, receiving, storing, and installing of all sodding materials.

PART 2 PRODUCTS

2.1 SOD: Kentucky 31 Fescue (Festuca Elatior); new sod consisting of live, dense, well rooted growth; well suited for the intended purpose and soil conditions; completely free of noxious weeds and grasses (Bermuda grass, quack grass, Johnson grass, Canada thistle); and containing less than 5 plants of objectionable weeds per 100 square feet if nursery grown or 10 such plants if field grown.

2.2 FERTILIZER: Commercially manufactured, Grade 10-10-10; furnished in standard containers that are clearly marked with the name, weight, and guaranteed analysis of the contents and that ensure proper protection in transportation and handling; and in compliance with all local, state, and federal fertilizer laws.

2.3 AGRICULTURAL LIMESTONE: Containing a minimum of 85% calcium carbonate and magnesium carbonate combined, 85% of which passes a No. 10 mesh sieve.

PART 3 EXECUTION

3.1 Before beginning sodding operations in any area, complete the placing of topsoil and final grading, and have the work approved by the District.

3.2 Scarify each area to be sodded a minimum of 2 inches.

3.3 Apply fertilizer and agricultural limestone uniformly over the sod bed at the rates shown below. Immediately prior to placing sod, water the sod bed until it is saturated to a depth of 1 inch, and keep it moist until the sod is placed.

A. Fertilizer: 40 pounds per 1,000 square feet of 10-10-10.

B. Agricultural Limestone: 80 pounds per 1,000 square feet.

3.4 Place sod as soon as practical after its removal from point of origin. Keep it moist while displaced.

3.5 Place sod by hand so that the edges are in close contact and in a position to break joints with the long dimension perpendicular to the slope. Fit and pound the sod into place with a 10 inch by 10 inch wood tamp or other similar implements.

3.6 Immediately after placing the sod, thoroughly wet and roll it.

3.7 Two weeks after the sod is installed, top dress and thoroughly water it. Top dressing shall consist of the following:

A. 1/2 to 1 pound: 38 percent urea formaldehyde per 1,000 square feet.

B. 20 pounds: 6-12-12 per 1,000 square feet.

3.8 No equipment, material storage, construction traffic, etc., will be permitted on newly sodded areas.

3.9 Dispose of all surplus material.

PART 4 INSPECTIONS

4.1 The District shall inspect the sod within 30 days after installation and determine if it is acceptable.

PART 5 GUARANTEE

5.1 Establish an acceptable growth of the specified sod on all areas indicated on the drawings or as directed by the District. An area is considered acceptable if the majority of each piece of sod is alive and healthy and generally free from weeds, insects, and disease.

END OF SECTION

SECTION 02575

PAVEMENT REPAIR

PART 1 GENERAL

1.1 The work specified by this section shall consist of repairing or replacing all damaged pavement, whether public or private. Dirt shoulders, roads, streets, drives, and walks are to be restored to their original condition as an incidental part of the installation of utilities. Repair damaged base on either side of a trench wherever necessary. Trim the oxidation surface to neat straight lines outside of the trench wall, and repave the entire area as specified below and as shown on the drawings or on the standard drawings.

1.2 These specifications make reference to the current edition of the standard specifications of the Tennessee Department of Transportation (TDOT). Even though the weather limitations, construction methods, and materials specifications contained in the TDOT specifications may not be explicitly repeated in these specifications, they shall, wherever applicable to the work called for by this section, be considered as implied and therefore adhered to. However, the various subsections "Basis for Payment" contained in the TDOT specifications shall not be considered applicable.

1.3 The repair of trenches in streets and roads, including shoulders, under the jurisdiction of the Metropolitan Government shall be made in accordance with and under the direction of the Engineering Division, Nashville Department of Transportation and Multimodal Infrastructure, and the District. Roads in Williamson County shall be repaired in accordance with the Williamson County Highway Department regulations and the District.

1.4 Refer to other sections for work related to that covered by this section.

PART 2 PRODUCTS

2.1 MINERAL AGGREGATE BASE: Class A, Grading D crushed stone “PUGMILL MIX” (Section 303, subsection 903.05)

2.2 BITUMINOUS PRIME COATS: Cutback asphalt, Grade RC-250, or emulsified asphalt, Grade AE-P (Section 402, Subsections 904.02 and 904.03)

2.3 CRUSHED STONE CHIPS: Size 6 or Size 7 (Subsection 903.14)

2.4 DOUBLE BITUMINOUS SURFACE: For both courses, either cutback asphalt, Grade RC-800 or RC-3000, or emulsified asphalt, Grade RS-2 (Subsections 904.02 and 904.03)

2.5 ASPHALTIC CONCRETE BINDER: Grading B or C, as directed by the District (Section 307)

2.6 BITUMINOUS TACK COAT: Grade AE-3 (Section 403, Subsection 904.03)

2.7 ASPHALTIC CONCRETE SURFACE: Grading E (Section 411)

2.8 QUICK DRY TRAFFIC MARKING PAINT (WHITE AND YELLOW): Subsection 910.05.

PART 3 EXECUTION

3.1 SUBGRADE

A. Before any base material is installed, compact the sub-grade of the area to be paved to 95% of optimum density as determined by ASTM D698 (Standard Proctor).

B. The backfill material shall contain no topsoil or organic matter. For all areas where sub-grade has been prepared, test for uniformity of support by driving a loaded dump truck at a speed of 2 to 3 mph over the entire surface. Make further improvements on all areas that show a deflection of 1 inch or more. When completed, the finished sub-grade shall be hard, smooth, stable, and constructed in reasonably close conformance with the lines and grades that existed prior to beginning construction.

C. When a base course is compacted, cut back the surface course of the existing pavement a minimum of 1 foot beyond the limit of the joint between the old and new base course or as shown on the standard drawings. Take special care to ensure good compaction of the new base course at the joint. Apply and compact the surface to conform to the existing pavement so that it will have no surface irregularity.

3.2 BASE

A. Install a mineral aggregate base of the type specified above in accordance with Section 303 of the TDOT specifications. The maximum compacted thickness of any one layer shall be 6 inches, and the total thickness of the base shall be that indicated by the standard drawings or as shown on the plans.

3.2 SEAL COAT SURFACE

A. Uniformly apply a bituminous prime coat of either emulsified asphalt, Grade AE-P, or cutback asphalt, Grade RC-250, over the entire width of the area to be surfaced at a rate of 0.3 gallon per square yard. Immediately after application, uniformly cover the entire area with Size 7 crushed stone chips at a rate of 12 pounds per square yard.

3.3 DOUBLE BITUMINOUS SURFACE

A. Apply the first course at a rate of 0.38 to 0.42 gallon per square yard with either emulsified asphalt, Grade RS-2, or cutback asphalt, Grade RC-800 or RC-3000, and then immediately cover with Size 6 crushed stone chips at a rate of 33 to 37 pounds per square yard. After this is rolled, apply the second course at a rate of 0.30 to 0.35 gallon per square yard, and at once uniformly cover with Size 7 chips at a rate of 20 to 25 pounds per square yard. Then roll the entire area.

B. After the application of the cover aggregate, lightly broom or otherwise maintain the surface for a period of 4 days, or as directed by the District. Maintenance of the surface shall include the distribution of cover aggregate over the surface to absorb any free bitumen and cover any areas deficient in aggregate. Sweep excess material from the entire surface with rotary brooms. Sweep the surface at the time determined by the District.

3.4 ASPHALTIC CONCRETE BINDER

A. Apply a bituminous prime coat of emulsified asphalt, Grade AE-P, or cutback asphalt, Grade RC-250, at a rate of 0.38 to 0.42 gallon per square yard. Take

care to prevent the bituminous material's splashing on exposed faces of curbs and gutters, walls, walks, trees, etc.; if such splashing does occur, remove it immediately. After the prime coat has been properly cured, apply an asphaltic concrete binder to the thickness shown on the standard drawings or the plans.

B. Carefully place the material to avoid segregation of the mix. Broadcasting of the material will not be permitted. Remove any lumps that do not readily break down.

3.5 ASPHALTIC CONCRETE SURFACE

A. If the asphaltic concrete surface course is to be placed directly on the mineral aggregate base, place a bituminous prime coat as described above. If, however, the surface course is to be placed on a binder course, then apply a bituminous tack coat of the sort specified above under PRODUCTS at a rate of 0.05 to 0.10 gallon per square yard. Take care to prevent the bituminous material's splashing on exposed faces of curbs, gutters, walls, walks, trees, etc.; if such splashing does occur, remove it immediately. After the prime or tack coat has been properly cured, apply the asphaltic concrete to the thickness shown on the drawings or standard drawings. Apply the surface course as described above for the binder course.

3.6 SMOOTHNESS

A. The finished surfaces shall conform to the lines and grades that existed prior to construction. No deviations, variations, or irregularities exceeding 1/4 inch in any direction when tested with a 12 foot straightedge will be permitted in the finished work, nor will any depressions that will not drain. Correct all such defects.

3.7 SAMPLING AND TESTING

A. Submit to the District test reports made by an independent testing laboratory on the crushed stone aggregate, bituminous materials, and asphaltic concrete design mixes, and obtain his approval of these reports before starting paving operations.

B. Tests shall be made on the completed elements of the pavement to ascertain the compacted thickness of the base and surface courses. If sections with deficient thicknesses are found, the full section for a reasonable distance on each side of the deficiency shall be refused. Remove and reinstall all such sections. Patch all test holes in connection with thickness tests.

C. When making surface tests, furnish one man to mark all surface defects for corrections.

END OF SECTION

SECTION 02640

VALVES, HYDRANTS, AND BLOWOFFS

PART 1 GENERAL

1.1 Refer to other sections for work related to that specified under this heading.

PART 2 PRODUCTS

2.1 GATE VALVES

A. Gate valves on water lines 24 inches and smaller shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509/C515 of latest revision and in accordance with the following specifications and shall be manufactured by American Darling, M&H, or Mueller.

B. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.

C. The valves shall be non-rising stem with the stem made of bronze described in AWWA C509/C515. Provide 2 stem seals of the O-ring type.

D. The stem nut shall be made of bronze and independent of the gate.

E. The sealing mechanism shall consist of a cast or ductile iron wedge gate fully encapsulated in synthetic rubber or urethane. The resilient sealing mechanism shall provide zero leakage at 200 psi working pressure when installed with flow in either direction.

F. The valve body, bonnet, and bonnet cover shall be ductile iron or cast iron, ASTM A126, Class B, fully coated with fusion bonded epoxy, both interior and exterior.

G. All valves shall be tested in strict accordance with AWWA C509/C515.

H. Buried valves shall be mechanical joint and equipped with a 2-inch square operations nut and shall be complete with a valve box specified herein. Valves in structures shall be flanged and equipped with removable hand wheel operators. Valves shall open to the left. All buried valves with

wrench nut over 10 feet deep shall have an extension stem projecting within 2 feet of the ground surface and the stem extension shall be centered in the valve box and anchored to prevent horizontal movement and pinned to the valve nut below. The valve manufacturer shall provide all glands, gaskets, and all the accessories necessary to install the valve.

I. Gate Valves 12 inches and larger may be required to be bevel gear design based on the depth of the water line.

2.2 BUTTERFLY VALVES

A. Valves on water lines 30 inches and larger shall be butterfly valves, mechanical joints, designed for direct burial service, and meet or exceed performance requirements for water application of applicable standards such as AWWA C504, class 250B, latest revision. Valves shall be fitted with operators designed to accept standard valve boxes and shall open to the left.

B. Valve bodies shall be constructed of cast iron (ASTM A126, Class B) and conform to AWWA C504 in terms of laying lengths and minimum body shell thickness.

C. Valve Discs shall also be built from ductile iron in conformance to ASTM A-536. Discs shall be furnished with a nickel-chrome or 316 stainless steel seating edge to mate with the rubber seat on the body.

D. Valve Seat shall be Buna-N rubber or Acrylonitrile-Butadiene located on the valve body and shall be retained in the valve body by mechanical means without use of metal retainers or other devices located in the flow stream.

E. Valves Shafts shall be 18-8 Type 304 stainless steel conforming to ASTM A-276. Shaft seals shall be standard split V packing and be provided where the shaft projects through the valve body. Shaft seals shall be of a design allowing replacement without removing the valve shaft.

F. Valve Bearings shall be sleeve type that are corrosion resistant and self-lubricating.

G. Valve Actuators shall be fully grease packed and have stops in the open/close position. The actuator shall have a mechanical stop which will withstand an input torque of 450 ft. lb. against the stop. The traveling nut shall engage

alignment grooves in the housing. The actuators shall have a built-in packing leak bypass to eliminate possible packing leakage into the actuator housing. It shall be designed to withstand continuous submergence in water to a head pressure of 25 feet. Valve operators shall be provided with 2-inch square operating nut and shall open left. All buried valves with wrench nut over 10 feet deep shall have an extension stem projecting within 2 feet of the ground surface. The valve manufacturer shall provide the glands, gaskets, and all the accessories necessary to install the valve.

H. The Valve Interior and Exterior Surfaces except for seating shall be coated with two coats of asphalt varnish in accordance with TT-C-494A or fully rubber lined.

I. Valves shall be Henry Pratt Company "Groundhog" or Dezurik LA-Series.

2.3 AIR RELEASE VALVES

A. Automatic air release valves shall be installed at all high points unless otherwise noted on plans and shall be manufactured by ARI.

B. For water lines 8-inches in diameter or smaller, automatic air release valves and assemblies shall be installed as shown on Standard Drawing 261A unless otherwise approved or directed by the District.

C. For water lines 12-inches in diameter or larger, automatic air release valves and assemblies shall be installed as shown on Standard Drawing 261B unless otherwise approved or directed by the District.

2.4 TAPPING SLEEVES FOR DUCTILE IRON PIPE

A. Tapping sleeves shall be a full sleeve, mechanical joint type manufactured from ductile iron. Sleeves shall be Mueller H-615 or approved equal.

B. Side flange seals shall be of the o-ring type of either round or rectangular cross-sectional shape and shall butt against the split end gaskets to produce a totally watertight seal.

C. The Sleeve manufacturer shall furnish all the accessories necessary to assemble the sleeve to the pipe.

D. Sleeves shall be rated for a minimum of 250 psi water working

pressure.

C. Sleeves shall be provided with a test plug on the outlet throat.

2.5 INSTALLING AND TESTING TAPPING SLEEVES

A. The District shall supply and install the tapping sleeve and tapping valve at the expense of the Developer. The District shall pressure test tapping sleeves while in place on the existing water line prior to the existing line being tapped. The tapping sleeve and valve shall be subjected to a hydrostatic pressure of 200 psi for a period of 15 minutes. The connection being tested shall maintain 100 percent of the test pressure throughout the test period. The Developer's Contractor shall be required to provide a safe and stable excavation to allow for the installation of the tap by the District. If a tapping sleeve and valve cannot be provided, or if the District prefers, the District shall cut in a tee at the expense of the Developer. Other details of the test shall be as directed by the District.

2.6 TAPPING VALVES - RESILIENT SEATED GATE VALVE

A. Tapping valves shall conform to AWWA C509/C515 or latest revision covering gate valves except as modified for passage and clearance of tapping machine cutters. Valves shall be as manufactured by Mueller or approved equal.

B. Tapping valves shall meet all the requirements in Paragraph 2.1 above as well as having mechanical joints on one end and a tapping flange on the other end. The valve waterway shall be a full opening to admit a full-size shell cutter.

C. Valves shall be furnished with tapping sleeve sized to ANSI B16.1 standards for flanges with male pilots for centering and the outlet side mechanical joint, conforming to AWWA C111. Flange and mechanical joint assemblies shall be supplied by the valve manufacturer.

2.7 VALVE BOXES

A. All valve box castings shall be made accurately to the required dimensions, and shall be sound, smooth, clean and free from blisters and other defects. Defective castings which have been plugged or otherwise treated to remedy defects shall be rejected. Contact surfaces of frames and

covers shall be machined so that the covers rest securely in the frames with no rocking and with the cover in contact with the frames for the entire perimeter of the contact surface.

B. Install valve boxes on each proposed valve in accordance with the details shown on the standard drawings 207-A and 207-B.

C. All valve boxes shall be John Bouchard No. 8006, East Jordon Iron Works V-8455, or Sigma.

2.8 FIRE HYDRANTS

A. Fire hydrants shall comply in all respects with AWWA C502 and shall be of the compression type, with the main valve opening against the pressure and closing with the pressure. The main valve opening shall be 4-1/2 inches in diameter. Hydrants shall be connected to the main by a 6-inch mechanical joint shoe, unless otherwise shown on the drawings, and fitted with strapping lugs. Two 2-1/2-inch hose nipples and one 4-1/2-inch steamer nipple shall be threaded and screwed into the nozzle section and then pinned to prevent turning.

B. Hydrants shall be furnished with 1-inch square operating nuts. Operating nut shall be provided with convenient means to afford lubrication to ensure ease of operation and the prevention of wear and corrosion.

C. Hydrant shall be the dry barrel type, and ductile iron hydrant shoe shall have 2 positive acting noncorrodible drain valves that drain the hydrant completely by opening as soon as the main valve is closed and by closing tightly when the main valve is open. Drain valves operated by springs or gravity will not be acceptable.

D. The packing gland located in the bonnet shall be solid bronze, and gland bolts shall be steel with bronze nuts. A double O-ring seal may be used in lieu of conventional stuffing box.

E. The hydrant shall open by being turned to the left and be so marked on the bonnet in cast letters and arrow.

F. Threads on hose and steamer nipples, operating nut, and cap nuts shall conform to the District's standards.

G. Bury shall be a nominal 42 inches, with the depth being measured from grade line to bottom of trench or connecting pipe.

H. Hydrants shall be FM and UL listed and rated for 200 psi working pressure.

I. Hydrants shall be Mueller "Super Centurion 250" or American-Darling Mark 73-5.

2.8 BLOW-OFF HYDRANT

A. Blow-off hydrant shall be the same as above except it shall only have two 2-1/2-inch hose nipples.

PART 3 EXECUTION

3.1 SETTING VALVES AND FITTINGS

A. General

1. Set valves, fittings, plugs, and caps and joint to pipe in the manner heretofore specified for cleaning, laying, and jointing pipe.

B. Location of Valves

1. Valves in water mains shall, where possible, be located on the street right-of-way (R.O.W.) lines extended.

C. Valve Boxes and Valve Pits

1. Provide a valve box for every valve with the lettering on the valve box cover being placed 90 degrees to the line.

2. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve, with the box cover flush with the surface of the finished pavement or such other level as may be directed by the District.

3.2 SETTING HYDRANTS

A. Location

1. Locate hydrants as shown on the drawings or as directed by the District and in a manner that will provide

complete accessibility and also minimize the possibility of damage from vehicles or injury to pedestrians. Hydrants shall be set between 3 feet to 7 feet behind the curb line when streets have curbs.

B. Position

1. All hydrants shall stand plumb and shall be set near normal bury. Set hydrants to the established grade, with the steamer nozzle between 12 inches and 24 inches above finish grade, as shown on the drawings or as directed by the District.

C. Connection and Anchorage to Main

1. A ductile iron anchoring tee with a 6-inch branch followed by a 6-inch gate valve shall be used to connect each hydrant to the main in accordance with standard drawing No.213 in these specifications. An anchoring pipe or section of pipe with a Meg-A-Lug Series 100 by EBAA, Sigma One-Lok or Uni-Flange Series 1400 by Ford on each end shall be used to connect between the fire hydrant and the 6-inch gate valve. Anchoring pipe shall be manufactured by Tyler/Union, U.S. Pipe, or approved equal.

D. Hydrant Drainage

1. Provide drainage at the base of the hydrant by placing coarse gravel or crushed stone from the bottom of the trench to at least 6 inches above the waste opening in the hydrant to a distance of 1 foot around the elbow. Connect no drainage system to a sewer.

END OF SECTION

SECTION 02713

WATER LINES

PART 1 GENERAL

1.1 Furnish all material, equipment, tools, and labor in connection with the water lines, complete and in accordance with the drawings and these specifications. Pipe material shall be ductile iron.

1.2 It shall be the Contractor's responsibility to ensure that all necessary materials are furnished to him and that those found to be defective in manufacture are replaced at no extra cost to the District. Materials damaged in handling after being delivered by the manufacturer shall be replaced at the Contractor's own expense. If installed material is found to be defective, the cost of both the material and labor needed to replace it shall be borne by the Contractor.

1.3 The Contractor shall be responsible for safely storing materials needed for the work which have been accepted by him. Keep the interior of all pipes, fittings, and other accessories, free from dirt and foreign matter at all times.

1.4 Refer to other sections for work related to that specified by this section. Coordinate this work with that required by other sections for timely execution.

PART 2 PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS

A. Ductile iron pipe shall conform to the requirements of ANSI 21.51/AWWA C151 for ductile iron pipe centrifugally cast in metal or sand-lined molds. It shall be made and tested in accordance with ASTM A536 and be subjected to and able to withstand a hydrostatic pressure of 500 psi. The minimum size shall be 6 inch. Sizes 10 inch, 14 inch, & 18 inch are **NOT** allowed to be used.

B. The pipe shall be plain end ductile iron pipe with push-on, single gasket joints. The design thickness shall be that specified by ANSI A21.50/AWWA C150 except that all pipe with a diameter of 12 inches or less shall have a wall thickness of Class 52 (Special Class) and all pipe with a diameter of 16 inches or more shall have a wall thickness of Pressure

Class 350 unless determined otherwise by the District. Pipe shall be manufactured by American Cast Iron Pipe Company, U.S. Pipe or McWane Ductile. All pipes shall be of the same manufacturer.

C. The length of each individual piece of ductile iron pipe shipped must be plainly marked on that piece of pipe.

D. The push-on single gasket joints shall be either "Fastite" (by American Cast Iron Pipe Company) or "Tyton" (by U.S. Pipe and McWane Ductile).

E. The bell of each pipe shall have a tapered annular opening and a cast or machined retaining groove for the gasket. The gasket groove shall have a flared design so that maximum deflection will be provided. The plain spigot end of the pipe shall be beveled in order to simplify its entry into and centering within the bell and the compression of the gasket.

F. The gasket shall be of high quality vulcanized rubber made in the form of a solid ring to exact dimensions. The design of the gasket groove in the bell of the pipe and the design, hardness, and other properties of the gasket itself shall be such that the joint is liquid tight for all pressures from a vacuum to a maximum rating of 350 psi of internal liquid pressure.

G. Enough lubricant shall be furnished with each order to provide for the proper installation of the pipe supplied with said order. This lubricant shall be nontoxic, impart no taste or smell to the water, and have no harmful effect on the rubber gasket. It shall have a consistency that will allow it to be easily applied to the pipe in either hot or cold weather and that will enable it to adhere to either wet or dry pipe.

H. Standard and special fittings shall be ductile iron. Use standard mechanical joint fittings or anchoring tees at hydrant locations. All fittings shall conform to the specifications of ANSI A21.10/AWWA C110 or ANSI/AWWA C153/A21.53.

I. Pipe and fittings shall be lined with a thin cement lining as specified in ANSI A21.4/AWWA C104. In addition, a petroleum asphaltic coat approximately 1 mil thick shall be applied to the cement lining in accordance with the pipe manufacturer's standard practices. The outside coating

shall be a petroleum asphaltic coating approximately 1 mil thick.

J. All fittings shall be mechanical joint unless otherwise shown on the contract drawings or directed by the District. Where flanged pipe is shown no substitution of a Uni-Flange type joint will be used without prior approval of the District.

K. Fittings, 6 inch through 24 inch size shall be the compact body type and shall conform to the specifications of ANSI/AWWA C153/A21.53 (latest edition) in all respects.

L. Fittings shall be in accordance with the standard mechanical joint fittings manufactured by the U.S. Pipe, American Cast Iron Pipe Company, Tyler/Union Foundry, Griffin, Star, McWane Ductile, Sigma or Pipeline Components Inc.

M. Restrained Joint Pipe and Fittings

1. Restrained pipe and fittings are to be noted on Drawings where applicable. Restrained gaskets such as Fast-Grip, Field Lok 350 or Sure Stop 350 shall not be allowed unless otherwise approved by the District in writing.

2. Restrained push-on pipe shall be either "Flex-Ring" or "Lok-Ring" (by American Cast Iron Pipe Company), or "TR Flex" or "HP Lok" (by U. S. Pipe), or "TR Flex" (by McWane Ductile). The lining and wall thickness shall be the same as that specified elsewhere in the section for the water lines.

3. For fittings 12-inch and smaller, restrained fittings shall be mechanical joint with restraining device Megalug Series 1100 as manufactured by EBAA Iron Sales Inc., Uni-Flange Series 1400 as manufactured by Ford, or One-Loc by Sigma.

4. For fittings 16-inch and larger, restrained fittings shall be "Flex-Ring" or "Lok-Ring" (by American Cast Iron Pipe Company), or "TR Flex" (by U.S. Pipe and McWane Ductile).

5. For restraining valves use Megalug Series 1100 as manufactured by EBAA Iron Sales Inc., Uni-Flange Series 1400 as manufactured by Ford, or One-Loc by Sigma.

N. Flanged Ductile Iron Pipe and Fittings

1. For flanged interior pipe, wall thickness shall be minimum Class 53 and flanged joints shall conform to ANSI 21.15/AWWA C115.

2. Flanges shall be screw-on type flanges and face of flange shall be machined after installation of flange onto pipe.

3. Flanges shall be rated for a maximum working pressure of 250 psi, unless otherwise noted, and shall be drilled with a bolt pattern conforming to ANSI B16.1 Class 125.

4. Flanged fittings shall be manufactured in accordance with ANSI/AWWA C110/A21.10 and shall have facing and drilling that match AWWA C115 and ANSI B16.1 class 125 flanges.

5. All potable water ductile iron pipe and fittings shall have cement mortar linings with seal coat which shall conform to ANSI A21.4/AWWA C104.

6. Provide an exterior protective coating in accordance with the latest revisions of AWWA Standard C151 and Section 2.07.

O. Where required by the District, ductile iron pipe shall be installed with loose polyethylene encasement in accordance with ANSI/AWWA C105/A21.5 (latest revision). Polyethylene encasement shall consist of three layers of co-extruded linear low-density polyethylene (LLDPE), fused into a single thickness of not less than eight mils. The inside surface of the polyethylene to be in contact with the pipe exterior shall be infused with a blend of antimicrobial biocide to mitigate microbiologically influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion. Polyethylene encasement shall be V-Bio^{R} Enhanced Polyethylene.

P. Where required by the District, the exterior of the ductile iron pipe shall be coated with a layer of arc-sprayed zinc per ISO 8179. The mass of the zinc applied shall be 200 g/m2 of pipe surface area. A finishing layer topcoat shall be applied to the zinc. The mean dry film thickness of the finishing layer shall not be less than 3 mils with a local

minimum not less than 2 mils. The coating system shall conform in every respect to ISO 8179-1 "Ductile iron pipes - External zinc-based coating - Part 1: Metallic zinc with finishing layer. Second edition 2004-06-01."

Q. The pipe manufacturer is to furnish the District a certificate of inspection, sworn to by the factory inspector in the presence of a notary public, stating that the pieces of pipe in the shipment were made and tested in accordance with AWWA/ANSI C151/A21.51 and that they were subjected to and withstood a hydrostatic pressure of 500 psi. Each statement is to give the number of pieces of pipe in the shipment, the length of each piece of pipe, and the weight of each piece of pipe making up the shipment.

PART 3 EXECUTION

3.1 INSTALLATION OF WATER LINES

A. Lay water lines to the line and grade required by the drawings. All fittings, valves, and hydrants shall be at the required locations, the spigots centered in the bells, and all valve and hydrant stems plumb.

B. Unless otherwise indicated by the drawings, all water lines shall have at least 30 inches of cover. No departure from this policy shall be made except with the approval of the District.

C. Provide and use tools and facilities that are satisfactory to the District and that will allow the work to be done in a safe and convenient manner. All pipe, fittings, valves, and hydrants are to be unloaded from the trucks using suitable tools and equipment. Use a derrick, ropes, or other suitable tools or equipment to lower all pipe, fittings, valves, and hydrants into the trench one piece at a time. Lower each piece carefully so that neither it nor any protective coating or lining it may have will be damaged. Under no circumstances drop or dump water line materials into the trench.

D. Any pipes strung out along the route of the proposed lines before the actual installation of those lines is due to take place shall not be lowered into the trench until they have been swabbed to remove any mud, debris, etc., that may have accumulated within them. Remove all unnecessary material from the bell and spigot end of each pipe. Before any pipe is laid, brush and wipe clean the outside of its spigot end

and the inside of its bell and leave dry and oil-free.

E. Take every precaution to keep foreign material from getting into the pipe while it is being placed in the line. If the crew laying the pipe cannot put it into the trench and in place without allowing earth to get inside, then put a heavy, tightly woven canvas bag of suitable size over each end of the pipe, and leave in place until it is time to connect that pipe to the one adjacent to it.

F. Place no debris, tools, clothing, or other materials in the pipe during laying operations.

G. After a length of pipe has been placed in the trench, center the spigot end in the bell of the adjacent pipe, and then insert to the depth specified by the manufacturer and bring to the correct line and grade. Secure the pipe in place by tamping an approved backfill material around it.

H. Bell holes shall be big enough so that there is ample room for the pipe joints to be properly made. Between bell holes, carefully grade the bottom of the trench so that each pipe barrel will rest on a solid foundation for its entire length.

I. Whenever pipe laying is not in progress, close the open ends of pipe either with a watertight plug or by other means approved by the District. This shall be done not only at the end of each working day but also before work is stopped for lunch periods, bad weather, or any other reason. If there is water in a trench, leave this seal in place until the trench has been pumped completely dry.

J. Cut pipe so that valves, fittings, or closure pieces can be inserted in a neat and workmanlike manner and without any damage to the pipe. Follow the manufacturer's recommendations concerning how to cut and machine the ends of the pipe in order to leave a smooth end at right angles to the pipe's axis.

K. Lay pipe with the bell ends facing in the direction of laying unless otherwise directed by the District.

L. Wherever pipe must be deflected from a straight line (in either the vertical or horizontal plane) in order to avoid obstructions or plumb stems, or wherever long radius curves are permitted, the amount of deflection shall not exceed that necessary for the joint to be satisfactorily made, nor

that recommended by the pipe manufacturer, and shall be approved by the District.

M. Lay no pipe in water or when it is the District's opinion that trench conditions are unsuitable. If crushed stone is used to improve trench conditions or as backfill for bedding the pipe, its use is considered incidental to the project.

N. Where a water line crosses over a sanitary sewer, use a full joint of pipe and center over the sewer. Where a water line is to be parallel to a sanitary sewer, lay it at least 10 feet from the sewer. If it is not practical for the water and sewer lines to be separated as described above, then lay the water line at least 18 inches above the top of the sewer.

O. Joint all pipe in the exact manner specified by the manufacturer of the pipe and jointing materials.

P. Thrust blocking must be used at all fittings in accordance with standard drawings 221-A and 221-B in these specifications.

3.2 HYDROSTATIC TESTS

A. Pressure Test

1. Provide pressure and leakage testing of water lines and appurtenances in conformance with the latest revision of AWWA C600.

2. After pipe has been laid and backfilled as specified above, subject all newly laid pipe or any valved section thereof to a pressure of 1.5 times the stated working pressure of the water line at the lowest elevation along the test section or 200 psi whichever is greater. All services are to be laid prior to testing the main and tested as part of the test of the main.

3. Maintain pressure for a minimum of 2 hours with no more than 5 psi variance for the duration of the test.

4. Slowly fill each valved section of pipe with water. Generally the newly laid line is to be filled using a 1-inch line between an existing water line and the new line. A 1-inch corporation cock is to be installed on each line and a 1-inch meter, 1-inch Reduced Pressure Backflow Preventor (RPBP), and/or 1-inch double check

valve installed on this line. Insert plugs in these taps after all tests are completed. Flush with this line until chlorine residual is below 5 PPM. Apply the specified test pressure (based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge) with a pump connected to the pipe in a manner satisfactory to the District. Contractor shall furnish the pump, pipe, connections, gauges, and all necessary apparatus. Pipe shall be filled at least 24 hours prior to testing. After the Contractor's tests indicate there is no leakage, notify the District to witness the tests.

5. Before applying the specified test pressure, expel all air from the pipe. If hydrants or blowoffs are not available at high places, make the necessary taps at the points of highest elevation before testing, and insert plugs after the test has been completed.

6. Carefully examine all exposed pipes, fittings, valves, and hydrants during the test. Remove any cracked or defective pipes, fittings, valves, or hydrants discovered in consequence of this pressure test, and replace with sound material in the manner specified. Repeat the test until the results are satisfactory to the District.

B. Leakage

1. Leakage is defined as the amount of water which must be supplied to the newly laid pipe or any valved section in order to maintain the specified test pressure after the pipe has been filled with water and the air expelled.

2. The Contractor is to provide a connection on his test apparatus for the District to install a pressure recorder during the pressure and leakage tests.

3. The amount of makeup water added shall be accurately measured by suitable methods and shall not exceed the applicable testing allowance as specified below:

AVG TEST PRESSURE (PSI)	Nominal Pipe Diameter (inches)														
	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
450	0.43	0.57	0.86	1.15	1.43	1.72	2.01	2.29	2.58	2.87	3.44	4.30	5.16	6.02	6.88
400	0.41	0.54	0.81	1.08	1.35	1.62	1.89	2.16	2.43	2.70	3.24	4.05	4.86	5.68	6.49
350	0.38	0.51	0.76	1.01	1.29	1.52	1.77	2.02	2.28	2.53	3.03	3.79	4.55	5.31	6.07
300	0.35	0.47	0.70	0.94	1.17	1.40	1.64	1.87	2.11	2.34	2.81	3.51	4.21	4.92	5.62
275	0.34	0.45	0.67	0.90	1.12	1.34	1.57	1.79	2.02	2.24	2.69	3.36	4.03	4.71	5.38
250	0.32	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21	3.85	4.49	5.13
225	0.30	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04	3.65	4.26	4.86
200	0.29	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87	3.44	4.01	4.59
175	0.27	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68	3.22	3.75	4.29
150	0.25	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48	2.98	3.48	3.97
125	0.23	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27	2.72	3.17	3.63
100	0.20	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03	2.43	2.84	3.24

4. Should any test of pipe laid disclose leakage greater than that specified, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

3.3 DISINFECTION

A. Disinfection of all water lines and appurtenances shall be in conformance with the latest revision of AWWA C651.

B. During construction, take precautions to protect pipe interiors, fittings, and valves against contamination. When pipe laying is not in progress (e.g., at the end of the day's work), place watertight plugs in the ends of all pipe already in the trench; if water accumulates in the trench, leave the plugs in place until the trench is dry. Complete the joints of all pipes in the trench before stopping work for any reason.

C. If dirt or other foreign material that has gotten into a pipe will not, in the opinion of the District, be removed by flushing, clean the interior of the pipe, and swab with a disinfecting solution of 5 percent hypochlorite.

D. Tablet/Granule Method – The tablet method consists of placing calcium hypochlorite granules or tablets in the water line during installation and then filling the line with potable water to create a chlorine solution. This method may be used only if the pipes and appurtenances are kept clean and dry during constructions.

1. Calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main and at 500-ft intervals as shown in the table below.

WEIGHT OF CALCIUM HYPCHLORITE GRANULES TO BE PLACED AT THE BEGINNING OF THE MAIN AND AT EACH 500 FT INTERVAL		
Pipe Size (Inches)	**Oz**	**g**
6	3.8	108
8	6.7	190
10	10.5	298
12	15.1	428
14	17.6	499
16	20.1	570
18	22.7	642
20	25.2	713
24	30.2	856
30	37.8	1,070
36	45.3	1,284
42	52.9	1,498
48	60.4	1,712

2. The chlorinated water shall remain in the pipe for at least 24 hours. If the temperature is less than 41°F, the water shall remain in the pipe for at least 48 hours. A detectable free chlorine residual (≥0.2 mg/L) shall be found at each sampling point after the 24- or 48-hour period.

E. Continuous-Feed Method – The continuous-feed method consists of completely filling the main with potable water, removing air pockets, then flushing the completed main to remove particulates, and refilling the main with potable water that has been chlorinated to 50 mg/L. After a 24-hour holding period in the main there shall be a free chlorine residual of not less than 10 mg/L.

1. Before the water line is chlorinated, it shall be filled with potable water to eliminate air pockets and flushed to remove particulates. The flushing velocity in the water line shall not be less than 2.5 ft/sec. The flow rates required to produce this velocity in various sizes of pipe are shown in the table below.

REQUIRED OPENINGS TO FLUSH PIPELINES (40 PSI RESIDUAL PRESSURE)				
Pipe Size (Inches)	Flow Required to Produce 2.5 fps Velocity (gpm)	Orifice Size (Inches)	Hydrant Outlet Nozzles*	
			Number	Size (Inches)
6	220	1-3/8	1	2-1/2
8	390	2-7/8	1	2-1/2
10	610	2-5/16	1	2-1/2
12	880	2-13/16	1	2-1/2
14	1,200	3-1/4	2	2-1/2
16	1,565	3-5/8	2	2-1/2
18	1,980	4-3/16	2	2-1/2
20	2,440	-------	1	4-1/2
24	3,470	-------	2	4-1/2
30	5,560	-------	2	4-1/2
36	7,920	-------	2 3	4-1/2 and 2-1/2
42	10,800	-------	2 4	4-1/2 and 2-1/2
48	14,100	-------	3 6	2-1/2 and 2-1/2

*With a 40 psi pressure in the main with the hydrant flowing to the atmosphere, a 2-1/2 inch hydrant outlet will discharge approximately 1,000 gpm and a 4-1/2 inch hydrant outlet will discharge approximately 2,500 gpm.

2. Once a line has been flushed, test to make certain that the residual chlorine in the water is within acceptable limits.

3. It must be noted that flushing is no substitute for taking preventative measures before and during the laying of water lines. Certain contaminants especially those in caked deposits are difficult or even impossible to remove by flushing, no matter how high the velocity. Furthermore, in pipes with diameters of 16 inches or more, it can be difficult to achieve even the minimum recommended flushing velocity of 2.5 fps.

4. The contractor will be required to sign a sheet stating that the agreed amount of chlorine was used during installation.

5. While water or the chlorine solution is being applied through a jumper fill line, use a double check valve or RPBP to assure that the treatment dosage will not

flow back into the line that is supplying the water. At a point not more than 10 ft downstream from the beginning of the new water line, water entering the new water line shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 50 mg/L free chlorine. Continue the application of water or chlorine solution until the entire line being treated is filled.

6. The table below gives the amount of chlorine required for each 100 feet of pipe for various pipe diameters. Solutions with a minimum 1% chlorine concentration may be prepared with sodium hypochlorite or calcium hypochlorite. The latter solution requires 1 lb. of calcium hypochlorite in 8 gallons of water.

CHLORINE REQUIRED TO PRODUCE A 50 MG/L CONCENTRATION IN 100 FEET OF PIPE, BY DIAMETER

Pipe Size (Inches)	65% HTH (Pounds)	100% Chlorine (Pounds)	1% Chlorine Solutions (Gallons)
6	0.094	0.061	0.73
8	0.167	0.108	1.30
10	0.262	0.170	2.04
12	0.377	0.240	2.88
14	0.513	0.328	3.96
16	0.670	0.428	5.20
18	0.848	0.540	6.58
20	1.046	0.680	8.12
24	1.507	0.980	11.70
30	2.354	1.526	18.28
36	3.390	2.197	26.32
42	4.615	2.991	35.83
48	6.027	3.906	46.80

7. Chlorine application shall not cease until the entire water line is filled with chlorinated water. The chlorinated water shall be retained in the water line for at least 24 hours, during with time valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of this 24-hour period, the treated water in all portions of the water line shall have a residual of not less than 10 mg/L of free chlorine.

F. For large transmission water lines (where personnel or equipment may safely enter the pipe), spray disinfection may be appropriate and efficient means of achieving disinfection if approved and authorized by the District.

3.4 DISINFECTION PROCEDURE AFTER CUTTING INTO OR REPAIRING EXISTING LINES

A. The procedures outlined above apply primarily to cases in which the lines are wholly or partially dewatered.

B. However, leaks or breaks that are repaired with clamping devices while the lines remain full of water under pressure present little danger of contamination and require no disinfection.

C. When an existing line is opened, whether by accident or design, the excavated area could be wet and contaminated because of the presence of sewers nearby. The danger of contamination from such pollution can be lessened if liberal quantities of hypochlorite are applied to the open trenches. It is better to use tablets for disinfection in such cases because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation site.

D. Where practical, treat the lines by the slug method in accordance with AWWA C651.

E. The following disinfection procedure is considered the minimum that may be used when existing lines are repaired:

1. Swab the interior of all pipes and fittings (particularly couplings and tapping sleeves) that are to be used in repairing an existing line with a minimum 1% chlorine solution before installing them.

2. The most practical means of removing contamination introduced into a line during repairs is to give the line a thorough flushing. If the locations of valves and hydrants make it possible, flushing in both directions is recommended. Start flushing as soon as repairs are completed and continue until all discolored water is eliminated.

3.5 BACTERIOLOGICAL TESTS

A. After a water line has undergone final flushing but before it is placed into service, collect an initial set of samples for bacteriological testing.

B. A set of samples includes all samples collected along the length of the pipeline.

C. For new water lines sets of samples shall be collected every 1,200-feet, plus one set from the end of the line and at least one from each branch greater than one pipe length. In the case of extremely long lines, take additional samples as directed by the District.

D. Collect these samples in sterile bottles treated with sodium thiosulphate. Do not use a hose or fire hydrant to collect samples. One suggested sampling method is to install a standard corporation stop in the line with a copper tube gooseneck assembly; after the samples have been taken, the gooseneck assembly can be removed and retained for later use. Remove the corporation stop and plug the line with a tapered plug after all samples are received.

E. Take the samples collected to the District's laboratory to be tested for bacteriological quality in order to determine if they contain any coliform organisms. If the initial disinfection fails to produce satisfactory samples, repeat disinfection until satisfactory samples are obtained.

F. After a minimum of 16 hours and satisfactory results from the first samples take a second set of samples in the same places.

G. When the second set of samples tested are found to be satisfactory, the water line may be placed in service provided all other requirements have been met.

3.6 FINAL CONNECTIONS TO EXISTING WATER LINES

A. Water lines and appurtenances must be completely installed, flushed, disinfected and satisfactory bacteriological sample results received prior to permanent connections begin made to the active distribution system.

B. The new pipe, fittings and valve(s) required for the connection may be spray disinfected or swabbed with a minimum 1% solution of chlorine just before being installed if the total length of the connection from the end of a new water line to the existing water line is equal to or less than 20 ft.

3.7 CLEANUP

A. After completing each section of water line, remove all debris and all construction materials from the work site. Then grade and smooth over the surface on both sides of the line. Leave the entire area clean and in a condition

satisfactory to the District.

END OF SECTION

SECTION 02718

SERVICE ASSEMBLIES

PART 1 GENERAL

1.1 Refer to other sections for work related to that specified under this heading.

PART 2 PRODUCTS

2.1 All material shall comply with all Federal and State safe drinking water laws and regulations.

2.2 The service assembly shall include a corporation stop, copper service pipe, meter yoke, meter box, and tapping saddle as required.

2.3 CORPORATION STOP: The corporation stop shall be of solid bronze with ANSI/AWWA Standard C800 as the AWWA Taper thread and ball valve. This stop shall be Mueller B-25008N, Ford FB1000-3-Q-NL, or Ford FB1000-4-Q-NL.

2.4 SERVICE PIPE: Service pipe shall be Type K copper meeting ASTM B88.

2.5 METER BOXES: Meter boxes for 5/8-inch x 3/4-inch and 1-inch assemblies shall be MSBCF-1324-18 with a MSCBC-1324-R lid. For 2-inch assemblies use a MSBCF-1730-18 with a MSCBC-1730-R lid as manufactured by Old Castle (Carson). The box shall be installed sitting on top off one course of brick on a base of 3/4-inch crushed stone at a minimum of 6 inches deep.

2.6 METER Yokes: Meter Yokes for 5/8-inch x 3/4-inch shall be Mueller B-2418-2AN, with H-14227, and H-14222 end pieces, or Ford LSVBHH41-233WR-Q-NL. For 1-inch Meter Yokes use Mueller B24118-2AN with H-14227, and H-14222 end pieces, or Ford LSVBHH41444WR-Q-NL. For 2-inch meter yokes use Mueller B-2423-2N or Ford VBRHH77-12BRHC-11-77-NL with 2-inch male by compression adapters. Yokes are to be fitted with angle ball valves (360 degree rotation) with provision for locking, ASSE dual check valves, hard copper cross tubes Mueller 110 or Ford G series compression inlet fittings, and double purpose outlet fittings. Copper cross tubes are to be of sufficient weight and hardness that they will not be bent during service installation or meter replacement.

PART 3 EXECUTION

3.1 The service line shall have a minimum of 20 inches cover except under roads and sidewalks where it shall have minimum of 24 inches cover. After the line is installed and yoke set, turn water on service pipe between yoke and main, blowing any accumulated trash out of the pipe. A single piece of copper pipe shall be used from the main to the meter unless the meter is over 100 feet from the main.

3.2 In general, install the meter box inside the property near the property line. Set plumb approximately 1 inch above the existing or proposed grade and so that surface drainage will not enter it. Fill from the existing or proposed grade to the top of the meter box at a slope of 1 inch in 12 inches. When the cut or fill slopes on streets extend beyond the street right-of-way, install the meter box at the top or toe of slope, as applicable, or as directed by the District. Place a minimum of 2 cubic feet of clean 3/4-inch crushed stone under each meter box.

3.3 The service main shall not be taut from stop to the meter yoke.

3.4 Set the yoke plumb and level.

3.5 For connecting the service lines to meters and corporation stop, use Mueller 110 or Ford Quick Joint, with suitable adapters, compression type connections. Unions shall be Mueller H-15403 or Ford Quick Joint Compression Coupling.

3.6 The meter box is to be installed at a location such that it will not be in a driveway or in sidewalks. If during construction of homes, the meter location conflicts with the location of the driveway or sidewalk, then the meter shall be moved at the expense of the builder or developer.

3.7 Refer to Drawing 215 in these specifications for proper installation of a 3/4-inch service assembly. For larger meters, see Drawing 252 in these specifications.

PART 4 PROPERTY OWNERS

4.1 All domestic water services will need to have a pressure reducing valve installed on the property owner’s side of the meter. This valve will be owned and maintained by the owner of the properties.

PART 5 LARGE METER ASSEMBLIES

5.1 Compound water meter assemblies will be installed for commercial

developments and fireline water meter assemblies will be installed when fire protection is needed in a private development. All pipe, valves, fittings and appurtenances shall be in accordance with the standard specifications and standard drawing 252. Meters are to be manufactured by Sensus or approved equal and have six-wheel radio read capabilities. The size of meter will be determined by the District based on projected flows.

5.2 Pits are to gravity drain, with flapper valve at outlet, if it can daylight within 50 feet. Sump pump is to be used if a gravity drain is not possible.

END OF SECTION

SECTION 02725

BORING AND CASING FOR WATER LINES

PART 1 GENERAL

1.1 The work to be performed hereunder shall consist of the installation of a casing pipe for the purpose of installing a water line as shown on the Drawings or as called for in these specifications. It shall include the excavation of a boring pit, auger boring between the points specified on the Drawings, furnishing and installing of the carrier pipe, and disposing of the excavated materials in the manner herein provided.

1.2 The District will provide the necessary control points required by the Contractor for this construction. The Contractor will provide the detailed layout required to keep the tunnel or bore on grade.

PART 2 PRODUCTS

2.1 CASING PIPE

A. The casing pipe shall be of steel meeting the latest approved American Railway Engineering Association "Specifications for Pipelines for Carrying Flammable and Nonflammable Substances." The steel casing pipe shall have minimum yield strength of 35,000 psi and shall have the minimum wall thickness shown in the following table:

TABLE OF MINIMUM WALL THICKNESS FOR STEEL CASING PIPE

(For Highway H20 Loading)			**(For Railroad E72 Loading)**	
Carrier Pipe (Inches)	Casing Pipe (Inches)	Nominal Thickness (Inches)	Casing Pipe (Inches)	Nominal Thickness (Inches)
2	6	0.250	8	0.250
4	8	0.250	10	0.250
6	12	0.250	14	0.250
8	16	0.250	18	0.281
12	20	0.281	24	0.375
16	24	0.375	30	0.500
20	30	0.500	30	0.500
24	36	0.500	36	0.625
30	42	0.500	42	0.625
36	48	0.625	48	0.750
42	54	0.625	54	0.875
48	60	0.750	60	0.875

2.2 PIPE: The carrier pipe shall meet the standards specified in Section 02713.

PART 3 EXECUTION

3.1 BORING

A. The boring shall be accomplished by means of auguring to the size, line, and grade shown on the Drawings.

3.2 INSTALLATION OF CASING PIPE

A. Jack the steel casing pipe into place as the boring proceeds. Weld sections of casing pipe together to provide watertight joints.

B. Do not remove unacceptable casing without prior approval from the District. If the removal of casing

pipe is permitted, make proper provisions to prevent caving in of the earth surrounding the casing.

3.3 INSTALLATION OF CARRIER PIPE

A. The carrier pipe(s) shall be furnished by the Contractor. Upon acceptance of the casing, install the carrier pipe in the casing by jacking it through the casing. Spacers shall be used within the casing pipe. Casing Spacers shall be bolt on style with a shell made in two sections of heavy T-304 Stainless Steel. Connecting flanges shall be ribbed for extra strength. The shell shall be lined with a PVC liner 0.090 inch minimum thickness with 85-90 durometer. All nuts and bolts are to be 18-8 stainless steel. Runners shall be made of ultra high molecular weight polymer with inherent high abrasion resistance and a low coefficient of friction. Runners shall be supported by risers made of heavy 304 Stainless Steel. The supports shall be mig welded to the shell and all welds shall be passivated. The height of the supports and runners combined shall be sufficient to keep the carrier pipe at least 0.75 inch from the casing pipe wall at all times. A minimum of three spacers shall be placed on each joint of pipe. Casing spacers shall be made by Cascade Waterworks Mgf. Co. or Pipeline Seal and Insulator, Inc., Model S 12G-2. Each end of the casing pipe shall be sealed with a wrap-around end seal. (See Standard Drawing 1024).

3.4 TUNNELING ALTERNATIVE

A. General

1. In the event boring and jacking is impossible because of pipe size, rock, or other factors and the highway department or railroad will not permit open cutting, make crossings by tunneling using liner plates. Conduct tunneling operations as approved by the railroad or highway department. If voids are caused by the tunneling operations, fill by pressure grouting or by other approved methods that will provide proper support.

B. Galvanized Plates

1. After the plates are formed to shape, the plates shall be galvanized on both sides by the hot dip

process. A coating of prime western spelter, or equal, shall be applied at the rate of not less than 2 ounces per square foot of double exposed surface. If the average spelter coating as determined from the required samples is less than the amount specified above, or if any 1 specimen shows a deficiency of 0.2 ounce, the lot shall be rejected. Spelter coating shall be of first class commercial quality free from injurious defects such as blisters, flux, and uncoated spots.

2. The outside of the plates shall be given a bituminous coating meeting the AASHO M-190 specifications for bituminous protected corrugated metal pipe.

C. Design and Construction

1. Construct the tunnel by the tunnel method, and completely line on the inside with structural steel liner plates meeting all requirements specified hereinafter. The dimensions of the tunnel shall be as shown on the Drawings.

2. The tunneling operation is to commence from a pit that is a minimum of 12 feet long and 4 feet wider than the diameter of the tunnel, bottom to grade, and sheeted and shored, if necessary. Furnish line and grade stakes.

3. All excavation for the entire length of the tunnel shall be done by tunneling, and the work may be done from either or both ends of the conduit. Trim the periphery of the tunnel smooth to fit the outside of the steel liner plate as nearly as is practical, and fill all space outside of the steel liner plate with a sand cement grout mixture.

4. Install the steel liner plates immediately after the excavated material has been removed. Do not remove material more than 24 inches ahead of the installed liner plates.

5. Provide all necessary bracing, bulkheads, and/or shields to ensure complete safety to all traffic at all times during the progress of the work, and

perform the work in such a manner as to not interfere with normal traffic over the work.

6. The steel lining shall consist of plates 16 inches wide, and each circumferential ring shall be composed of the number and length plates necessary to complete the required diameter.

7. The inside diameter of the completed ring shall be a minimum size as called for as a casing pipe in Paragraph 2.1A, and no part of the plate or reinforcing ribs will be allowed to extend inside this net diameter.

8. The strength of the tunnel lining will be determined by its section modulus. In no case shall it be less than 0.0590 inch cubed per inch of plate width based on the average for 1 ring of plates. Thickness of the metal for these steel plates shall be not less than 10 gauge, allowing for standard mill tolerances. The tunnel strength shall be equal to AASHO railroad E80 loading at the depth of cover obtaining.

9. All plates shall be punched for bolting on both longitudinal and circumferential seams and shall be fabricated so as to permit complete erection from the inside of the tunnel. The longitudinal seam shall be of the lap type with offset equal to gauge of metal for the full width of the plate, including flanges, and shall have staggered bolt construction fabricated so as to allow the cross section of the plate to be continuous through the seam. All plates shall be of uniform fabrication, and those intended for 1 size tunnel shall be interchangeable.

10. The material used for the construction of these plates shall be new and unused and suitable for the purpose intended. Workmanship shall be first class in every respect.

11. Install the carrier pipe to the line and grade shown on the Drawings. The carrier pipe shall be adequately blocked inside the tunnel so that no part of the carrier pipe touches the tunnel liner. The blocking shall be such that the carrier pipe cannot move horizontally or vertically. The blocking shall be installed

within one foot on each side of the bell of the carrier pipe and at the center of each joint. The main portion of the support shall be stainless steel with a PVC liner between the support and the carrier pipe. Detailed plans and specifications shall be submitted showing the proposed bracing and support of the carrier pipe inside the tunnel. Each end of the tunnel liner shall be plugged with brick and mortar.

12. All tunnel liners shall have one 2 inch grout coupling in every ring. Grout back of the rings as required.

PART 4 GUARANTEE OF WORK

4.1 Guarantee a usable completed casing or tunnel between the points specified and to the line and grade specified. The allowable tolerance at the downstream end point of the bore shall be such that the invert of the carrier pipe may be positioned within a vertical area limited on the top by an elevation no higher than the elevation shown on the Drawings and on the bottom by and elevation no lower than the existing inlet pipe invert.

4.2 The allowable tolerance at the upstream end point of the bore shall be such that the invert of the carrier pipe may be positioned at the elevation shown on the Drawings.

END OF SECTION

SECTION 03303

CONCRETE FOR UTILITY LINES

1. This item shall include furnishing and installing concrete blocking, cradles, anchors, caps, and/or pipe protection at the locations shown on the drawings and/or as directed by the District.

2. Concrete work shall conform to ACI 301-72 (as revised), as modified by the supplemental requirements below:

3.2 Strength

The strength of concrete shall be 4,000 psi unless otherwise shown on the Drawings.

3.4.1 Durability

All concrete exposed to weather shall be air entrained.

3.5 Slump

Concrete shall be proportional and produced to have a slump of 3 inches with a 1 inch tolerance.

3.7 Admixtures

Air entrainment, mandatory for concrete exposed to weather, may be used. A water reducing admixture (retarding, normal, or accelerating, depending on placing temperature), may be used if approved by the District.

5.2.1 Reinforcing Steel

Yield strength of reinforcing steel shall be 60,000 psi.

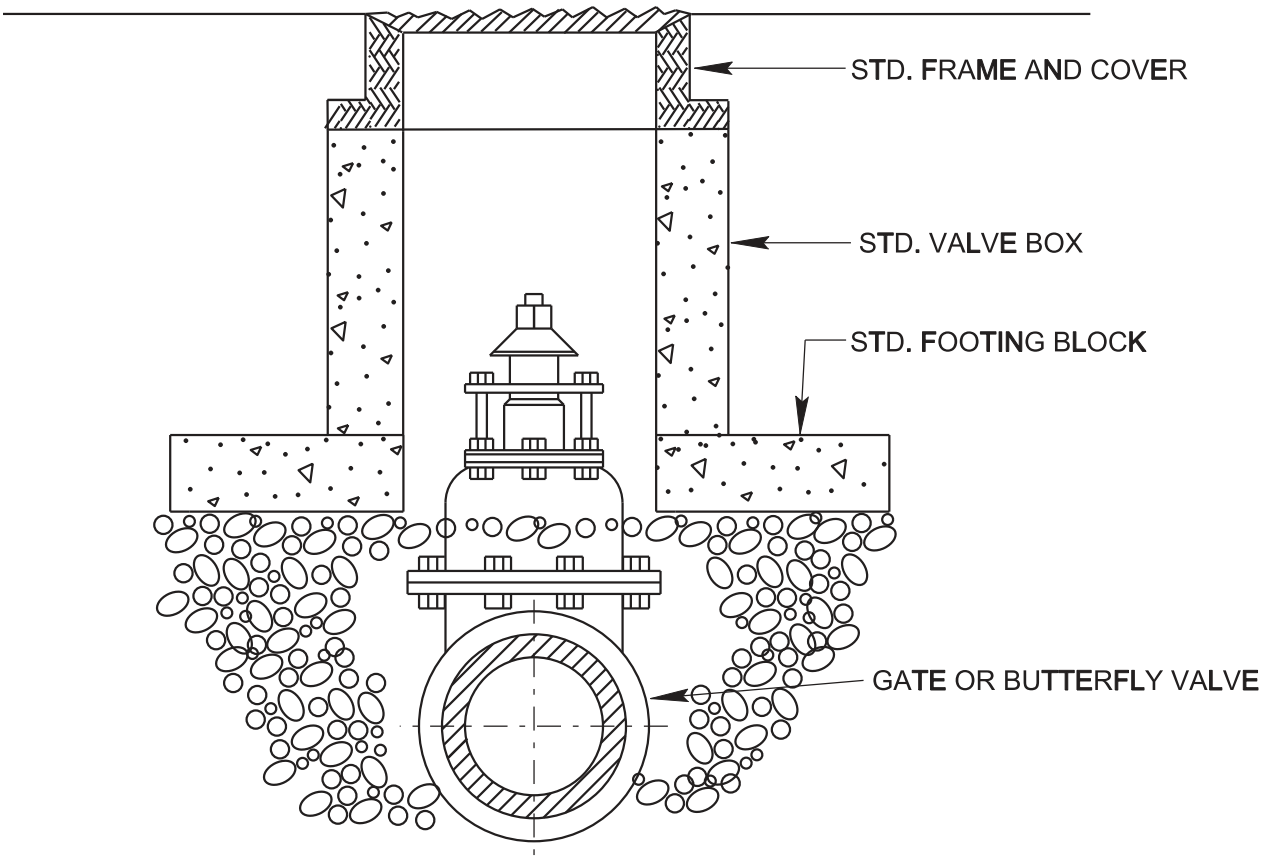
END OF SECTION

STANDARD DRAWINGS

SHEET	DETAIL NAME
207A	TYPICAL VALVE BOX SETTING
207B	STANDARD CONCRETE VALVE BOX
213	TYPICAL FIRE HYDRANT SETTING
215	3/4", 1" & 2" SERVICE ASSEMBLY
220	CONCRETE CAP
221A	CONCRETE THRUST BLOCKING
221B	CONCRETE THRUST BLOCKING DIMENSIONS
252	DOMESTIC / FIRELINE METER ASSEMPLY
261A	AUTOMATIC AIR RELEASE ASSEMBLY FOR 8" AND SMALLER WATER MAINS
261B	AUTOMATIC AIR RELEASE ASSEMBLY FOR 12" AND LARGER WATER MAINS
805	ALUMINUM FENCE DETAIL
1024	CASING SPACER INSTALLATION DETAIL

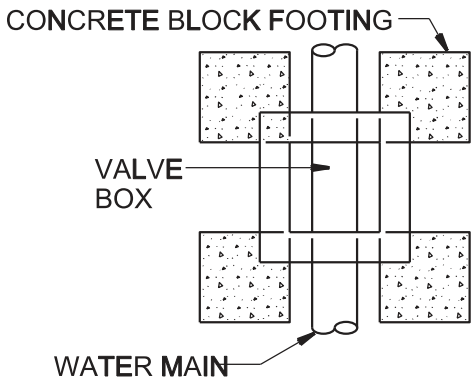
HARPETH VALLEY UTILITIES DISTRICT

DATE: JAN 2011	DETAIL INDEX	DETAIL NO.
JOB NO.		

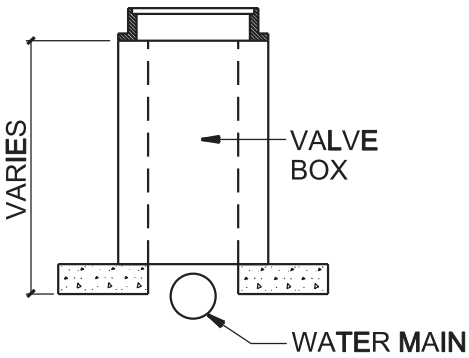


HARPETH VALLEY UTILITIES DISTRICT

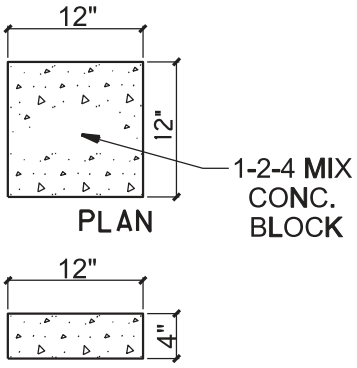
DATE: JAN. 2011	TYPICAL VALVE BOX SETTING N.T.S.	DETAIL NO. 207A
JOB NO.		



PLAN



ELEVATION

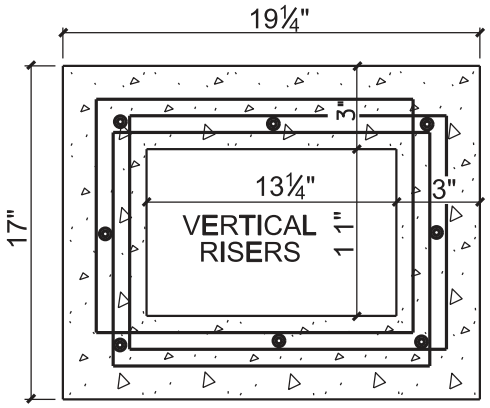


ELEVATION

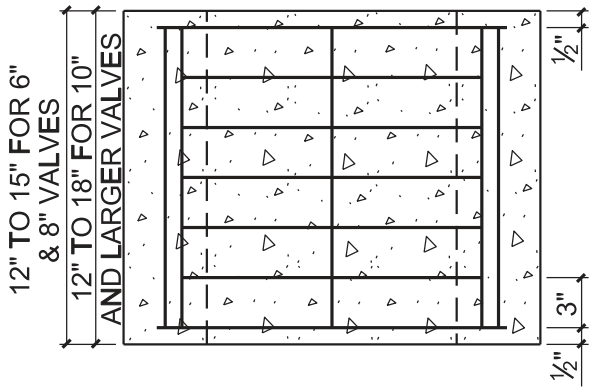
NOTES:

1. FOUR (4) CONCRETE BLOCKS OF THE SIZE AND SHAPE SHOWN ARE TO BE PLACED UNDER EACH VALVE BOX, ONE UNDER EACH CORNER OF BOX.

2. NO REINFORCING IN FOOTING. CONCRETE MIX 1 PART CEMENT, 2 PARTS SAND AND 4 PARTS NO. 2 CRUSHED STONE OR GRAVEL. VOLUME FOR ONE BLOCK = 0.333 CU. FT. WEIGHT OF ONE BLOCK = APPROX. 50 LBS. FOR ALL FOUR BLOCK, WEIGHT = 200 LBS. BEARING AREA ON SOIL = 576 SQ. IN.



PLAN



ELEVATION

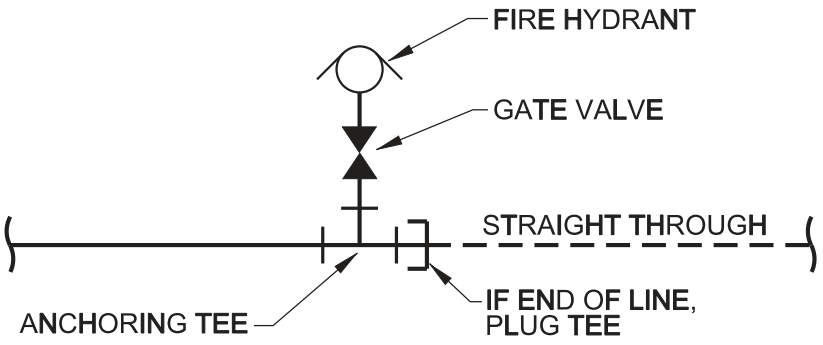
NOTES:

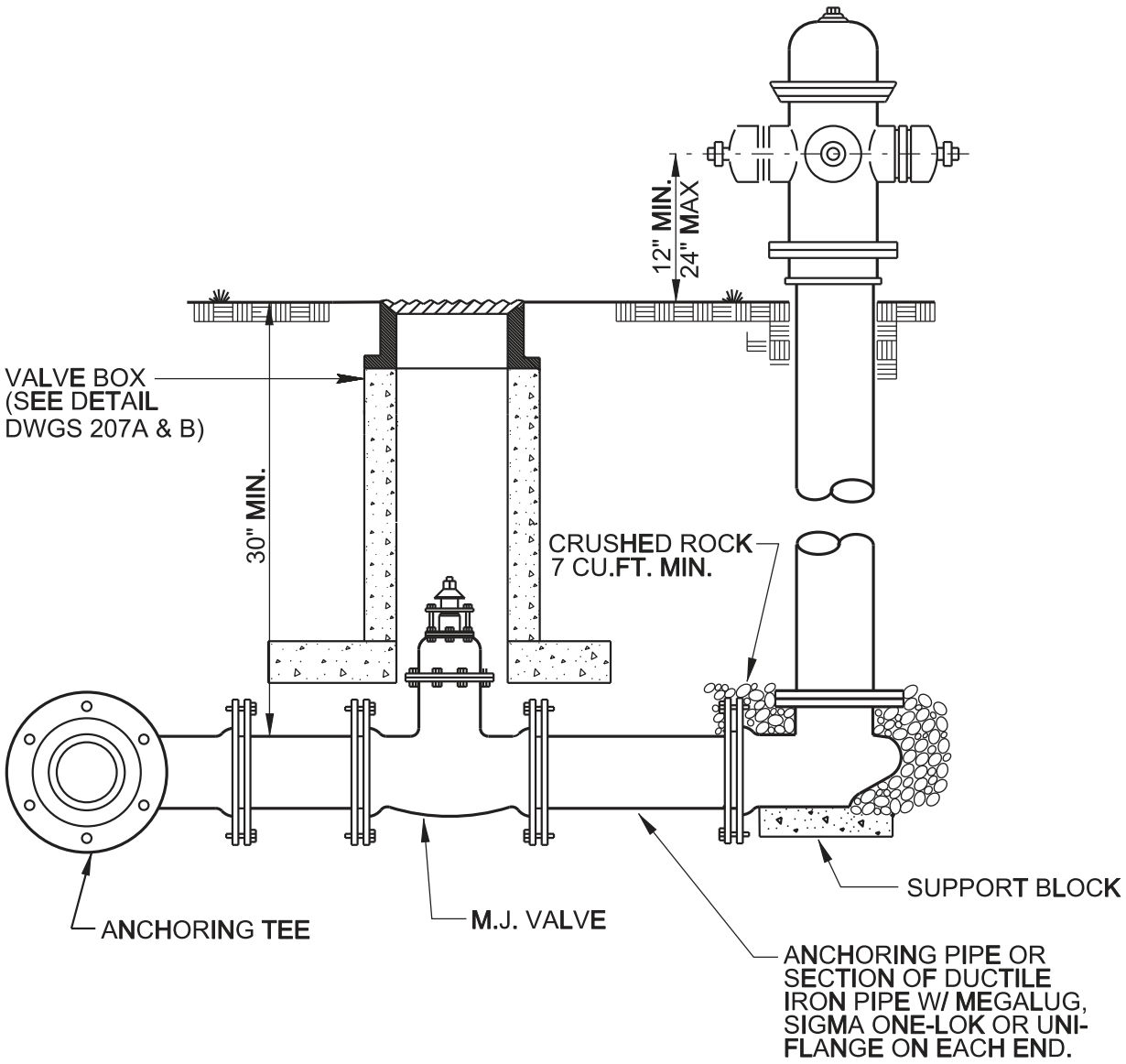
1. REINFORCING TO BE ¼" STEEL REINFORCING RODS PLACED HORIZONTALLY IN SQUARES 16¼" x 14" AND TO BE STAGGERED APPROX. AS SHOWN ON PLAN VIEW, ONE FOR EVERY 3" OF HEIGHT OF BOX. VERTICAL RISERS ARE TO BE 2" SHORTER THAN THE HEIGHT OF THE BOX AND SHALL BE PLACED IN EACH CORNER AND AT THE HALF WAY POINT OF EACH SIDE OF THE BOX USING 8 RISERS TO THE BOX. TOTAL LENGTH OF REINFORCING ROD FOR BOX APPROX. 47'.

2. CONCRETE MIXTURE TO BE 1 PART CEMENT, 2 PARTS SAND AND 4 PARTS NO. 2 CRUSHED STONE OR GRAVEL. TOTAL VOLUME OF MIXTURE FOR BOX APPROX. 2 CUBIC FT.

HARPETH VALLEY UTILITIES DISTRICT

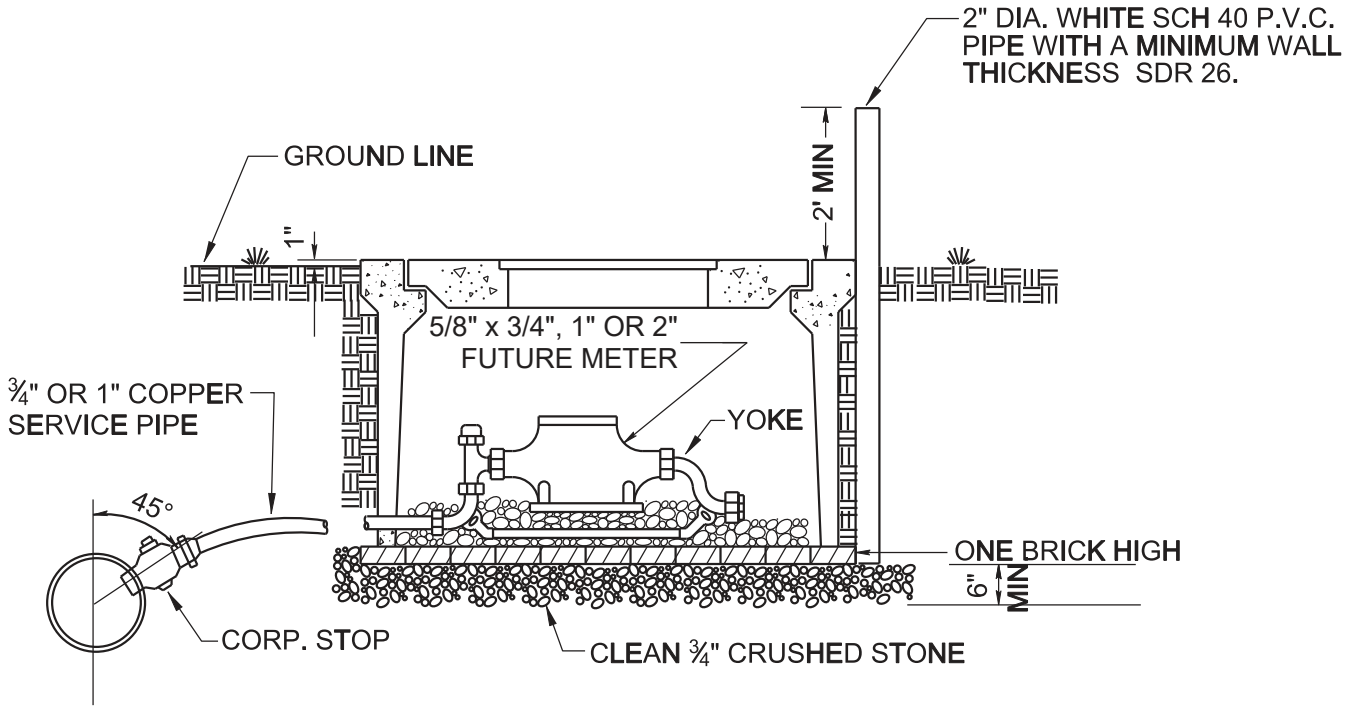
DATE: JAN. 2011	STANDARD CONCRETE VALVE BOX N.T.S.	DETAIL NO.
JOB NO.		207B





HARPETH VALLEY UTILITIES DISTRICT

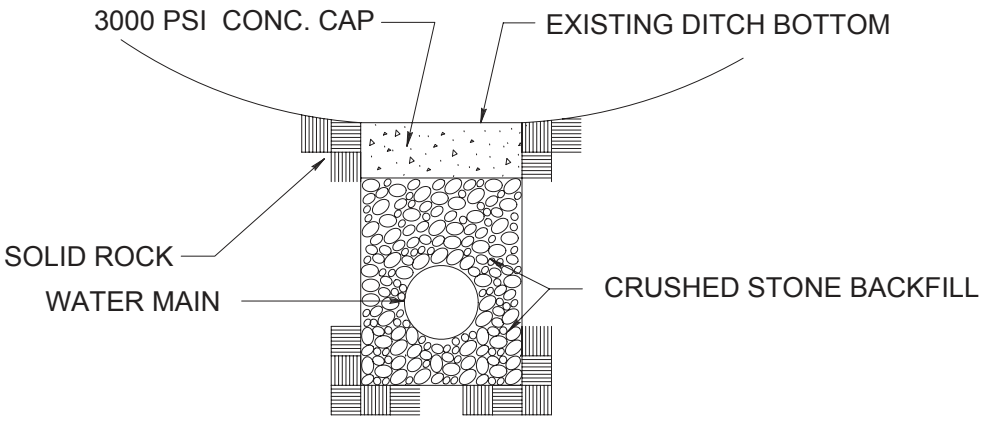
DATE: DEC 2016	TYPICAL FIRE HYDRANT SETTING N.T.S.	DETAIL NO. 213
JOB NO.		



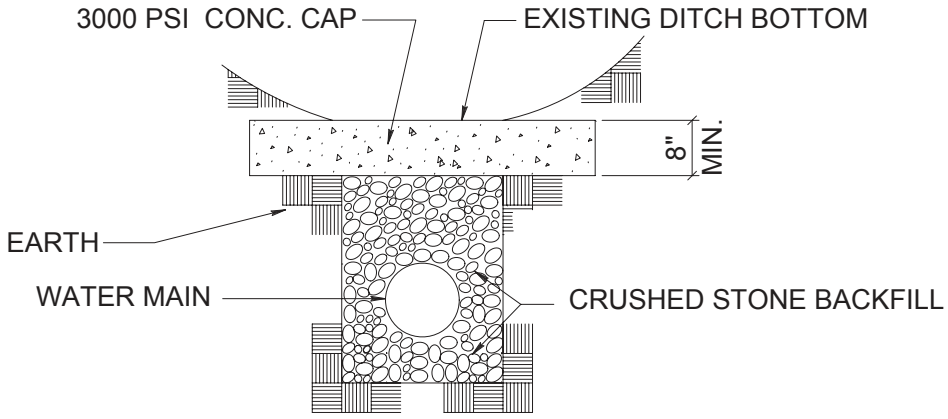
NOTE: PLACE 6" DEEP OF CLEAN ½" TO ¾" CRUSHED STONE BELOW BOTTOM OF METER BOX.

HARPETH VALLEY UTILITIES DISTRICT

DATE: DEC. 2022	3/4", 1" & 2" SERVICE ASSEMBLY	DETAIL NO.
JOB NO.	N.T.S.	215



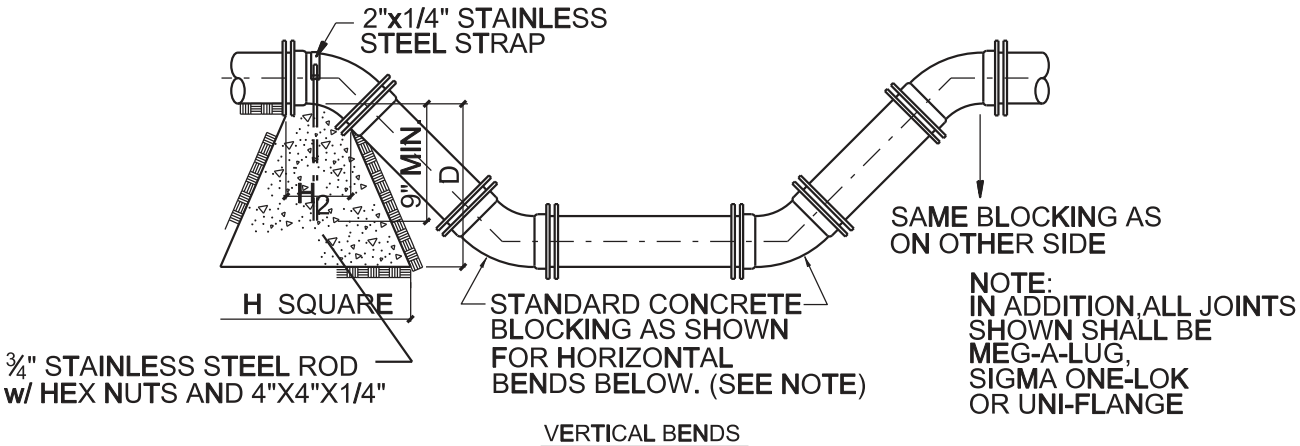
ROCK EXCAVATION



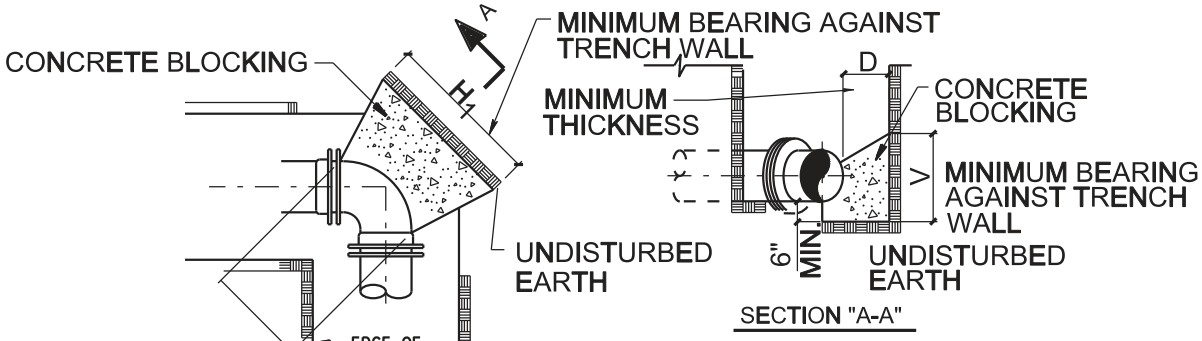
EARTH EXCAVATION

HARPETH VALLEY UTILITIES DISTRICT

DATE: DEC 2019	CONCRETE CAP N.T.S.	DETAIL NO.
JOB NO.		220

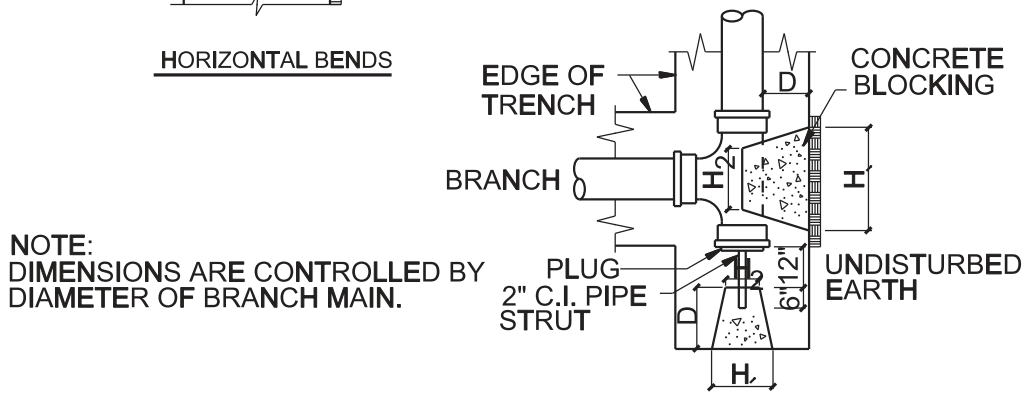


VERTICAL BENDS



HORIZONTAL BENDS

SECTION "A-A"



NOTE:
DIMENSIONS ARE CONTROLLED BY DIAMETER OF BRANCH MAIN.

TEES, CROSSES & PLUGS

HARPETH VALLEY UTILITIES DISTRICT

DATE: JAN. 2011	CONCRETE THRUST BLOCKING N.T.S.	DETAIL NO. 221A
JOB NO.		

TABLE OF DIMENSIONS FOR CONCRETE BLOCKING

SIZE	TEES,PLUGS & CROSSES					90° BENDS					45° BENDS					22½° BENDS					1 1¼° BENDS					SIZE
PIPE	H_1	H_2	V	D	CU. FT.	H_1	H_2	V	D	CU. FT.	H_1	H_2	V	D	CU. FT.	H_1	H_2	V	D	CU. FT.	H_1	H_2	V	D	CU. FT.	PIPE
2"&2¼"	18"	10"	12"	18"	1.9	18"	10"	12"	18"	1.9	18"	6"	12"	18"	1.5	18"	6"	12"	18"	1.5	18"	6"	12"	18"	1.5	2"&2¼"
3"&4"	24"	12"	12"	18"	2.3	24"	12"	12"	18"	2.3	18"	8"	12"	18"	1.6	18"	8"	12"	18"	1.6	18"	8"	12"	18"	1.6	3"&4"
6"	24"	16"	18"	18"	3.5	30"	16"	18"	18"	4.1	24"	10"	16"	18"	3.2	24"	10"	16"	18"	3.2	24"	10"	16"	18"	3.2	6"
8"	36"	18"	18"	18"	5.1	39"	18"	24"	18"	7.3	30"	1 1"	18"	18"	4.0	24"	1 1"	18"	18"	3.5	24"	1 1"	16"	18"	3.4	8"
10"	48"	24"	18"	24"	7.2	54"	32"	24"	18"	10.3	24"	18"	21"	18"	4.6	24"	18"	21"	18"	4.6	24"	18"	21"	18"	4.6	10"
12"	54"	30"	24"	24"	13.4	54"	32"	36"	24"	18.2	42"	18"	24"	24"	9.6	24"	18"	24"	24"	6.6	24"	18"	21"	24"	6.1	12"
14"	60"	32"	30"	24"	17.9	60"	40"	42"	24"	25.0	44"	24"	30"	24"	13.2	30"	24"	24"	24"	9.2	27"	21"	24"	24"	7.9	14"
16"	66"	34"	36"	24"	22.5	69"	48"	48"	24"	29.0	48"	30"	36"	24"	17.0	36"	30"	27"	24"	1 1.8	27"	24"	27"	24"	9.1	16"
18"	72"	36"	40"	24"	30.0	72"	48"	60"	24"	38.0	54"	30"	42"	24"	21.0	42"	30"	30"	24"	15.0	30"	30"	36"	24"	13.0	18"
20"	84"	38"	42"	24"	36.0	84"	48"	66"	24"	48.0	60"	40"	46"	24"	27.0	48"	36"	36"	24"	19.0	42"	40"	36"	24"	18.0	20"
24"	108"	42"	48"	24"	45.0	108"	60"	72"	24"	68.0	72"	48"	56"	24"	41.0	54"	42"	42"	24"	25.0	48"	42"	42"	24"	23.0	24"
30"	132"	52"	60"	24"	70.0	132"	72"	92"	24"	104.0	84"	48"	76"	24"	58.0	60"	48"	48"	24"	32.0	52"	48"	54"	24"	32.0	30"
36"	162"	58"	72"	24"	100.0	162"	72"	108"	24"	150.0	108"	60"	84"	24"	85.0	66"	48"	60"	24"	50.0	36"	48"	60"	24"	40.0	36"
42"	166"	60"	84"	36"	168.4	190"	66"	108"	36"	190	122"	60"	84"	24"	90"	72"	48"	72"	24"	56.0	56"	48"	66"	24"	44.0	42"
48"	172"	66"	96"	36"	200.0	220"	72"	120"	36"	230	136"	60"	90"	24"	98"	78"	48"	84"	24"	66.0	60"	48"	72"	24"	50.0	48"

1. THIS TABLE IS BASED ON AN INTERNAL HYDROSTATIC PRESSURE OF 200 PSI AND AN ALLOWABLE SOIL BEARING CAPACITY OF 4000 LB/SF.

2. SHOULD THE INTERNAL HYDROSTATIC PRESSURE EXCEED 200 PSI AND/OR THE ALLOWABLE SOIL BEARING CAPACITY BE LESS THAN 4000 LB/SF, THE THRUST BLOCK SIZE MUST BE ENLARGED ACCORDINGLY. IF EITHER OR BOTH OF THESE CONDITIONS OCCUR, THE CONTRACTOR SHALL PROVIDE CALCULATIONS TO SUPPORT THE ENLARGED SIZE THRUST BLOCK PROPOSED.

3. DIMENSIONS FOR CONCRETE BLOCKING ARE FOR DUCTILE IRON FITTINGS ANSI 21.10/AWWA C110

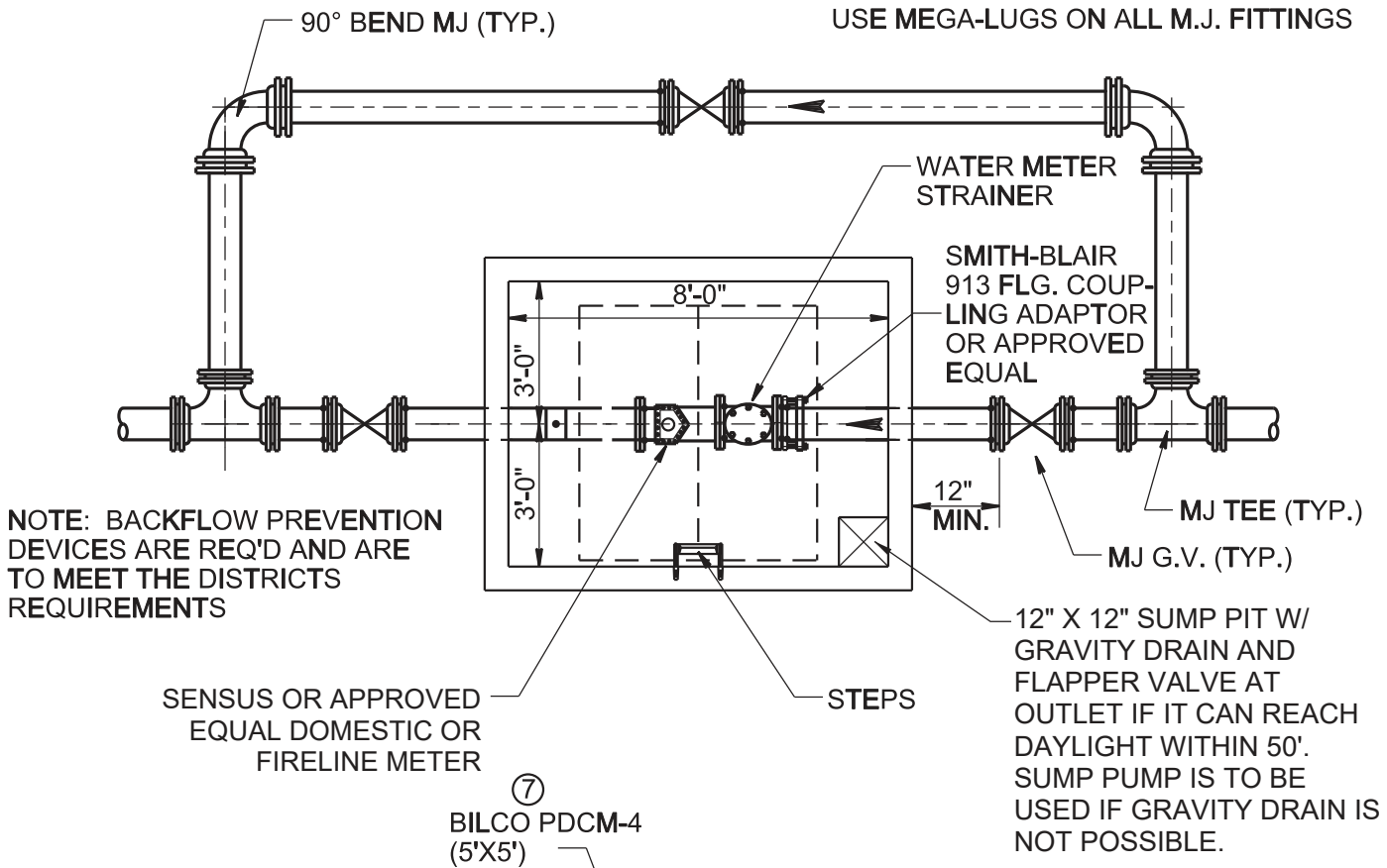
4. ALL BENDS, TEES, CROSSES, AND PLUGS SHALL HAVE CONCRETE THRUST BLOCKING INSTALLED AS SHOWN ON THE STANDARD DRAWING 221-A OR AS DIRECTED BY THE A/E.

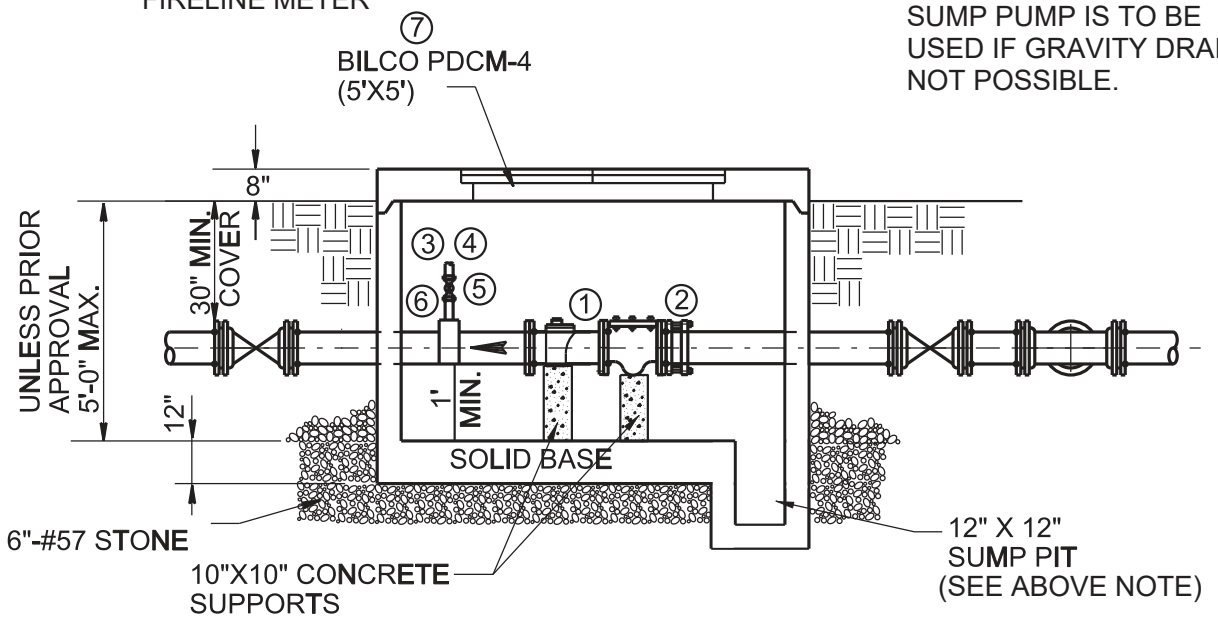
HARPETH VALLEY UTILITIES DISTRICT

DATE: JAN. 2011	CONCRETE THRUST BLOCKING DIMENSIONS N.T.S.	DETAIL NO. 221B
JOB NO.		

NOTES

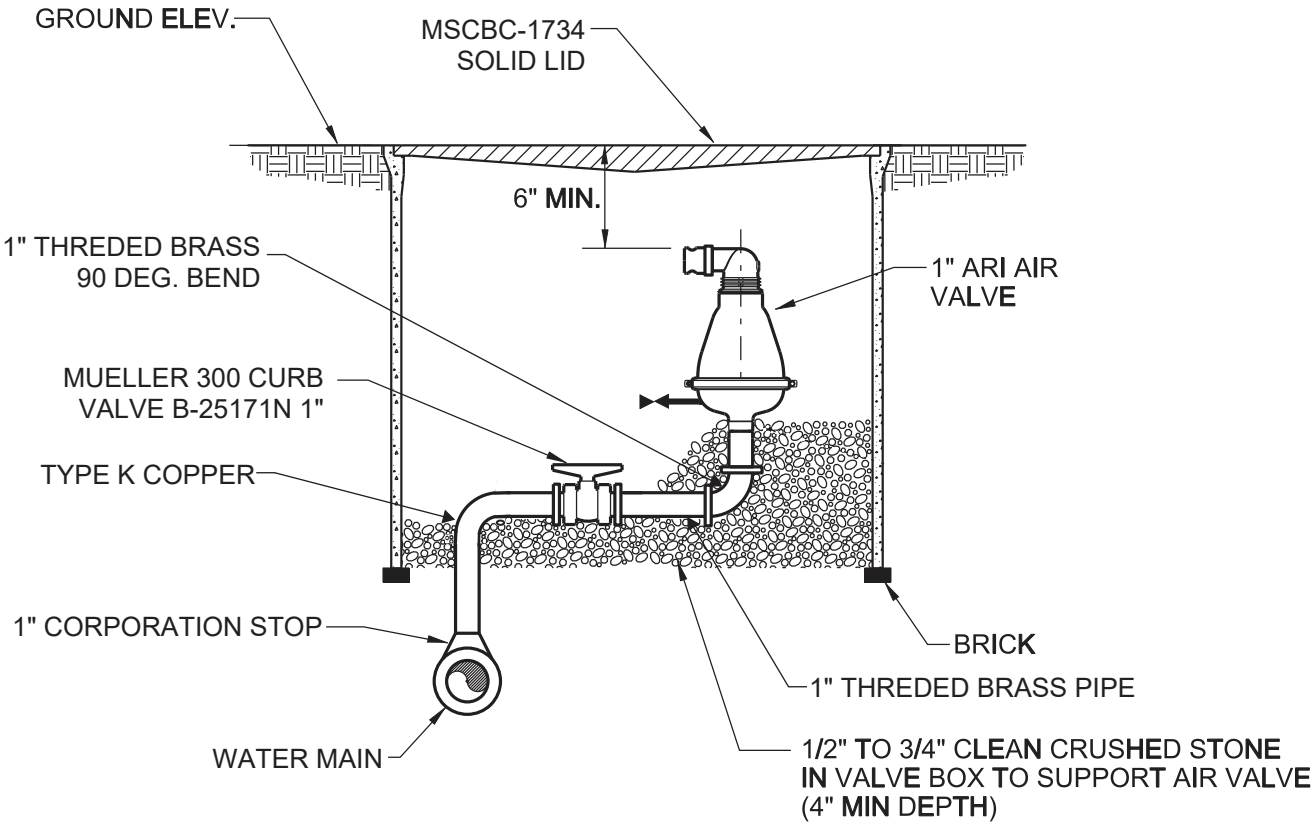
1. METER PROVIDED BY HUVD AT DEVELOPER'S EXPENSE
2. SMITH-BLAIR 913 FLANGED COUPLING ADAPTER OR APPROVED EQUAL
3. 2" DOUBLE STRAP SADDLE (STAINLESS STEEL)
4. 2" BRONZE NIPPLE
5. 2" BALL VALVE WITH PLUG
6. 2" TAP IS TO BE MADE A MINIMUM OF 2 PIPE DIAMETERS DOWNSTREAM OF METER
7. PRECAST CONCRETE VAULT CONCRETE VAULT (BY OLDCASTLE PRECAST, JARRETT CONCRETE PRODUCTS, BARGER & SONS, OR APPROVED EQUAL - 8X6X5HVUD-6) W/ BILCO PDCM-4 (5'X5')
8. NOTES 3 - 6 APPLY TO METERS THAT DO NOT HAVE BUILT-IN TEST PORT
9. FOR METERS WITH BUILT-IN TEST PORT PROVIDE NOTES 4 AND 5 AT METER





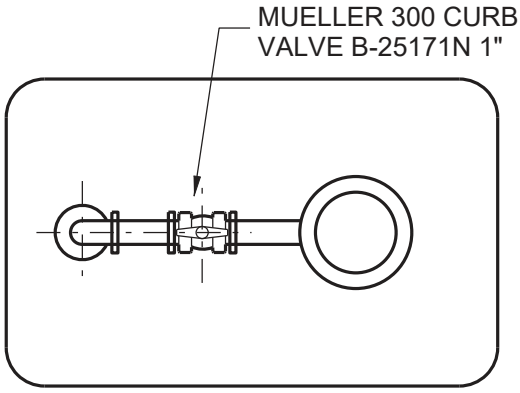
HARPETH VALLEY UTILITIES DISTRICT

DATE: DEC. 2022	DOMESTIC / FIRE LINE METER ASSEMBLY	DETAIL NO.
JOB NO.	N.T.S.	252



SIDE VIEW

VALVE BOX SIZE:
MSBCF 1730-18

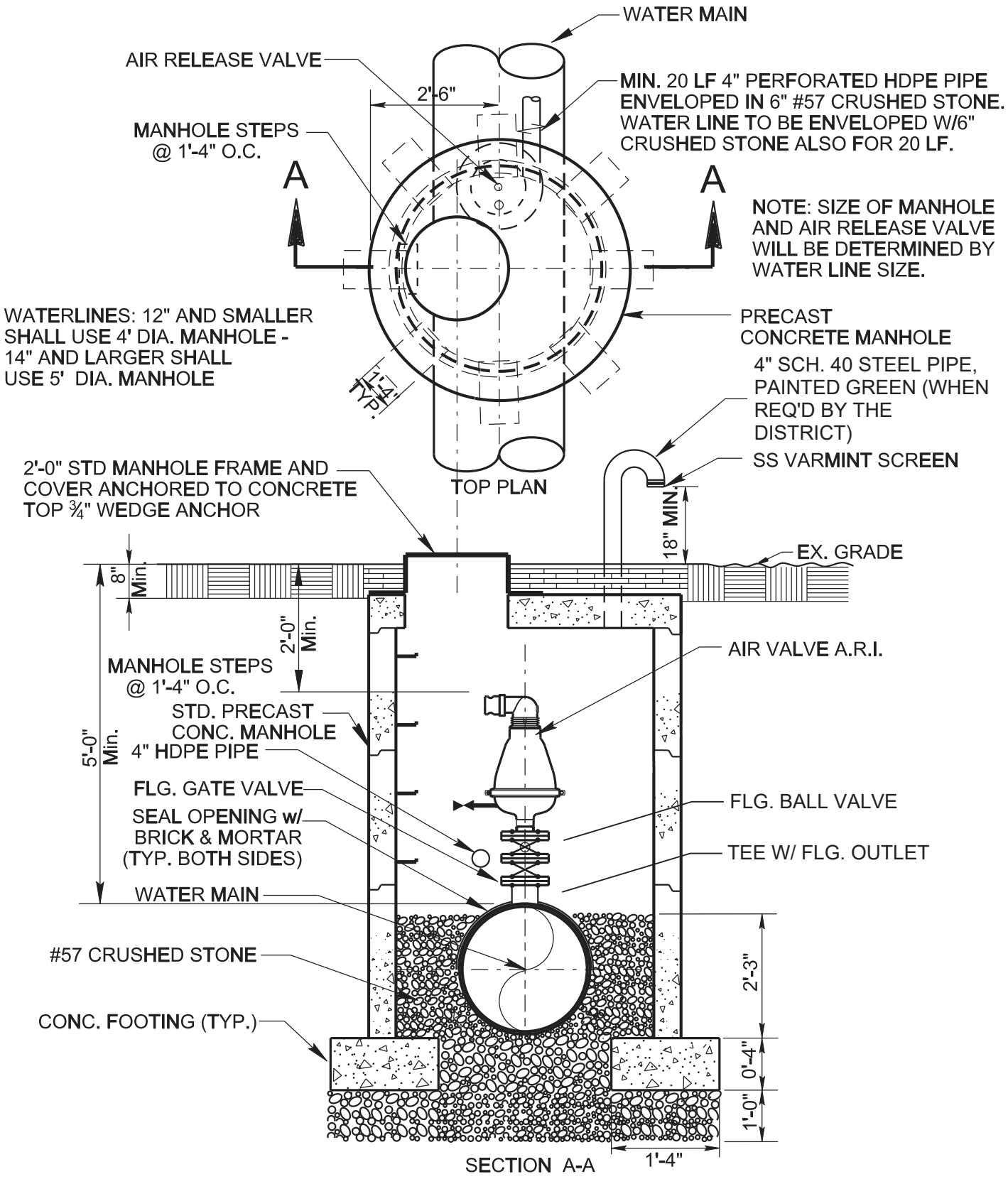


PLAN VIEW

HARPETH VALLEY UTILITIES DISTRICT

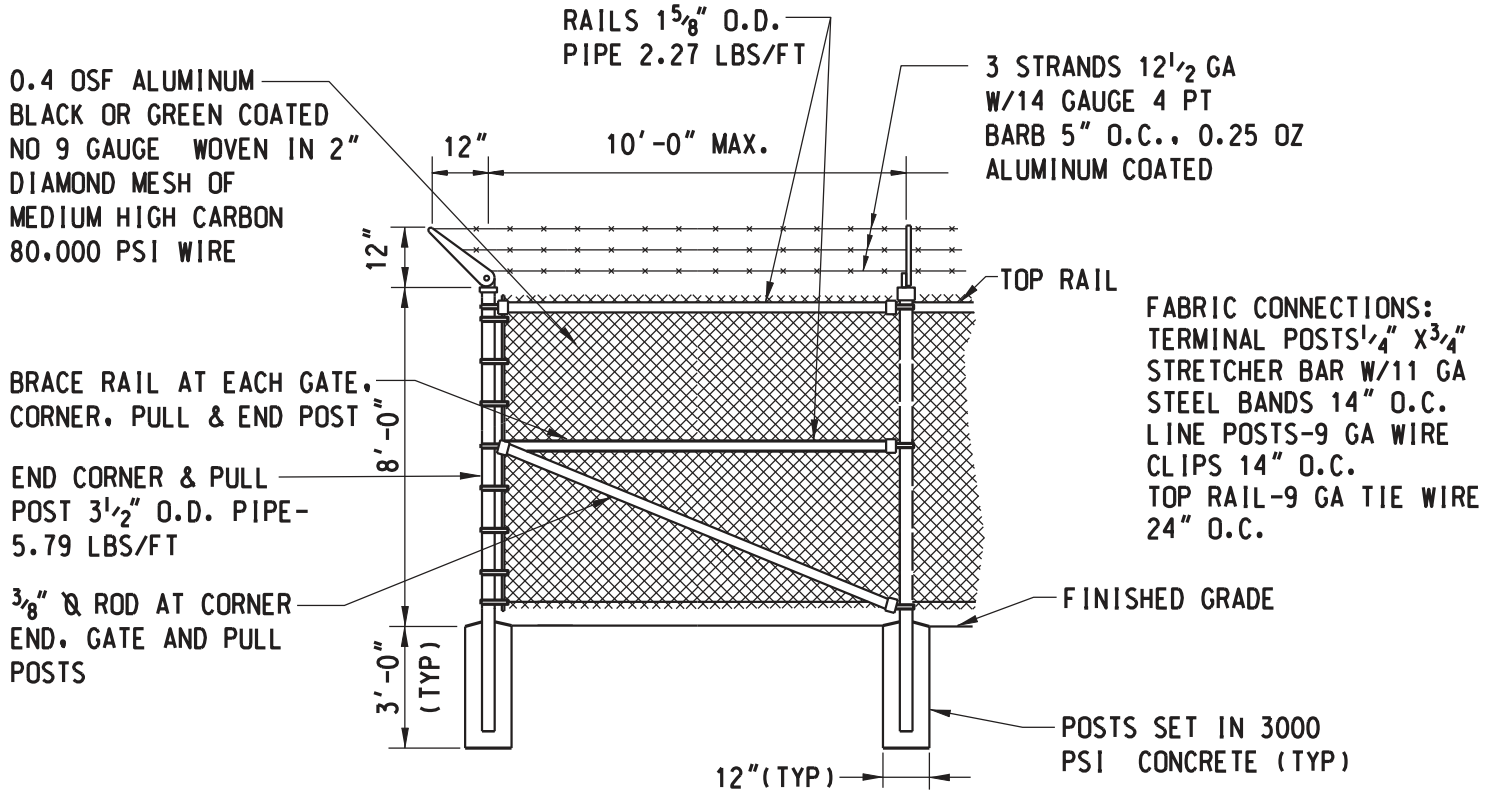
DATE: DEC 2019	AUTOMATIC AIR RELEASE ASSEMBLY FOR 8" AND SMALLER WATER MAINS N.T.S.	DETAIL NO. 261A
JOB NO.		

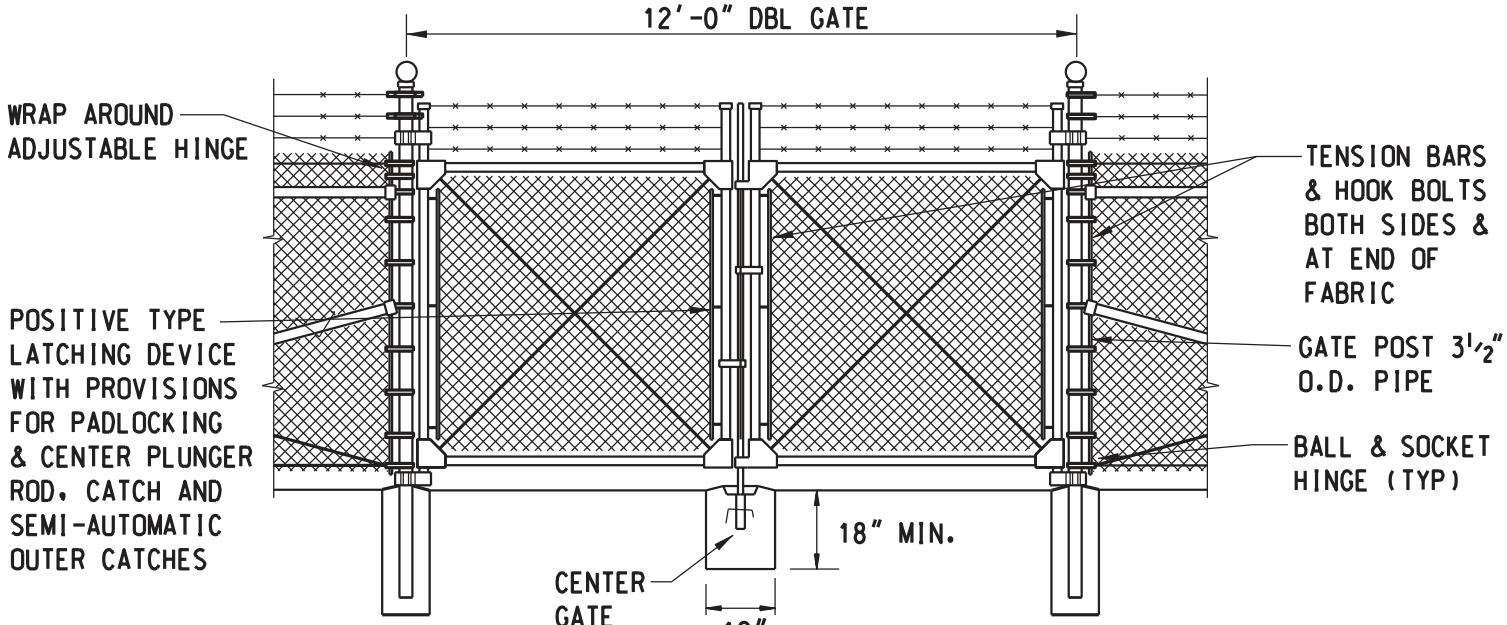
261A.pdf



HARPETH VALLEY UTILITIES DISTRICT

DATE: DEC 2019	AUTOMATIC AIR RELEASE ASSEMBLY FOR 12" AND LARGER WATER MAINS	DETAIL NO.
JOB NO.	N.T.S.	261B



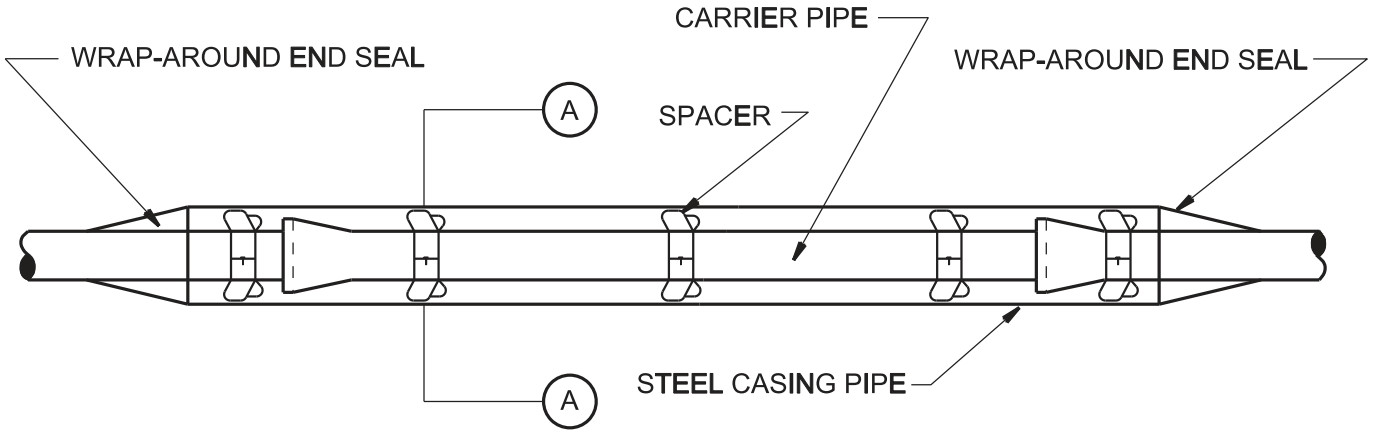


ALL POSTS. RAILS AND OTHER APPURTENANCES SHALL BE HOT DIP GALVANIZED W/MIN 200 OSF ZINC. ALL FITTINGS SHALL BE MALLEABLE CAST IRON OR PRESSED STEEL.

HARPETH VALLEY UTILITIES DISTRICT

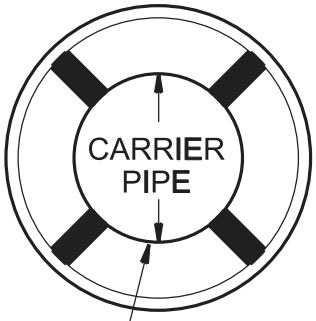
DATE: APRIL 2011	ALUMINUM FENCE DETAIL N.T.S.	DETAIL NO. 805
JOB NO.		

805.pdf



NOTE:

SPACERS FOR CARRIER PIPES UP THROUGH 36-INCHES IN DIAMETER SHALL BE INSTALLED WITHIN 1-FOOT ON EACH SIDE OF THE BELL AND IN THE CENTER OF JOINTS. IF THE CASING OR CARRIER PIPE IS ANGLED, BENT, OR DENTED, SPACING SHALL BE AT 1/3 INTERVALS. IF SPACER IS MORE THAN 1-FEET FROM END OF CASING PIPE AN ADDITIONAL SPACER SHALL BE PLACED WITHIN 1-FOOT OF THE END OF THE CASING PIPE.



DUCTILE IRON CARRIER PIPE TO BE CENTERED IN STEEL CASING PIPE.

SECTION A-A

HARPETH VALLEY UTILITIES DISTRICT

DATE: JAN. 2011	CASING SPACER INSTALLATION DETAIL	DETAIL NO.
JOB NO.	N.T.S.	1024