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CITY OF LA VERGNE PUBLIC WORKS STANDARD SPECIFICATIONS

SECTION 2: WATER DISTRIBUTION SYSTEM

APPROVED EXPIRES
SEP 28 2016

PREPARED FOR:

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APPROVED FOR CONSTRUCTION
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
SEP 28 2015

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2.0 SYSTEM DESIGN

2.0.1 Description of System Layout

The layout of extensions of the La Vergne Water System from a design concept, for convenience, will be the circle or belt system circumventing smaller crossover or gridiron systems.

2.0.2 Pre-Design Conference

Before beginning a system extension design, the design engineer shall first confer with the City of La Vergne Utilities Director in regard to the growth potential and density that may be expected in the general area of the extension being planned. A conference shall follow to discuss the system standards and requirements as well as problems related to the mains being extended.

2.0.3 Construction Plans and Specifications Approval

a) Construction drawings and specifications for proposed extensions must be furnished to the City of La Vergne Utilities Director for approval. Once approval has been obtained, the detailed plans and specifications must be submitted to the Tennessee Department of Environment and Conservation (TDEC), Division of Water Resources, for approval. Upon completion of the project, the design engineer shall revise the detailed plans to reflect as-built information and label as "Record Drawings."

b) Each plan sheet shall bear an appropriate title block showing the name of the project, location, owner, engineer, date, scale in feet, true north where applicable, sheet number, revision date, and other information as may be required.

Each sheet shall contain a blank area at least 4 inches by 6 inches near the title block for imprinting the official "Approved for Construction" stamps of the Tennessee Department of Health and Environment and the Utilities Director. Plans shall be clear and shall conform to the requirements of the La Vergne Public Works Standards and Specifications. Plans shall be on sheets 24 inches x 36 inches.

c) **Construction Plans of Water Mains:** A plot plan of existing and proposed water mains shall be submitted for projects involving substantial additions to the existing water distribution system. The plan shall show the location and size of all proposed water mains. A vicinity map must accompany all water main extension plans. A project layout map showing the entire project may also be required.

1. Valves shall be provided at both ends of any water crossing so that the section can be isolated for test or repair, and the valves shall be easily accessible and not subject to flooding;

2. Sampling taps shall be available at each end of the crossing; and

3. Permanent taps shall be made for testing and locating leaks.

d) **Detailed Plans:** Plans shall have a scale of not more than 100 feet to the inch and must show:

1. Locations of streets and water mains, size of mains, material and type of pipe.

2. All known existing structures both above and below ground, which might interfere with the proposed construction, particularly sewer lines, gas mains, storm drains, communication lines, electrical lines, etc.

3. Stationing of the waterline at 100-foot intervals and locations of appurtenances by stationing.

4. The plans shall show the design of the water lines only; no other utilities shall be shown except for clarifications or reference.

5. Water mains 12-inch in diameter and larger shall be shown in both plan and profile section.

2.0.4 Minimum Water Main Pipe Size

a) The minimum pipe diameter shall be 6-inch. Pipes 6-inch in diameter and larger shall be looped in a gridiron arrangement, except in cul-de-sacs.

b) All water mains shall be sized to provide a minimum flow of 500 gallons per minute. Piping shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the system under all conditions of flow.

c) All assumptions and any data used by the design engineer must be clearly documented and submitted with hydraulic calculations. If actual flow data is not available, theoretical calculations shall be based on all storage facilities being half-full and the appropriate Hazen-Williams friction factor shall be applied for the type of pipe being used, but in no case shall such friction factor be greater than 120.

2.0.5 Fire Protection

a) Fire hydrants shall not be connected to new or existing water mains that are not capable of providing a flow of 500 gallons per minute at a residual pressure of 20 psi.

b) Fire hydrants shall be located at points so that no exposed structure is further than 500 feet via public roadway from a hydrant.

c) The minimum pipe diameter to which a fire hydrant may be connected is 6-inch.

d) Privately owned sprinkler or fire service lines shall be metered and have a reduced pressure backflow preventer (RPBP) installed. Sprinkler or fire service lines shall be separate from the domestic water service line, unless otherwise approved in writing by the City.

2.0.6 **Dead Ends**

a) Water main dead ends shall be minimized.

b) Where dead end water mains occur, they shall be provided with a fire hydrant. An approved blow-off assembly for flushing purposes may be installed instead of a fire hydrant upon approval of the Utilities Director.

2.0.7 **Gate Valves**

a) Unless otherwise specified by the Utilities Director, gate valves shall be placed at all intersections of distributor pipes. Three valves shall be placed at each tee. Four valves shall be placed at each cross. Valves shall be positioned in the pipeline approximately 3 feet distance from the face of tee or cross.

b) Valves shall not be placed greater than 1,000 feet apart unless otherwise approved by the City.

c) Valves shall be placed on lead-outs approximately 3 feet from fire hydrants.

2.0.8 **Bends:** Bends in water mains shall be minimized. All bends shall have concrete thrust blocks or kickers.

2.1 DETAILS OF DESIGN AND CONSTRUCTION OF WATER MAINS

2.1.1 **Pipe Bedding and Support**

a) **Ductile Iron Pipe in Earth:** Each water main section shall be laid on a 6 inch bed of No. 67 size crushed stone and shall be backfilled to the spring line of the pipe using No. 67 compacted crushed stone.

b) **PVC Pipe in Earth:** Each water main section shall be bedded from 6 inches below the bottom of the pipe to 6 inches above the top of the pipe with No. 67 size crushed stone.

c) **All Pipe in Rock:** Each water main section shall be bedded from 6 inches below the bottom of the pipe to 12 inches above the top of the pipe with No. 67 crushed stone.

2.1.2 **Pipe Backfill**: All water pipe, including services, installed in roadway or paved areas shall be backfilled with No. 67 crushed stone for the full depth of the trench. Full depth backfill will be required for pipe placement in pavement or within 2 feet of the pavement. For areas 2 feet or beyond the roadway or pavement, the backfill shall be of select nature and can be material removed from the trench excavation provided care is taken in placement and rock material does not exceed 8 inches in size. Any subsequent settlement shall be repaired by the Contractor.

2.1.3 **Rock Excavation**: Stones found in the trench shall be removed for a depth of at least 6 inches below the bottom of the pipe. Blasting shall not be done within 25 feet of a water or sewer pipe, unless approved in writing by the Utilities Director.

2.1.4 **Pipe Cover:** All water mains shall be provided with sufficient earth or other suitable cover to prevent freezing and to provide protection to the pipe. The cover shall not be less than 36 inches for pipe 8-inches in diameter or less and not less than 42 inches for pipe greater than 8 inches in diameter from the top of the pipe. The cover shall not be less than 18 inches for service lines 1-inch in diameter or less.

2.1.5 **Pipe Alignment:** Alignment of the pipe shall be installed as true as practical. When it becomes necessary to deflect pipe alignment, such deflection shall be limited to 5 degrees per pipe joint when using ductile iron pipe up to 12 inches in diameter. Such deflection shall be limited to 3 degrees per pipe joint when using ductile iron pipe 12 inches in diameter and larger. The radius of curvature using PVC pipe shall not exceed the pipe manufacturer's written recommendation.

2.1.6 **Hydrostatic Tests**

a) Pressure and leakage tests shall be performed in accordance with AWWA C600. Pipe shall be tested with a minimum of 150 psi or 1.5 times the working pressure of the pipe, whichever is greater. Contractor shall provide necessary means to fill lines, pressurize lines, and expel air pockets from lines for testing purposes. Minimum time for testing shall be 2 hours. Pressure and leakage tests shall be performed and accepted by the City prior to installation of services.

b) The procedure for ductile iron pipe is generally described below:

1. The test pressure of the installed pipe shall be a minimum of 150 psi or 1.5 times the working pressure, whichever is greater.
2. Allowable leakage shall be no greater than as calculated in $L = \frac{SD\sqrt{P}}{133{,}000}$, where:

L = allowable leakage in gallons per hour,
S = length of test section in feet,
D = pipe diameter in inches, and
P = average test pressure in pounds per square inch (psi).
Pressure shall not fluctuate more than 5 psi.

c) All hydrostatic tests shall be witnessed by the City.

2.1.7 **Disinfection of New Water Mains:** The specifications shall include detailed procedures for the adequate flushing, disinfection, and bacteriological testing of all new water mains. Disinfection shall be as described in AWWA C651 (latest edition).

2.1.8 **Disinfection When Cutting Into or Repairing Existing Water Mains**

a) Shall be performed when water mains are wholly or partially dewatered.

b) Shall follow AWWA C651 (latest edition) procedures, including but not limited to trench treatment, swabbing with hypochlorite solution, flushing and/or slug chlorination as appropriate.

c) Bacteriological testing shall be conducted after repairs are complete, but upon approval of the City, the water line may be returned to service prior to completion of testing to minimize the time users are without water.

d) Leaks or breaks that are repaired with clamping devices, while mains remain full of water under pressure, require no disinfection.

2.1.9 **Means of Detecting PVC Pipe:** When PVC pipe is installed, detectable tape and copper wire shall be installed per Sections 2.2.26 and 2.2.27 of these Standard Specifications, Standard Drawing "Typical Water Service Installation," and Standard Drawing "Standard Waterline Bedding and Backfilling." The ends of the wire shall terminate in a valve box or other acceptable location, whereby detection equipment may be attached.

2.1.10 **Separation of Water Mains and Sewers**

a) In general, the following factors shall be considered in providing adequate separation between water mains and sewer pipes:

1. Material and type of joints for water and sewer pipes,
2. Soil conditions,
3. Service and branch connections into the water main and sewer line,
4. Compensating variations in the horizontal and vertical separations,
5. Space for repair and alterations of water and sewer pipes,
6. Offsetting of pipes around manholes, and
7. Water mains and sanitary or storm sewers shall not be laid in the same trench.

b) Parallel Installation:

1. Normal conditions – Water mains shall be laid at least 10 feet horizontally from any sanitary sewer, storm sewer or sewer manhole. Whenever possible, the distance shall be measured edge-to-edge.

2. Unusual conditions – When local conditions prevent a horizontal separation of 10 feet, a water main may be laid closer to a storm or sanitary sewer provided that:

i. The bottom of the water main is at least 18 inches above the top of the sewer and laid in a separate trench.

ii. Where this vertical separation cannot be obtained, the sewer shall be constructed of materials and with joints that are equivalent to water main standards of construction and shall be pressure tested to assure water-tightness prior to backfilling.

c) Crossing Installations:

1. Normal conditions – Water mains crossing house sewers, storm sewers, or sanitary sewers will be laid to provide a separation of at least 18 inches between the bottom of the water main and the top of the sewer, whenever possible.

2. Unusual conditions – When local conditions prevent a vertical separation as described under Section 2.1.11(c)1 of these Standard Specifications, the following shall be used:

   i. Sewers passing over or under water mains shall be constructed of the materials described in Section 2.1.11(b)2 of these Standard Specifications.

   ii. Water mains passing under sewers shall, in addition, be protected by providing a vertical separation of at least 18 inches between the bottom of the sewer and the top of the water main; adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking the water mains; that the length of water pipe be centered at the point of crossing so that the joints will be equidistant as far as possible from the sewer. Both the sewer and the water main shall be constructed of water pipe and hydrostatic tested in accordance with Section 2.1.6 of these Standard Specifications.

d) Sewer Manholes: No water pipe shall pass through or come into contact with any part of a sewer line or sewer manhole.

2.1.11 Surface Water Crossings

Surface water crossings, both under and over water, present special problems, which shall be discussed with the City of La Vergne, the Tennessee Department of Environment and Conservation Division of Water Supply and the U.S. Army Corps of Engineers before plans are prepared.

a) Above water crossings, the water main shall be:

   1. Adequately supported,

   2. Protected from damage and freezing, and

   3. Accessible for repairs and replacement.

b) When crossing water courses that are greater than 15 feet in width, as measured from the top of bank to top of bank:

   1. The water mains shall be of special construction having flexible, watertight joints,

   2. Valves shall be provided at both ends of the water crossing so the crossing section can be isolated for test or repair, and the valves shall be easily accessible and not subject to flooding,

   3. Sampling taps shall be available at each end of the crossing, and

   4. Permanent taps shall be made for testing and locating leaks.

2.1.12 **Cross Connections**

a) There shall be no physical connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contaminating materials may be discharged or drawn into the system.

b) The approval of the Tennessee Department of Environment and Conservation Division of Water Supply shall be obtained for interconnections between potable water supplies.

c) Neither steam condensate nor cooling water from engine jackets nor other heat exchange devices shall be returned to the potable water supply.

2.1.13 **Water Services and Plumbing:** Water services and plumbing shall conform to the Standard Plumbing Code, as may be revised and adopted from time to time by the City of La Vergne.

2.2 PRODUCTS

2.2.1 **General - DELETED**

2.2.2 **Water Mains**

a) All new water mains for public water distribution shall be a minimum of 6-inch diameter. Water main pipe with diameters from 6-inch to 8-inch shall be either ductile iron, Pressure Class 350 or PVC C900 high pressure water pipe, Pressure Class 200, DR14. All water main pipe greater than 8-inch in diameter shall be ductile iron, Pressure Class 350.

b) Ductile iron pipe shall be as described in Section 2.2.2(a) of these Standard Specifications meeting the latest requirements of AWWA C151, cement-mortar lined meeting the latest requirements of AWWA C110 with either mechanical joint or slip joints with rubber gaskets. Ductile iron pipe shall be as manufactured by American Cast Iron, U.S. Pipe, Griffin, McWane Pipe, or approved equal.

c) PVC pipe shall be as described in Section 2.2.2(a) of this Standard. The pipe must meet the requirements set forth in ASTM D2241, and shall bear the NSF seal of approval for potable water. Fittings used with PVC pipe shall be ductile iron, Class 350, compact mechanical joint fittings confirming to the latest requirements of AWWA C153.

d) Pipes shall be bell-end type.

e) Gaskets and lubricants intended for use with PVC pipe shall be made from materials that are compatible with the plastic material and with each other when used together, but will not support the growth of bacteria and will not adversely affect the potable quantities of water that is to be transported. Gaskets shall be the elastomeric type and shall be manufactured to conform to the latest requirements of ASTM F477.

f) Solvent cemented joints in the field for PVC pipe are not permitted.

g) Pipe lengths shall be no greater than 20 feet for PVC or ductile iron water mains.

2.2.3 Tees, Crosses, and Bends

a) Tees, crosses, and bends for use with ductile iron pipe shall be cement-mortar lined, all mechanical joint.

b) Tees, crosses, and bends for use with ductile iron pipe shall be Class 350 compact ductile iron fittings meeting the latest requirements of AWWA C153.

c) Mechanical joint and plain end tees, crosses, and bends shall be manufactured by American Cast Iron, U.S. Pipe, Griffin, McWane Pipe, or approved equal.

d) Mechanical joint locked hydrant tees or tapping tees may be permitted.

2.2.4 Reducers

a) Reducers for use with ductile iron pipe shall be cement-mortar lined with mechanical joints.

b) Reducers for use with ductile iron pipe shall be Class 350 compact ductile iron fittings meeting the latest requirements of AWWA C153.

c) Mechanical joint and plain end reducers shall be manufactured by American Cast Iron, U.S. Pipe, Griffin, McWane Pipe, or approved equal.

2.2.5 Caps and Plugs

a) Caps and plugs for use with ductile iron pipe shall be mechanical joint, except for slip-on type plugs which shall be restrained type, with cast lugs and furnished with a minimum of four restraining cap screws, and shall be manufactured by American Cast Iron, U.S. Pipe, Griffin, McWane Pipe, or approved equal.

b) Mechanical joint caps and plugs shall be Class 350 compact ductile iron fittings meeting the latest requirements of AWWA C153.

2.2.6 Sleeves

a) Sleeves for use in connecting ductile iron pipe shall be mechanical joint and shall be manufactured by American Cast Iron, U.S. Pipe, Griffin, McWane Pipe, or approved equal.

b) Sleeves shall be Class 350 compact ductile iron fittings meeting the latest requirements of AWWA C153.

2.2.7 Valves

a) Gate valves:

1. Shall be mechanical joint, resilient-seat type, iron body, non-rising stem, o-ring, steam seal type, 2-inch square operating nut, open counterclockwise.

2. Shall meet the latest requirements of AWWA C509. Pressure rating shall be 200 psig.

3. Shall be either Mueller Company Catalog No. A-2360, U.S. Pipe Valve and Hydrant Division Catalog No. A-USP0, M&H Company Catalog No. 4067-01, American Iron Pipe Series 2500, or any succeeding model numbers, or approved equal.

b) Butterfly valves:

1. Shall be rubber-seated meeting the latest requirements of AWWA C504

2. Will be acceptable for use on 12-inch (diameter) or greater pipe

3. Shall open counter-clockwise, furnished with a 2-inch operating nut, mechanical joint type, Class 150B.

c) Air Release valves:

1. For 6", 8", and 10" water mains: Shall be APCO Clean Water Air Release Valve Simple Lever Series No. 65 as manufactured by DeZurik, Inc., or approved equal.

2. For 12" and greater water mains: Shall be APCO Clean Water Air Release Valve Compound Lever Series No. 200 as manufactured by DeZurik, Inc. or approved equal.

2.2.8 **Valve Boxes**

a) Outside Pavement: Valve boxes shall be square, "Metro Standard Traffic Duty", John Bouchard & Sons Co. No. 8006 - Standard Frame and Cover and Cloud Concrete valve box, No. UT-045, or approved equal.

b) Inside Pavement: Valve boxes shall be square, "Metro Standard Traffic Duty", John Bouchard & Sons Co. No. 8006 - Standard Frame and Cover and Cloud Concrete valve box, No. UT-045, or approved equal.

c) Valve box lids shall be provided with the word "WATER" embossed in the lid surface. Lids shall be compatible with the box lid receptacle.

2.2.9 **Blow-off Assemblies:** Where blow-off assemblies are approved by the City, they shall be a post type fire hydrant similar to Mueller Model No. A-411 – 2-1/8" with one 2-1/2" hose nozzle, or approved equal.

2.2.10 **Fire Hydrants**

a) Shall conform to the latest requirements of AWWA C502.

b) Shall be equipped with two 2-1/2 inch hose outlet nozzles and one 4-1/2 inch steamer nozzle.

c) Nozzle thread shall conform to NFPA Standard No. 1963 for National Standard Fire Hose Coupling Screw Threads.

d) Size of hydrant main valve shall be 5-1/4 inch nominal diameter.

e) Size of hydrant inlet shall be 6-inch mechanical joint with one set of mechanical joint accessories.

f) Direction of rotation of the operating nut to open shall be counterclockwise.

g) The operating nut shall be pentagonal in shape. The pentagon shall measure 1-1/2 inches from point to flat at the base of the nut and 1-7/16 inches at the top. The height of the nut shall not be less than one-inch.

h) Color of the finish paint above the ground line shall be yellow.

i) Shall be equipped with harnessing lugs or anchor couplings.

j) Affidavit of Compliance shall be furnished for each fire hydrant.

k) Outlet nozzle-cap chains shall be required.

l) Shall be the Mueller Company, Centurion Catalog No. A-423; the American Cast Iron Pipe Company, American-Darling, Catalog No. B-62-B; or any acceptable revision of these models.

2.2.11 **Thrust Blocking**

a) Thrust forces are created in a pipeline at changes in direction, tees, dead-ends, or where changes in pipe size occur at reducers. Acceptable restraint measures include concrete thrust blocks, restrained joints, and tie rods. The Engineer shall calculate the pressure and soil bearing capacity when designing thrust blocking.

b) When iron tie rods are used, all parts of such tie rods exposed to soil or weather shall be given a final coating of asphalt for protection. Tie rods shall not be less than 5/8-inch (nominal) in diameter.

2.2.12 **Tapping Sleeves and Valves**

a) Tapping sleeves:

1. Shall be cast iron with mechanical joint ends rated for 200 psi working pressure.

2. End gaskets shall be duck-tipped type.

3. Shall be appropriately sized for use on the OD of the pipe to be tapped.

4. Shall be provided with tapped bosses for testing purposes.

5. Side flange bolts and pipe shall be of corrosive-resistant material.

6. Shall be US Pipe – Valve and Hydrant Division, M&H Valve Company, Clow Valve Company, or Mueller Co., Type 9 mechanical joint cast iron with non-corrosive bolts, non-corrosive nuts and duck-tipped gaskets, or approved equal.

b) Tapping valves:

1. Shall meet the requirements for gate valves under Section 2.2.7 of this Standard, except flanged valve inlets Class 125 and mechanical joint outlets shall be provided.

2. Shall be US Pipe Valve and Hydrant Division Catalog No. T-USP0, Mueller Company Catalog No. T-2360, or approved equal, and any succeeding catalog number for the same.

2.2.13 **Cut-in Sleeves and Valves**

a) Cut-in sleeves:

1. Shall be cast iron mechanical joint and plain end, Class 200 pressure rated.

2. Gaskets shall be duck-tipped.

3. Mechanical joint gland shall be provided with setscrews for bonding.

4. Shall be Mueller Company Catalog No. H-842, or approved equal, and any succeeding catalog number for the same.

b) Cut-in valves:

1. Shall be cast iron mechanical joint for use in ductile iron and cast iron pipe.

2. Gaskets shall be duck tipped.

3. All other requirements for gate valves under Section 2.2.7 of this Standard Specifications shall be met.

4. Shall be Mueller Company Catalog No. C-2360, or approved equal, and any succeeding catalog number for the same.

2.2.14 **Repair Sleeves**

a) Repair sleeves used for repairing pipe may be either cast iron or ductile iron split type having appropriate pipe diameter range, mechanical joint ends, for 200 psi working pressure, furnished with two duck-tipped end gaskets. Split repair sleeves shall be Mueller Company, Catalog No. H-785, or approved equal.

b) Full circumference stainless steel band-type couplings having appropriate pipe diameter range may be used only for repairing circumference breaks in ductile iron pipe. Stainless steel band-type repair couplings must be capable of withstanding test pressures of 300 psi at a torque of 70 foot pounds for 5/8-inch bolts and 90 foot pounds for 3/4-inch bolts; equipped with malleable iron lugs meeting ASTM A47 Grade 32510 or ductile iron per ASTM A536 Grade 60-40-18; with supporting side fingers, furnished with Grade 30 specially

compounded rubber of new materials with ingredients to produce superior storage characteristics, performance and resistance to set after installation; and bolts of high strength steel with hexagon nuts meeting the latest requirements of AWWA C111.

c) Repair of PVC pipe shall be accomplished by replacing the damaged pipe using compression couplings of iron having galvanized protection with rubber gaskets having 5-inch minimum length. The repair of PVC pipe shall include the repair or replacement of the detection wire.

2.2.15 **Service Lines 1-inch Diameter or Less**

a) Copper Tubing

1. Shall be seamless, type K, soft tempered.

2. Shall meet the requirements as set forth in ASTM B88 and AWWA C800 Appendix A for type K.

b) PEXa (Cross-Linked Polyethylene) Plastic Tubing

1. Shall conform and be certified to comply with AWWA C904, ASTM F876, ASTM F877, CSA B137.5. Fittings shall conform and be certified to comply with AWWA C800, ASTM F2080, CSA B137.5, NSF/ANSI 14, and NSF/ANSI 61.

2. PEXa pipe pressure rating shall be a minimum of 160 psi at 73.4°F.

c) Service Line Casing Pipe

1. If the service line is installed below the road, casing is required for the service line. Casing of the service line shall be from the water main tap to the water meter or from right-of-way to right-of way.

2. Casing pipe shall be PVC Schedule 80 where the diameter is the outside diameter of the service line plus 2-inches minimum.

3. If the water main is not under the pavement and the water meter is on the same side of the road as the water main, casing of the service line shall not be required.

d) Means of Detecting Service Line:

When PEXa service line piping is installed, detectable tape and copper wire shall be installed per Sections 2.2.26 and 2.2.27 of these Standard Specifications. The ends of the wire shall terminate in a valve box, meter box, or other acceptable location, whereby detection equipment may be attached.

2.2.16 **Corporation Stops**

a) Corporation stops shall meet the latest requirements of AWWA C800.

b) Corporation stop inlets shall have AWWA taper threads. The outlet shall be pack joint outlet for Type K copper service tubing or PEXa plastic tubing. Insert stiffeners when using plastic pipe or tubing shall be used as recommended by the corporation stop manufacturer.

c) Corporation stops shall be limited to size 3/4-inch and 1-inch.

d) Corporation stops shall be Mueller Company Catalog No. H-15000, the Ford Meter Box Company Catalog No. F1000-3-Q-NL (for 3/4-inch) or F1000-4-Q-NL (for 1-inch), or approved equal, or any succeeding catalog numbers.

e) The size of the corporation stop shall match the diameter of the service line.

2.2.17 **Copper Service Unions**

a) Unions for copper service tubing shall be the copper service thread, three-part type meeting the latest requirements of AWWA C800. The coupling nuts of the union shall have copper service threads and shall meet the latest requirements of AWWA C800.

b) Copper service unions shall be used when coupling copper service tubing.

2.2.18 **Tapped Saddles**

a) Shall be used in connecting 3/4-inch and 1-inch service taps to 2-inch and larger PVC pipe and ductile iron pipe.

b) Shall comply with the "lead-free" requirement of the Safe Drinking Water Act adopted on January 4, 2014.

c) Shall be double strap, two-part type Ford Meter Box Company, Inc. Catalog No. F202, or approved equal. The body shall be made of high strength ductile iron per ASTM A536 with black e-coating finish. The straps shall be 5/8" AISI C1010 steel, zinc plated with di-chromate or trivalent seal. Each strap shall have a 5/8" flat bearing surface. 1/2" straps may be furnished on saddles 3" and smaller. Saddles shall be designed to form a hydraulic seal between the pipe and an EPDM rubber gasket meeting ASTM D2000 shall be furnished with each saddle.

d) Outlets of saddles shall be tapped 3/4-inch or 1-inch AWWA thread for installation of corporation stop.

e) Shall be designated to be satisfactory for use with water up to 145 psi in accordance with Section 3, General Design under the latest requirements of AWWA C800.

f) Saddles shall be UL classified to ANSI/NSF Standard 61.

2.2.19 **Service Fittings**

a) Adapters:

1. Service fittings for use in 3/4-inch and 1-inch copper service tubing shall meet the latest requirements of AWWA C800.

2. Adapters for use in 3/4-inch and 1-inch copper service tubing may be straight, quarter bend, or eighth bend.

3. Adapter inlets shall be compression-type.

4. Adapters having 3/4-inch inlets shall have either male or female iron pipe thread outlets of either 3/4-inch or 1-inch size.

5. Adapters having 1-inch inlets shall have either male or female iron pipe thread outlets of 1-inch.

6. Corporation stop adapters shall have inlet threads compatible with old-type corporation stop threads. Outlets of corporation stop adapters shall be compression-type. Gaskets used with corporation stop adapters shall be copper. Corporation stop adapters shall be used only for corporation stop sizes 5/8-inch, 3/4-inch, and 1-inch.

7. Threaded pipe nipples for use in setting 2-inch and greater meters shall comply with the "lead-free" requirement of the Safe Drinking Water Act adopted on January 4, 2014. Pipe nipple threads shall be NPT.

b) Tees for copper and PEXa service pipe shall be compression-type. Sizes shall be limited to 3/4-inch and 1-inch. Tees may have a combination of 3/4-inch and 1-inch branches and runs when deemed appropriate.

c) Brass plugs of either 3/4-inch or 1-inch size having AWWA threads shall be used to plug taps where corporation stops have been removed from service.

2.2.20 **Water Meters**

a) Water Meter Sizes 5/8-inch x 3/4-inch and 1-inch:

1. 5/8-inch x 3/4-inch meters shall be Badger Model RCDL-25 Lead Free Bronze Alloy or Engineered Polymer with remote read transmitter, as provided by the City of La Vergne Water and Sewer Department.

2. One-inch meters shall be Badger Model RCDL-70 Lead Free Bronze Alloy with remote read transmitter, as provided by the City of La Vergne Water and Sewer Department.

b) Water Meter Sizes 1-1/2 inch and greater:

1. The City of La Vergne may provide water meters up to size 1-1/2 inch. Customers shall provide water meters sized 2-inch and greater.

2. Non-compound meters:

i. Non-compound meters shall be Badger Model RCDL-120 with remote read transmitter for 1-1/2 inch, Badger Model RCDL-170 with remote read transmitter for 2-inch, or any City approved revision of this model with a straight reading in U.S. gallons.

3. Compound Meters:

   i. Flow demand, head loss, and range of user's expected flows will be considered by the Utilities Director in making evaluations if a compound meter is required and if it is required to be installed with a bypass.

   ii. Compound meters shall be Badger Recordall Compound Series Meter Lead Free Bronze Alloy with remote read transmitter appropriately sized for the water line for sizes 2-inch to 6-inch diameter, or any City approved revision of this model with a straight reading in U.S. gallons.

4. Fire Service Meters:

   i. Fire service meters shall be Badger Recordall Fire Series Meter with Integral Strainer (FSMA) appropriately sized for the water line, or any City approved revision of these models with a straight reading in U.S. gallons.

   ii. Flow demand head loss and range of user's expected flows will be considered by the Utilities Director in making evaluations of such meters.

2.2.21 Meter Yokes (for 5/8-inch and 1-inch Meters)

a) Yokes shall be the Ford Meter Box Company 40 Series Resetter Catalog No. VBHH42 for 5/8" x 3/4" meters or Catalog No. VBHH44 for 1" meters, which includes an angle ball valve on the inlet side and an angle dual check valve on the outlet side, or approved equal.

b) Yokes shall be the riser type for compression-type adapters on both ends.

c) The inlet shall have an all bronze inverted key angle valve close-coupled to the yoke piece.

d) The outlet shall have an all bronze ell close-coupled to the yoke piece.

e) The yoke piece shall be of cast iron, holding the inlet and outlet pipes, braced and correctly spaced.

f) Yoke angle valves and ells shall be connected to the yoke piece such that they can be rotated to connect to piping below.

g) A three-part expansion connection capable of being screwed on one end of the meter shall be furnished with each yoke. The expansion connection shall expand by turning a hand wheel to make watertight compression joints against rubber gaskets in the yoke ends.

h) Yokes shall be used for all 5/8-inch and 1-inch meter settings.

i) An additional ball straight service valve shall be installed before the meter yoke in the service line. Ball valve shall be Mueller 300 Series, or approved equal.

2.2.22 Meter Boxes

a) Meter boxes for 5/8-inch meter settings for non-traffic conditions shall be the two-part, rectangular concrete type having minimum inside dimensions of 10-1/2 inches by 17-1/4

inches. The cover shall be rectangular concrete having minimum dimensions of 10 inches x 15-1/4 inches furnished with a cast iron hinged reader lift having minimum dimensions of 4 inches by 7 inches provided with a keyhole for lifting.

b) Meter boxes for 1-inch meter settings for non-traffic conditions shall be the two-part, rectangular concrete type having minimum inside dimensions of 16 inches by 21 inches. The cover shall be rectangular concrete having minimum dimensions of 16-3/4 inches by 21-3/4 inches furnished with a cast iron hinged reader lift having minimum dimensions of 4 inches by 7 inches provided with a keyhole for lifting.

c) Meter boxes for 5/8-inch and 1-inch meter settings in traffic conditions shall be the two-part, rectangular concrete type having minimum inside dimensions of 10-1/2 inches by 17-1/4 inches for 5/8-inch meter settings and 16-3/4 inches by 21-3/4 inches for 1-inch meter settings. The covers shall be of cast iron, shall be furnished with embossed tread markings, shall have the word "WATER" on the top surface, and shall be provided with a keyhole for lifting. Meter boxes and covers shall be capable of supporting minimum wheel loads of 16,000 pounds.

d) The minimum depth of combined two-part meter box sections for setting 5/8-inch and 1 inches meters shall be 24 inches.

e) Meter box upper sections shall be designed with recesses for receiving covers. Covers and upper box sections shall be designed for easy cover removal and such that cover top surface when set will be flush with that of the upper meter box section rim.

f) Meter boxes for 1-1/2 inch and 2-inch disc meter setting shall be the three-part, rectangular concrete type having a combined minimum depth of 36 inches and minimum inside dimensions of 17 inches by 30 inches. Covers shall be the two-part cast iron type, shall be furnished with embossed thread markings, shall have the word "WATER" on the top surface and shall be provided with a keyhole or other easy means for lifting cover sections. Meter boxes and covers shall be capable of supporting minimum wheel loads of 16,000 pounds. Covers in non-traffic areas shall have a hinged reader lift having minimum dimensions of 5-1/2 inches by 7-5/8 inches provided with a keyhole for lifting.

g) Compound meters 2-inch and greater in size shall be set in vaults. Vaults in general shall be of precast concrete having a minimum depth of 36 inches. The cover may be of reinforced concrete provided with an easy means for reading and removal of the meter and/or appurtenances. Factory type covers may be considered by the Utilities Director.

h) Meter boxes shall be as follows, or approved equal:

1. For 5/8-inch by 3/4-inch meter, non-traffic settings: Brooks Products, Inc., Catalog No. 36 Meter Box Body with No. 36 Extension, effecting 24 inches combined depth, with No. 36-H cover with cast iron reader left (or any succeeding catalog numbers), or approved equal.

2. For 5/8-inch by 3/4-inch meter, traffic settings: Brooks Products, Inc., Catalog No. 36 Meter Box Body with No. 36 Extension, effecting 24 inches combined depth, with No. 36-T cast iron cover (or any succeeding catalog numbers), or approved equal.

3. For 1-inch meter, non-traffic settings: Brooks Products, Inc., Catalog No. 11 Meter Box Body with No. 11 Extension, effecting 24 inches combined depth, with No. 11-5 cover with cast iron reader left (or any succeeding catalog numbers), or approved equal.

4. For 1-inch meter, traffic settings: Brooks Products, Inc., Catalog No. 11 Meter Box Body with No. 11 Extension, effecting 24 inches combined depth, with No. 11-T steel cover (or any succeeding catalog numbers), or approved equal.

5. For 1-1/2 inch and 2-inch meter, non-traffic settings: Brooks Products, Inc., Catalog No. 66 Meter Box Body with No. 66 Extensions, effecting 36 inches combined depth, with No. 66-H cover with cast iron reader left (or any succeeding catalog numbers), or approved equal.

6. For 1-1/2 inch and 2-inch meter, traffic settings: Brooks Products, Inc., Catalog No. 66 Meter Box Body with No. 66 Extensions, effecting 36 inches combined depth, with No. 66-T steel cover (or any succeeding catalog numbers), or approved equal.

2.2.23 **Reduced Pressure Backflow Preventers**: Backflow preventers shall meet the requirements as set forth in the Standard Plumbing Code as adopted by the City of La Vergne. Backflow preventers located outdoors shall be located behind the water meter on private property and shall be maintained by the property owner. Backflow preventers located outdoors shall be installed above ground in an insulated structure with an insulated drain door as manufactured by Safe-T-Cover (Hydrocowl, Inc.), or approved equal.

2.2.24 **Residential Pressure Reducing Valves**: Pressure reducing valves shall meet the requirements of the Standard Plumbing Code as adopted by the City of La Vergne. Pressure reducing valves shall be located behind the meter, and they shall be provided and maintained by the property owner.

2.2.25 **Residential Service Line Shutoff Valves:** Service line shutoff valves shall meet the requirements of the Standard Plumbing Code as adopted by the City of La Vergne. Shutoff valves shall be located behind the meter, and they shall be provided and maintained by the property owner. A shutoff valve shall be located outside in the yard area and installed within a cast iron, concrete, or polyethylene prefabricated valve box. Shutoff valve shall be located between the meter and the pressure reducing valve.

2.2.26 **Copper Wire for Detection:** Twelve (12) gauge coated copper wire shall be installed over all plastic pipe. The copper wire shall be between 12" to 18" below the ground surface to assist in future locating of pipe. Where two sections of wire connect a 12-inch minimum twisted overlap is required with adequate bare wire connection for continuity. The bare wire connection shall be suitably coated to protect the wire from corrosion. The copper wire shall extend up into all valve and/or meter boxes so it is accessible for connection to locating equipment. At uncased road crossings, if allowed, the copper wire shall be installed onto the top of the plastic pipe.

2.2.27 **Detectable Tape:** Detectable tape shall be installed approximately 6-inches above the copper wire to assist in locating all underground pipe, including but not limited to water mains and service lines. Detectable tape shall consist of a solid aluminum foil encased in

a protective high visibility inert plastic jacket. Width of the tape shall be 2 inch minimum with a thickness of 5.0 mil minimum. The tape shall be imprinted continuously over the entire length in permanent black ink containing wording similar to "Caution – Buried Waterline Below". Maximum imprint length shall be 36 inches. Minimum tensile strength shall be 2800 psi. Detectable tape shall be "Terra Tape Sentry Line Detectable" by Reef Industries, Inc. of Houston, Texas or approved equal.

2.3 EXECUTION

2.3.1 General

a) All construction on the City of La Vergne water distribution system that is not performed by the City shall be executed by a person, firm, or corporation licensed to engage in contracting as set forth in the Tennessee Contractors Licensing Act of 1976 (TCA 62-6-Part 1). This requirement shall apply to all construction regardless of the amount of work involved.

b) Prior to commencement of work, the contractor or developer may be required to provide a cash deposit, bond, certified check, or other acceptable form of security for the amount of the work to be completed or a portion thereof pursuant to the approved construction plans. The amount of the security shall be determined by and at the discretion of the Utilities Director. Within sixty (60) days of the completion and acceptance of all provisions of the approved plans, cash deposits or other legal arrangements, or unexpended or unobligated funds thereof shall be refunded or terminated.

c) Prior to the commencement of work, the contractor or developer shall be required to submit a completed Construction Start Notification to the Tennessee Department of Environment and Conservation, Division of Water Resources – Nashville Field Office.

2.3.2 Preparation

a) Precautions and permit to excavate: A preconstruction conference shall be held by the City prior to beginning construction. A representative of the Owner, Contractor and City's Resident Inspector shall be present. Contractor shall at this time present Contractor's schedule of activities, present Contractor's submittals for material approvals, establish project communication guidelines and review the City's construction criteria. The Design Engineer shall be present.

1. Contractor shall notify utility companies to locate existing facilities by contacting TN One Calls/TN 811.

2. Contractor shall abide by their requirements when repairing, replacing, or disturbing existing facilities.

3. Prior to trench excavation being performed within any public right-of-way, including public alleys, a permit shall be obtained by the Contractor from the governing authority to perform such excavation. As a minimum, the trench backfill and street repair shall be made in accordance with the La Vergne Public Works Standards and Specifications.

b) Protect all vegetation and other features to remain and install erosion control measures as required.

c) Protect all survey points.

d) Trench excavation:

1. Perform in such a manner as to form a suitable trench in which to place the pipe and so as to cause the least inconvenience to the public.

2. Maximum width at the crown of the pipe shall be 2 feet plus the nominal diameter of the pipe.

3. Cut pavements along neat, straight lines with either a pavement breaker or pavement saw.

4. Trench depth shall be sufficient to provide a minimum cover in accordance with Section 2.1.4 of these Standard Specifications.

5. Align trench as shown on the plans and in accordance with Section 2.1.5 of these Standard Specifications.

6. Shape the bottom of the trench to provide uniform bearing of the pipe throughout its entire length in accordance with Sections 2.1.1 of these Standard Specifications. Provide bell holes to aid in securing uniform support of the pipe.

7. When unstable soil is encountered at the trench bottom, remove it to a depth required to assure adequate support of the bedding material, pipeline, and backfill to the proper grade with AASHTO M-43, Size 3 or 4 course aggregate.

8. Remove rock encountered in the trench excavation to a depth at least 6 inches below the bottom of the pipe barrel, provide bedding and backfill in accordance with Sections 2.1.1 and 2.1.2 of these Standard Specifications and compact to uniformly support the pipe.

e) Sheeting, shoring, and bracing: When necessary or when directed by the City, put in place and maintain sheeting, bracing, etc., as may be required to support the sides of the excavation and to prevent movement. Remove all sheeting, shoring, and bracing after backfill has been placed to a depth of 18 inches over the pipeline.

f) Before placing the pipe in the trench, field inspect the pipe for cracks or other defects. Remove defective pipes from the construction site.

g) Swab the interior of the pipe to remove all undesirable material.

h) Prepare the bell end and remove undesirable material from the gasket and gasket recess.

2.3.3 Installing Water Mains

a) Lay all piping in a straight line on a uniform grade in accordance with Section 2.1.5 of these Standards.

b) After applying gasket lubricant, extreme care shall be taken to keep the spigot end from contacting the ground.

c) Hone the pipe with suitable tools or equipment.

d) As a minimum, the manufacturer's instructions for laying and joining pipe shall be followed.

e) Cut pipe for installing valves, fittings, etc. in a neat and workmanlike manner without damaging the pipe so as to leave a smooth end at right angles to the axis of the pipe.

f) Locate water lines in relation to other piped utilities in accordance with Section 2.1.10 of these Standard Specifications.

2.3.4 Installing Appurtenances

a) Securely plug open ends of pipe at the close of each workday and during temporary discontinuance of pipe laying.

b) Set all valves, fittings, fire hydrants, and other specials in a neat workmanlike manner.

c) Use thrust blocks, restrained joints, and tie rods in accordance with Section 2.2.11 of these Standard Specifications.

d) Fire hydrants shall be set so that the center of nozzles is 18 inches minimum and 24 inches maximum above adjacent finished grade and the steamer nozzle faces the street. Where the street cannot be clearly defined or recognized, the steamer nozzle shall face the most likely route of approach and location of the fire truck, all as determined by the City.

e) Effect drainage of fire hydrants by using a minimum of 7 cubic feet of Size No. 2 or No. 3 crushed stone.

f) Close dead ends with caps or plugs meeting the requirements of these Standard Specifications and equip with fire hydrants, where shown on the drawings, in accordance with Section 2.2.10 of these Standards.

2.3.5 Installing Water Lines in Street, Highway, and Railroad Right-of-way

a) Permits, as may be required for crossing streets, highways, and railroads and performing work within their right-of-way, shall be obtained from the appropriate authorities.

b) Boring and jacking methods shall be in accordance with the Standard Detail included in these Standard Specifications.

2.3.6 Water Main Pressure Tests

a) After the pipe has been laid, subject all newly laid pipe or any valved section thereof, to a hydrostatic pressure of at least 150 psi or 1.5 times the working pressure of the pipe, whichever is greater.

b) Test pressure shall:

1. Not exceed the pipe or thrust restraint design pressures,

2. Be of at least a 2-hour duration.

3. Not vary by more than plus or minus 5 psi.

4. Not exceed twice the rated pressure of closed valves or fire hydrants included in the test section.

5. Not exceed the rated pressure of resilient seated butterfly valves.

c) Pressurization:

1. Under the supervision of Utility personnel, slowly fill each valved section of pipe with water.

2. Apply the specified test pressure, based on elevation of the lowest point of the line or section under test, and correct the elevation of the test gauge by means of a pump connected to the pipe.

d) Air removal:

1. Before applying, the specified test pressure, expel air completely from the pipe, valves, and hydrants.

2. Install air release valves at all points where entrapment of air occurs.

3. After all the air has been expelled, close corporation stops and apply the test pressure.

4. At the conclusion of the pressure test, remove the corporation stops and plug or leave in place at the discretion of the Utilities Director.

e) Examination:

1. Carefully examine all exposed pipe, fittings, valves, fire hydrants, and joints.

2. Repair or replace any damaged or defective pipe, fittings, valves, or hydrants that are discovered with sound material and repeat the test until it is satisfactory to the City.

2.3.7 Water Line Leakage Tests

a) Concurrently conduct a leakage test with the pressure test.

b) Leakage is defined as the quantity of water that must be supplied into the newly laid pipe to maintain the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

c) Allowable leakage:

1. Allowable leakage shall be determined in accordance with Section 2.1.7 of these Standard Specifications.

2. When testing against closed metal-sealed valves, an additional leakage per closed valve of 0.0078 gal/hr/in. of nominal size shall be allowed.

3. When hydrants are in the test section, test against the closed hydrant.

2.3.8 Acceptance of Installation

a) If any test of pipe laid discloses leakage greater than that determined under Section 2.1.7 of these Standard Specifications, locate and repair the defective material until the leakage is equal to or less than the determined amount allowable.

b) Repair all visible leaks regardless of the amount of leakage.

2.3.9 Cleaning and Disinfection of New Water Lines

a) Flush water lines clean prior to disinfection.

b) Thoroughly disinfect water lines in accordance with AWWA C651 (latest edition) prior to placing in service.

1. Use chlorine-disinfecting agent in the pipe so that the chlorine concentration in the water is kept at a minimum of 50 mg/L available chlorine. To ensure that this concentration is maintained, measure the chlorine residual at intervals of 6 hours. Table 1 shows how much chlorine is needed for each 100 feet of line for pipes of various diameters. A one-percent (1%) chlorine solution may be prepared either with one pound of calcium hypochlorite for each 8.5 gallons of water or with sodium hypochlorite.

TABLE 1
CHLORINE REQUIRED TO PRODUCE A 50 MG/L CONCENTRATION
IN 100 FEET OF PIPE, BY DIAMETER

Pipe Size (Inches)	100% Chlorine (Pounds)	1% Chlorine Solutions (Gallons)
4	0.027	0.33
6	0.061	0.73
8	0.108	1.30
10	0.170	2.04
12	0.240	2.88
14	0.328	3.96
16	0.428	5.12
18	0.540	6.48
20	0.680	8.00
24	0.980	11.52

2. Allow water to escape from the ends of the lines to cause dispersion of the chlorine solution into all parts of the system.

3. Operate all valves and fire hydrants during the time disinfection is occurring.

4. Retain the chlorine solution in the lines for a period of 24 hours.

5. At the end of the 24-hour period, the residual chlorine must be a minimum of 25 PPM. Otherwise, repeat the disinfection procedure again.

6. After the applicable retention period, flush the heavily chlorinated water from the line until the chlorine concentration in the water leaving the main is no higher than that generally prevailing in the system, or less than 1 mg/L. Perform such flushing only at sites where there is adequate drainage.

7. Bacteriological samples shall be collected to determine the effectiveness of the disinfection prior to placing new lines into service. Two sets of microbiological samples shall be collected 24 hours apart or a single set of microbiological samples shall be collected 48 hours, or longer, after flushing the highly chlorinated water from the line at approximately 2,500-foot intervals with samples collected near the beginning point and the end point, unless alternate sampling frequency and distance between sampling points approval has been obtained in writing from the Department. If the new line yields positive bacterial samples, additional flushing, disinfection, and bacteriological sampling shall be repeated until the samples results are negative. The Contractor shall advise the City through the resident inspector that the main is ready for bacteriological analysis. The City will provide the collection and analysis of the sample and advise the Contractor if the sample is acceptable at no charge. If the samples are not acceptable, additional collection and analysis of samples and additional disinfection costs will be the Contractor's sole responsibility.

2.3.10 Cleaning & Disinfection Procedures When Cutting Into or Repairing Existing Mains

a) Clean and disinfect existing water mains in accordance with AWWA C651, Section 9.

b) The following procedures apply when mains are wholly or partially dewatered. After the appropriate procedures have been completed, the main may be returned to service prior to completion of bacteriological testing in order to minimize the time customers are out of water upon approval of the City. Leaks or breaks that are repaired with clamping devices while the mains remain full of pressurized water present little danger of contamination and require no disinfection.

1. Trench Treatment: When an existing water main is opened, either by accident or by design, the excavation will likely be wet and may be badly contaminated from nearby sewers. Liberal quantities of hypochlorite tablets shall be applied to open trench areas to lessen the danger from such pollution.

2. Swabbing with Hypochlorite Solution: The interiors of all pipes and fittings (particularly couplings and sleeves) used in making the repair shall be swabbed or sprayed with a one-percent hypochlorite solution before they are installed.

3. Flushing: Thorough flushing is the most practical means of removing contamination introduced during repairs. If valve and hydrant locations permit, flushing toward the work location from both directions shall be performed. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.

4. Slug Chlorination: Where practical and in addition to the procedures above, a section of water main in which the break is located shall be isolated, all service connections shut

off, and the section flushed and chlorinated as described in Section 2.3.9 of these Standard Specifications, except that the dose may be increased to as much as 300 mg/L and the contact time reduced to as little as 15 minutes. After chlorination, flushing shall be resumed and continued until discolored water is eliminated and the water is free of noticeable chlorine odor.

5. Sampling: Bacteriological samples shall be taken after repairs are completed to provide a record for determining the procedure's effectiveness. If the direction of flow is unknown, samples shall be taken on each side of the main break. If positive bacteriological samples are recorded, the situation shall be evaluated by the City to determine corrective action, and daily sampling shall be continued until two consecutive negative samples are recorded.

2.3.11 **Water Service Line Connections**

a) Where practical, tap water mains in the upper half the pipe at a 45 degree angle to the pipe.

b) Maintain a distance of at least 24 inches between taps, measured along the axis of the water main.

c) Use tapped saddles for all taps on PVC mains and ductile iron mains in accordance with Section 2.2.18 of these Standard Specifications.

d) Service lines and meter setting sizes shall be at the discretion of the Utilities Director.

e) Service lines shall be installed by the contractor from the water mains to the edge of right-of-way lines or to the edge of easements provided for such water mains.

f) Meter setting locations shall be at the discretion of the Utilities Director. Meters 2-inch and larger shall be installed in a location free of vehicular traffic. Whenever possible, 5/8-inch x 3/4-inch and 1-inch meters shall be set in a non-traffic area at the right-of-way line.

2.3.12 **Water Service Line Pressure Tests:** Pressure tests of water service lines shall be performed in accordance with and meet the requirements of the latest edition of the Standard Plumbing Code adopted by the City of La Vergne.

2.3.13 **Annual Inspection**

a) Twelve (12) months following acceptance of the water system improvements, 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 representative of the Utilities Director, of the developer, and/or of the contractor. The developer and/or contractor will be responsible for correction of all failures/deficiencies that have occurred during the first year of service.

b) A warranty bond is required in the amount set by the Utilities Director and released upon correction of any deficiencies or failures.

2.4 STANDARDS FLEXIBILITY

2.4.1 **Interpretations of Standard Specifications and Design Criteria:** Interpretations of these Standard Specifications and Design Criteria or the determination of any other La Vergne standards and design criteria not covered under these Standards shall be at the discretion of the Utilities Director. The decision of the Utilities Director shall be based on past practices, traditional policies, widely accepted professional principles and practices of the industry.

2.4.2 **Right of Appeal:** Any disagreement with the interpretation of determinations made by the Utilities Director with respect to these Standard Specifications or any other standards not covered herein may be appealed to the City Administrator.

2.5 APPENDIX 1 – REFERENCE STANDARDS

2.5.1 American National Standards Institute (ANSI), latest edition

a)	B1.2	Pipe Threads
b)	14	Plastics Piping System Components and Related Materials
c)	16	Drinking Water System Components

2.5.2 American Society for Testing and Materials (ASTM), latest edition

a)	A47	Standard Specification for Ferritic Malleable Iron Castings
b)	A536	Standard Specification for Ductile Iron Castings
c)	B88	Standard Specification for Seamless Copper Water Tube
d)	D2000	Standard Classification System for Rubber Products in Automotive Applications
e)	D2241	Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
f)	F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
g)	F876	Standard Specification for Crosslinked Polyethylene (PEX) Tubing
h)	F877	Standard Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems
i)	F2080	Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Cross-Linked Polyethylene (PEX) Pipe

2.5.3 American Water Works Association (AWWA), latest edition

a)	C110	Ductile-Iron and Gray-Iron Fittings
b)	C111	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
c)	C151	Ductile Iron Pipe, Centrifigually Cast for Water
d)	C153	Ductile-Iron Compact Fittings
e)	C502	Dry-Barrel Fire Hydrants
f)	C504	Rubber-Seated Butterfly Valves, 3 In. (75 mm) Through 72 In. (1,800 mm)
g)	C509	Resilient-Seated Gate Valves for Water Supply Services
h)	C600	Installation of Ductile-Iron Water Mains and Their AppurtenancesC800
i)	C651	Disinfecting Water Mains
j)	C800	Underground Service Line Valves and Fittings
k)	C904	Cross-Linked Polyethylene (PEX) Pressure Pipe, ½ In. (12 mm) Through 3 In. (76 mm) for Water Service

2.5.4 National Fire Protection Association (NFPA), latest edition

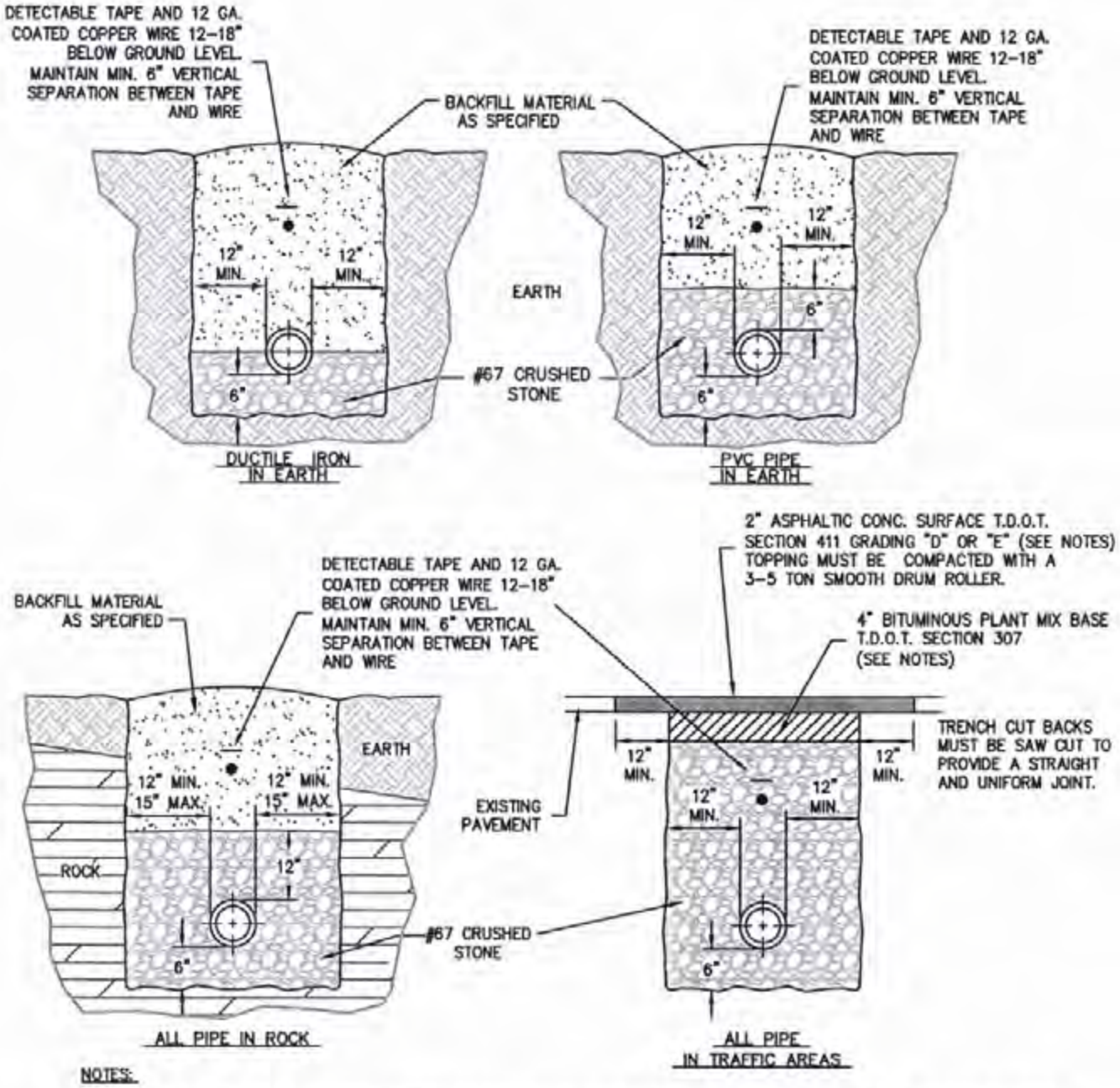
a)	1963	Standard for Fire Hose Connections

2.5.5 National Sanitation Foundation (NSF), latest edition

a)	14	Plastics Piping System Components and Related Materials
b)	61	Drinking Water System Components

2.6 APPENDIX 2 – STANDARD DRAWINGS

Detail 010 – Standard Waterline Trench Bedding and Backfilling
Detail 020 – Typical 3/4" or 1" Water Service Installation
Detail 021 – Typical 1-1/2" or 2" Disc Meter Water Service Installation
Detail 022 – 2" to 6" Compound Meter with Box and Cover
Detail 023 – Fire Meter Assembly in Vault for Dedicated Fire Service Line
Detail 030 – Typical Valve Box Setting Inside & Outside of Pavement
Detail 040 – Typical Fire Hydrant Setting
Detail 050 – Typical 2" Blow-Off Assembly
Detail 060 – Automatic Air Release Assembly for 6", 8", and 10" Water Mains
Detail 061 – Air Release Assembly for 12" and Larger Water Mains
Detail 070 – Reduced Pressure Backflow Preventer (Aboveground)
Detail 080 – Typical Protection for Water Lines
Detail 081 – Typical Concrete Kickers
Detail 082 – Water Main Road Crossing under Paved Roads and Railroads



NOTES:

1. FOR ROADWAYS 30' OR GREATER IN WIDTH OR DIVIDED HIGHWAYS WITH 2 OR MORE LANES USE 8" OF BINDER (2 LIFTS) AND 3" OF TOPPING.
2. BINDER SHALL BE INITIALLY INSTALLED FLUSH WITH EXISTING ASPHALT SURFACE AND SHALL BE IN PLACE FOR 2 WEEKS TO ALLOW FOR SETTLING AND COMPACTION. AFTER 2 WEEKS, MILL UP 2" OF THE NEW BINDER AND EXISTING ASPHALT TO THE DIMENSIONS SHOWN IN EACH DIRECTION AND INSTALL 2" OF NEW SURFACE MIX OVER MILLED AREA. REPAINT OR REPLACE, IF THERMOPLASTIC, ALL DELINEATION LINES AND PAVEMENT MARKINGS.
3. WHERE EXISTING SURFACE IS CONCRETE SUBSTITUTE 6" T.D.O.T. ITEM NO. 701-02.
4. FOR RESTORATION OF GRAVEL SURFACES, BACKFILL ENTIRE TRENCH WITH STONE.

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FILE NAME: L: \Engineering\442-56\2015 Updates\Drawings\010 Water Line Bedding and Backfilling Detail.dwg

STANDARD WATERLINE BEDDING & BACKFILLING

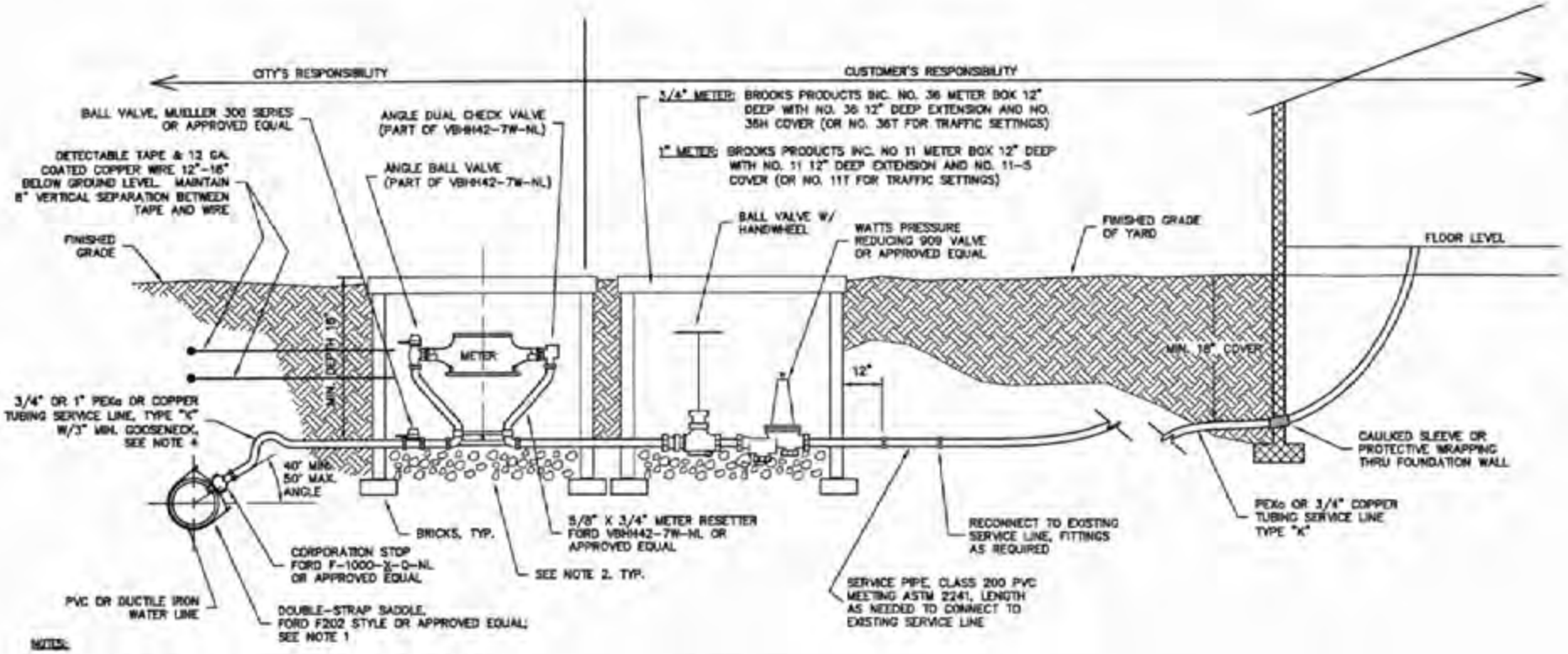
N.T.S.

Revised September, 2015

STANDARD DETAIL 010

CITY OF LAVERGNE, TENNESSEE

G & M File No. 442-56



NOTES:

1. USE DOUBLE STRAP SADDLE FOR ALL PVC AND DUCTILE IRON PIPE INSTALLATION.
2. PLACE 3" DEEP (MIN.) OF CLEAN 1/2" TO 3/4" CRUSHED STONE IN BOTTOM OF METER BOX.
3. SEE STANDARD SPECIFICATIONS FOR LIST OF SERVICE CONNECTION FITTINGS.
4. METER:
   - 4.1. 3/4 INCH – BADGER MODEL 25, LEAD FREE BRONZE ALLOY OR ENGINEERED POLYMER WITH REMOTE READ TRANSMITTER.
   - 4.2. 1 INCH – BADGER MODEL 70, LEAD FREE BRONZE ALLOY WITH REMOTE READ TRANSMITTER.
5. CASING IS REQUIRED IF THE SERVICE LINE IS UNDER THE ROADWAY.
   - 5.1. CASING PIPE SHALL EXTEND FROM WATER MAIN TAP TO METER OR RIGHT-OF-WAY TO RIGHT-OF-WAY.
   - 5.2. CASING PIPE SHALL BE PVC SCH. 80 AND THE DIAMETER SHALL BE THE OUTSIDE DIAMETER OF THE SERVICE LINE PLUS 2" MINIMUM.
   - 5.3. CASING IS NOT REQUIRED IF WATER MAIN IS NOT UNDER THE PAVEMENT AND WATER METER IS ON THE SAME SIDE OF THE ROAD AS THE WATER MAIN.
6. WHEN PEXa SERVICE LINE IS INSTALLED, DETECTABLE TAPE AND COPPER WIRE SHALL BE INSTALLED AS SHOWN AND PER PARAGRAPHS 22.26 AND 22.27 OF THE STANDARD SPECIFICATIONS. THE ENDS OF THE WIRE SHALL TERMINATE IN A VALVE BOX, METER BOX, OR OTHER APPROVED LOCATION, WHEREBY DETECTION EQUIPMENT MAY BE ATTACHED.

WATER LINE INSPECTION

OBJECTIVE:
As provided in the City of LaVergne Municipal Code new customer potable water service piping requires inspection and testing prior to commencement of potable water service. This policy establishes LaVergne Water Department minimum inspection and testing requirements to safeguard health, public welfare, and the protection of property.

REQUIREMENTS:
New water supply service piping shall be tested and proven tight for 15 minutes under a water pressure of not less than 80 psi or not less than 25 psi above the working pressure under which it is to be operated, whichever is more. The water used for test shall be potable water service.

Inspections shall be carried out on the portion of the piping from the building to the customer (discharge) side of the water meter and is in general the water supply system outside the building. The inspection shall include visual review of materials and workmanship to assure code conformance. A record of the inspection details shall be kept by LaVergne Water Department.

Inspection and testing of underground piping shall be made after trenches are excavated, piping installed and prior to any backfill put in place.

Advance notice of at least 24 hours is required for inspection and re-inspection and shall be performed during normal working hours. Contact the City of LaVergne Water Department at 615-793-9891.

TYPICAL 3/4" OR 1" WATER SERVICE INSTALLATION

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STANDARD DETAIL 020
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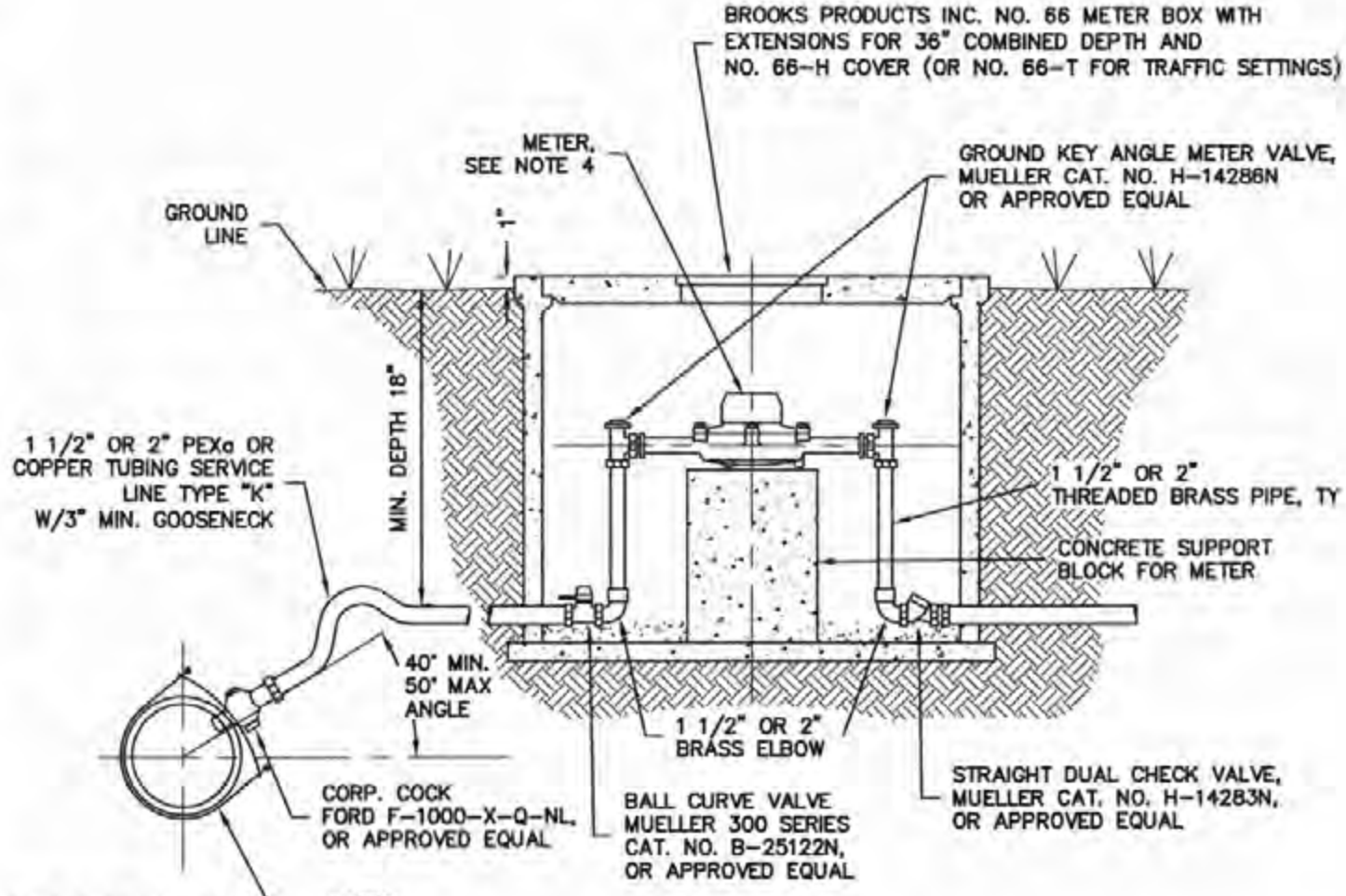
FILE NAME: I:\Engineering\442-56\2015 Updates\Drawings\020 Typical Water Service Installation.dwg



NOTES:

1. USE DOUBLE STRAP SADDLE FOR ALL PVC AND DUCTILE IRON PIPE INSTALLATION.
2. PLACE 3" DEEP OF CLEAN 1/2" TO 3/4" CRUSHED STONE IN BOTTOM OF METER BOX.
3. FITTINGS: TUBING-PEXa OR TYPE "K" COPPER SERVICE LINE.
4. METER:
   - 4.1. 1 1/2 INCH - BADGER MODEL RCDL-120, LEAD FREE BRONZE ALLOY WITH REMOTE READ TRANSMITTER, OR APPROVED EQUAL.
   - 4.2. 2 INCH - BADGER MODEL RCDL-170, LEAD FREE BRONZE ALLOY WITH REMOTE READ TRANSMITTER, OR APPROVED EQUAL.

1 1/2" OR 2" DISC METER WATER SERVICE ASSEMBLY

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STANDARD DETAIL 021

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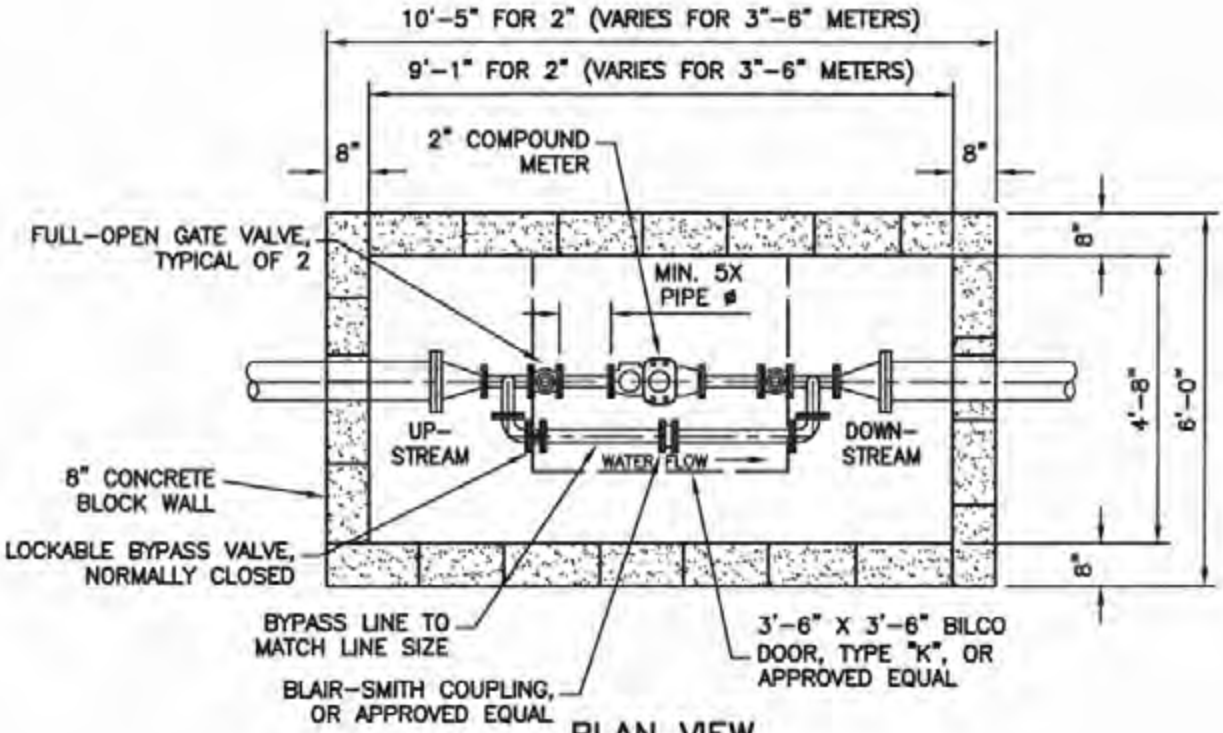
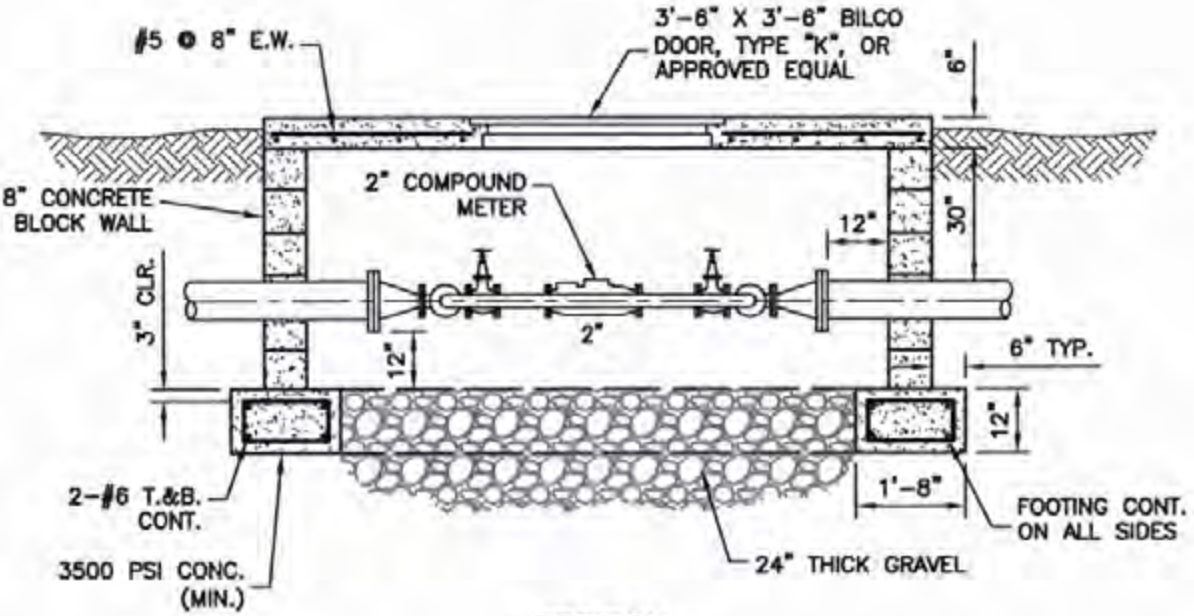
FILE NAME: L: \Engineering\442-56\2015 Updates\Drawings\021 Disc Meter Water Service Assembly.dwg



PLAN VIEW



SECTION

2" to 6" COMPOUND METER WITH BOX AND COVER

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STANDARD DETAIL 022

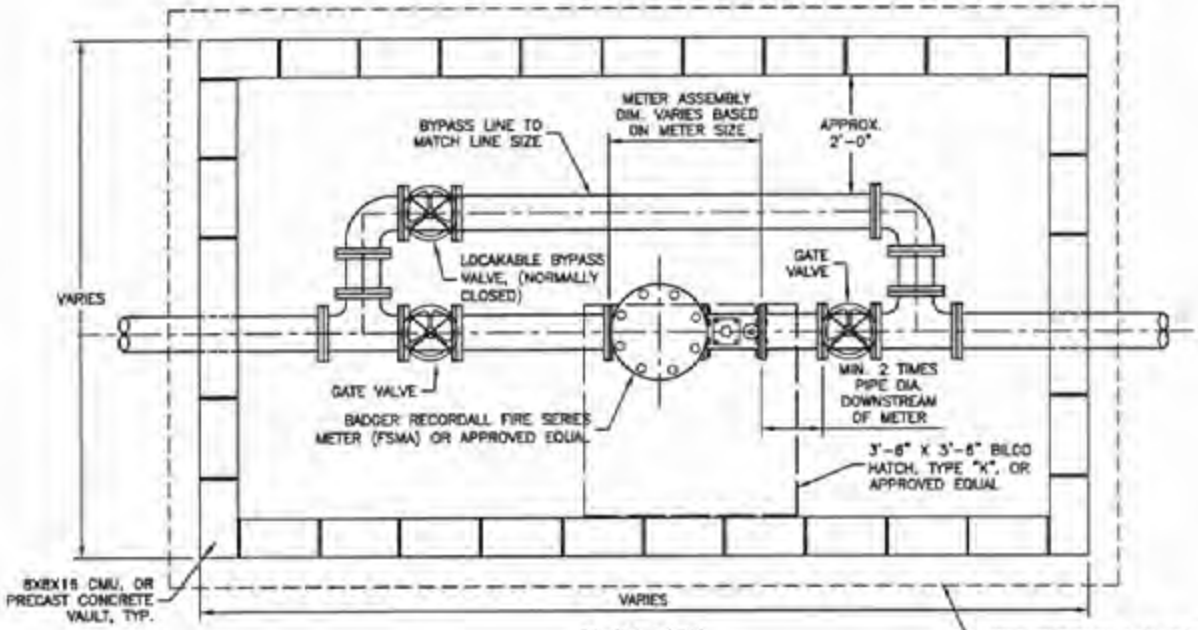
CITY OF LAVERGNE, TENNESSEE

G & M File No. 442-56

FILE NAME: L: \Engineering\442-56\2015 Updates\Drawings\022 2 in to 6 in Meter with Box and Cover.dwg

FIRE METER ASSEMBLY IN VAULT FOR DEDICATED FIRE SERVICE LINE

N.T.S.



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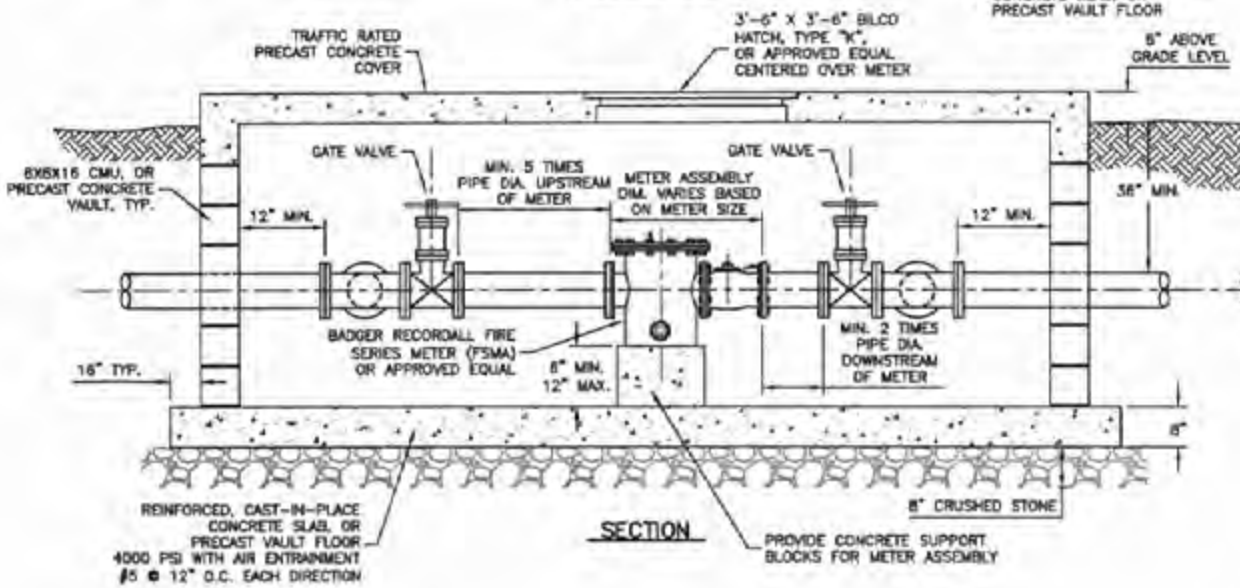

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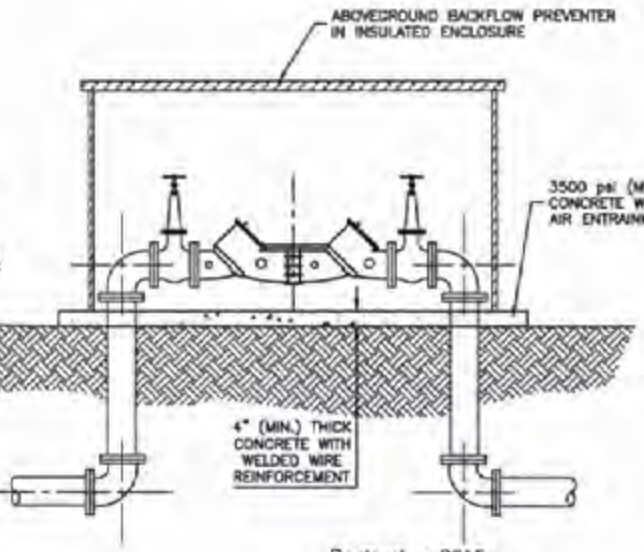

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STANDARD DETAIL 023

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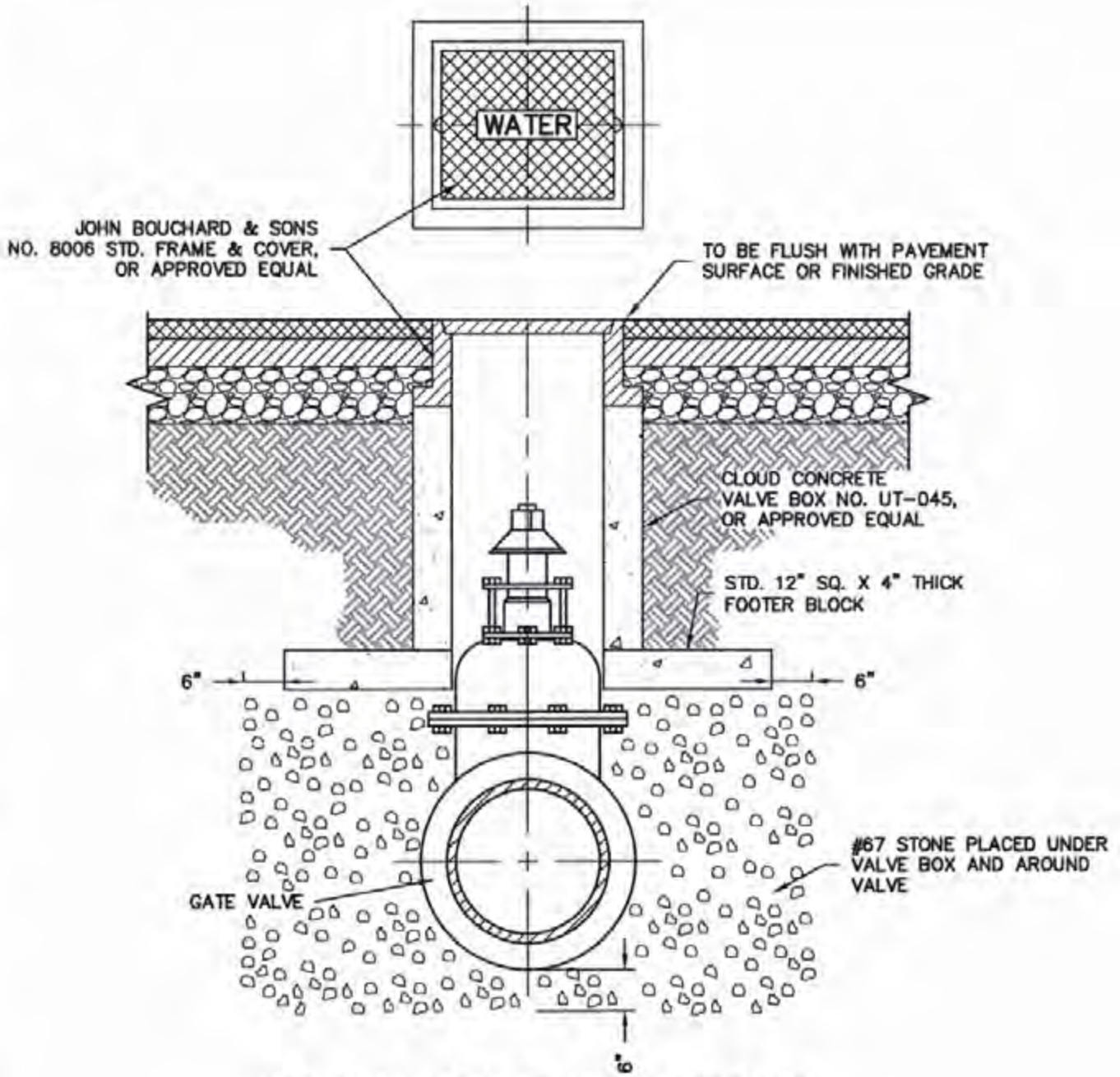
FILE NAME: L:\Engineering\442-56\2015 Updates\Drawings\023 Fire Meter Assembly in Vault for dedicated fire service line.dwg



TYPICAL VALVE BOX SETTING INSIDE & OUTSIDE OF PAVEMENT

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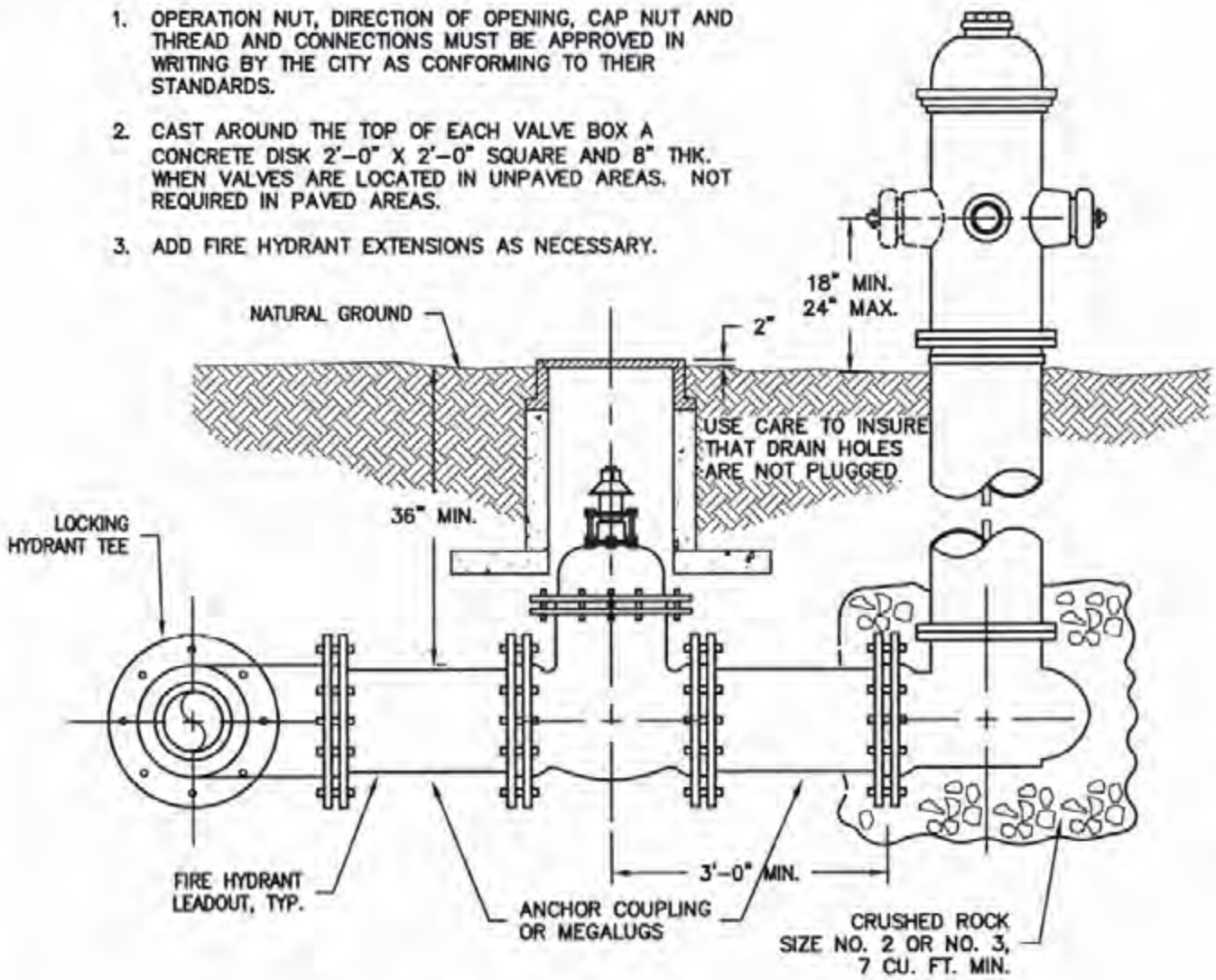
FILE NAME: L: \Engineering\442-56\2015 Updates\Drawings\030 Typical Valve Box Setting.dwg

NOTES:

1. OPERATION NUT, DIRECTION OF OPENING, CAP NUT AND THREAD AND CONNECTIONS MUST BE APPROVED IN WRITING BY THE CITY AS CONFORMING TO THEIR STANDARDS.
2. CAST AROUND THE TOP OF EACH VALVE BOX A CONCRETE DISK 2'-0" X 2'-0" SQUARE AND 8" THK. WHEN VALVES ARE LOCATED IN UNPAVED AREAS. NOT REQUIRED IN PAVED AREAS.
3. ADD FIRE HYDRANT EXTENSIONS AS NECESSARY.



TYPICAL FIRE HYDRANT SETTING

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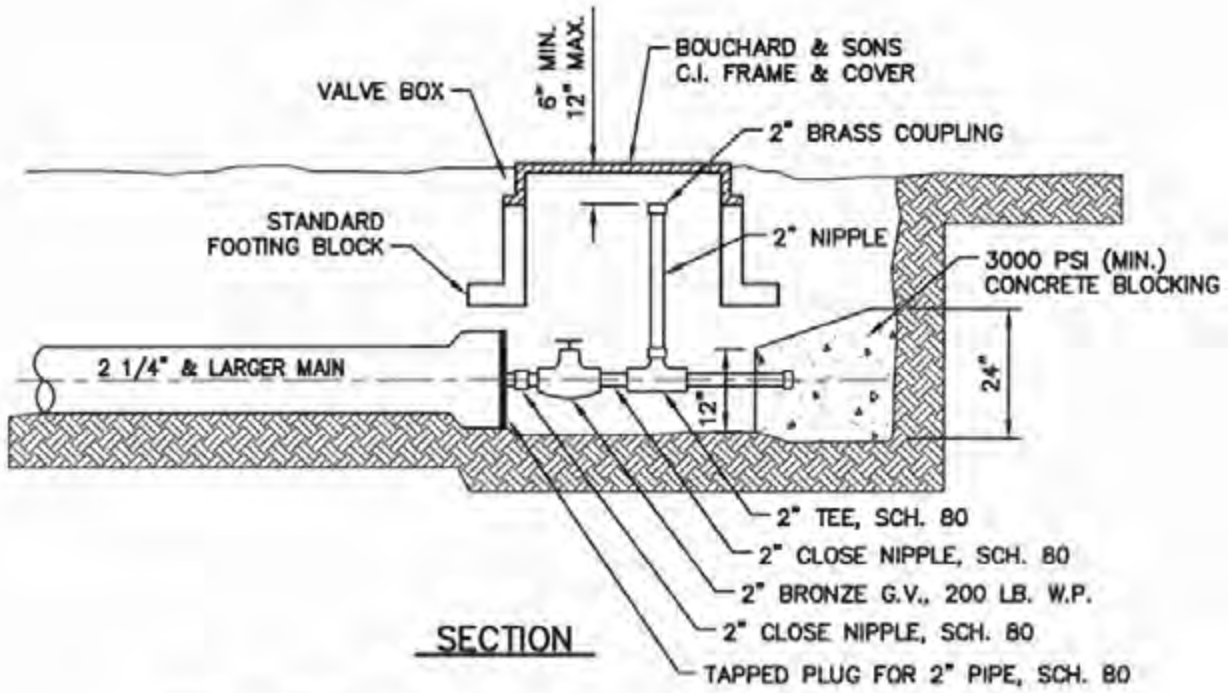

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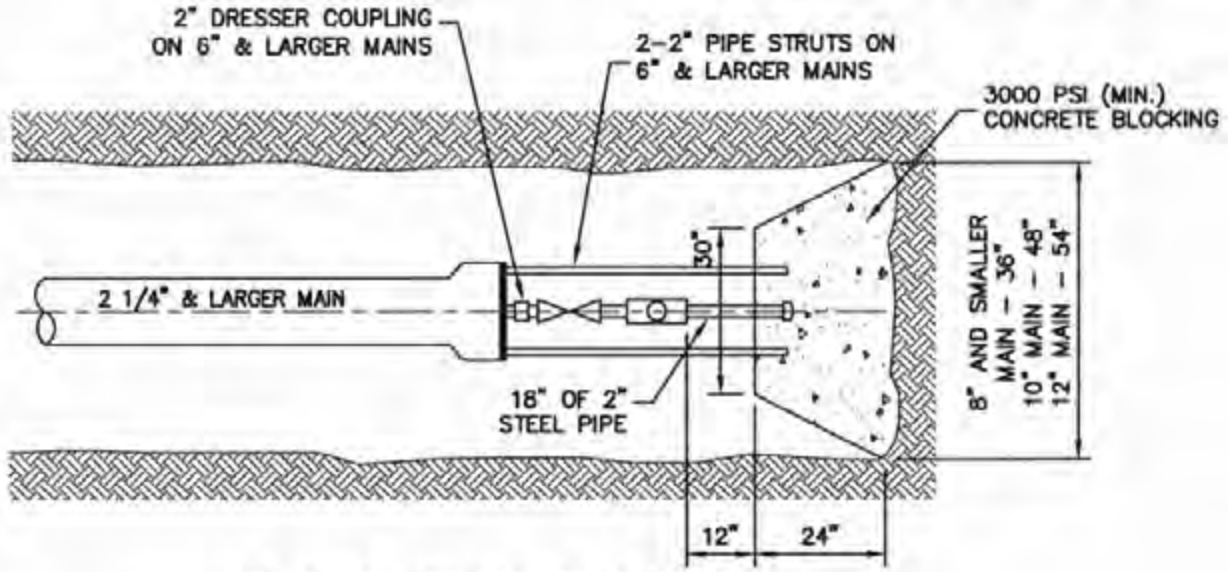

PLAN OF CONCRETE BLOCKING

TYPICAL 2" BLOW-OFF ASSEMBLY

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STANDARD DETAIL 050

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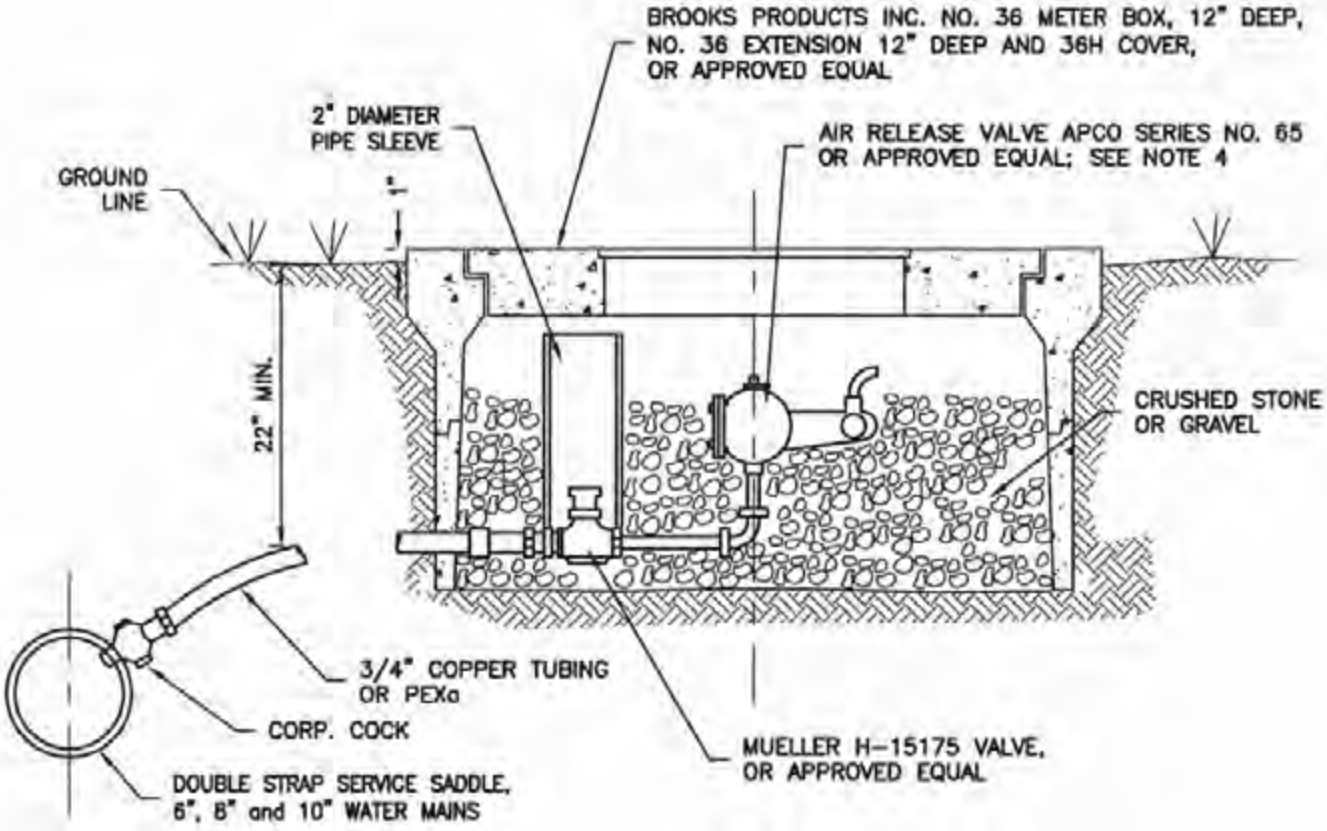
FILE NAME: L: \Engineering\442-56\2015 Updates\Drawings\050 Typical 2 in Blow-off.dwg



NOTES

1. USE TRAFFIC-RATED MANHOLE FRAME & COVER WHEN IN ROADWAY.
2. PIPE GRADE SHALL BE LOWERED, IF REQUIRED, WHEN APPROACHING AIR RELEASE VALVE TO GIVE VERTICAL SPACE FOR AIR RELEASE APPURTENANCES.
3. FOR AUTOMATIC AIR RELEASE VALVE, USE AS SHOWN. FOR MANUAL AIR RELEASE, OMIT THE APCO VALVE AND USE A 12" NIPPLE WITH A THREADED END.
4. ENGINEER TO SELECT APPROPRIATE AIR RELEASE VALVE MODEL BASED ON WATER MAIN SIZE AND CONDITIONS.

AUTOMATIC AIR RELEASE ASSEMBLY FOR 6", 8" and 10" WATER MAINS

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STANDARD DETAIL 060

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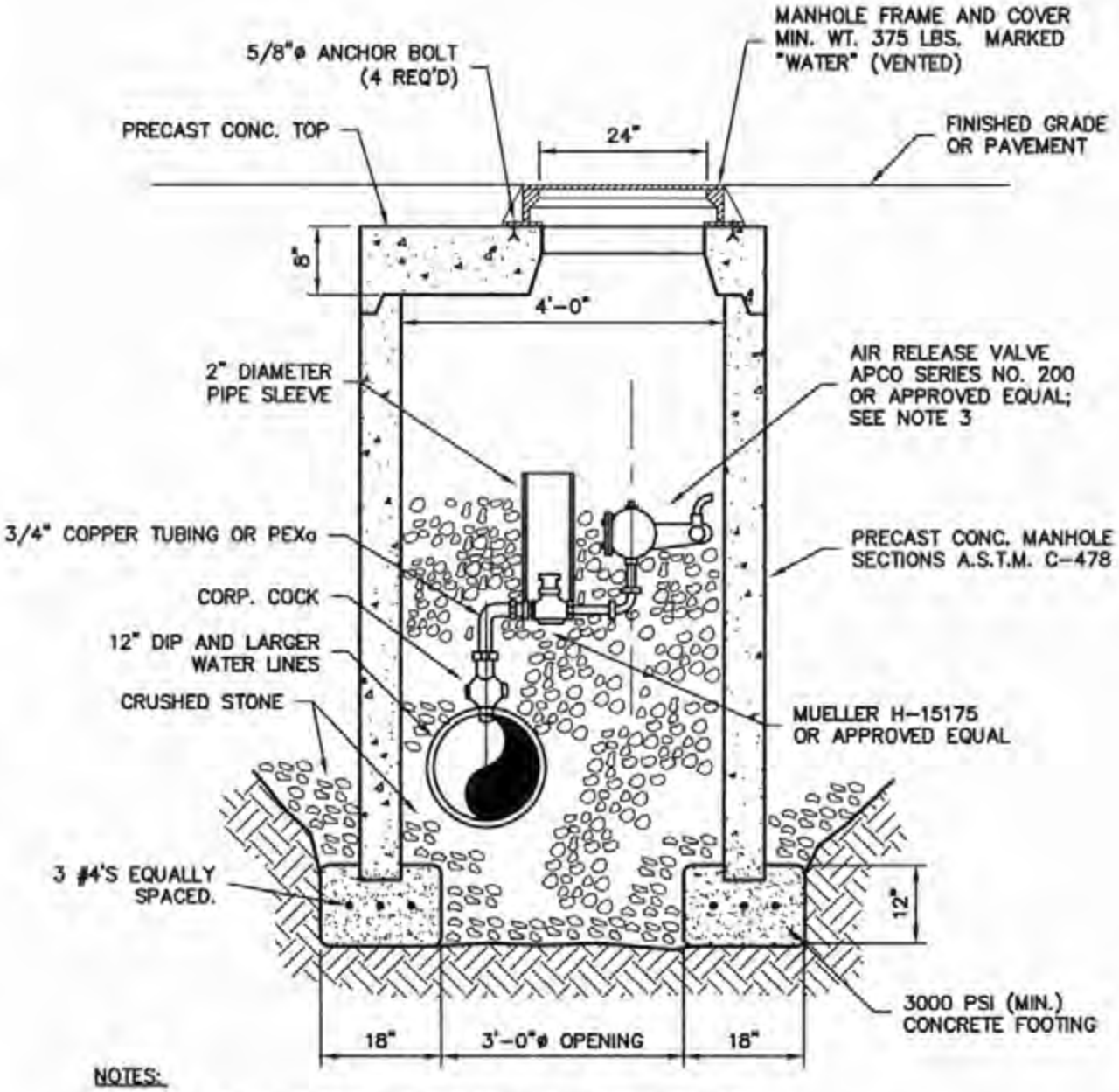
FILE NAME: L: \Engineering\442-56\2015 Updates\Drawings\060 Automatic Air Release Assembly for 6, 8 and 10 inch Water Mains.dwg



NOTES:

1. USE TRAFFIC MANHOLE FRAME & COVER WHEN IN ROADWAY.
2. PIPE GRADE SHALL BE LOWERED, IF REQUIRED, WHEN APPROACHING AIR RELEASE VALVE TO GIVE VERTICAL SPACE FOR AIR RELEASE APPURTENANCES.
3. ENGINEER TO SELECT APPROPRIATE AIR RELEASE VALVE MODEL BASED ON WATER MAIN SIZE AND CONDITIONS.

AIR RELEASE ASSEMBLY FOR 12" & LARGER WATER MAINS

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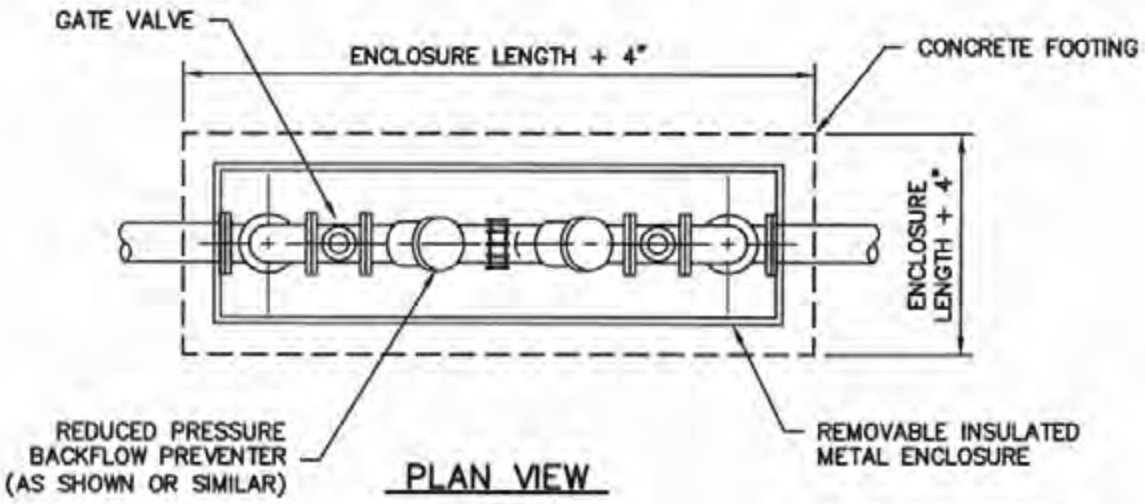
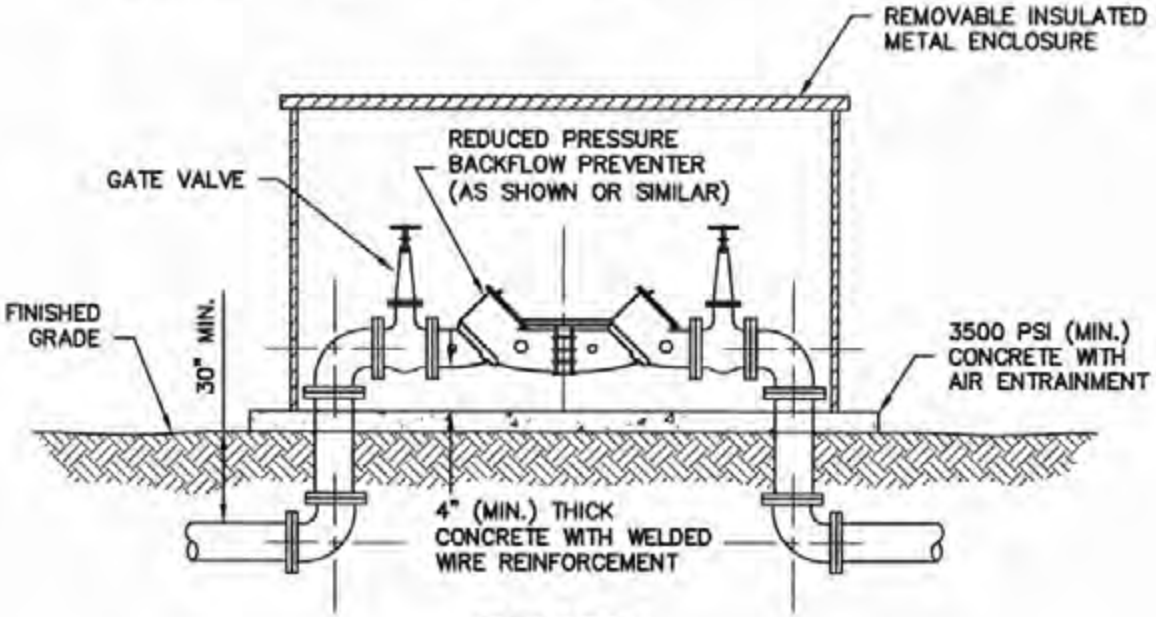


PLAN VIEW



ELEVATION

REDUCED PRESSURE BACKFLOW PREVENTER (ABOVEGROUND)

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Revised September, 2015

STANDARD DETAIL 070

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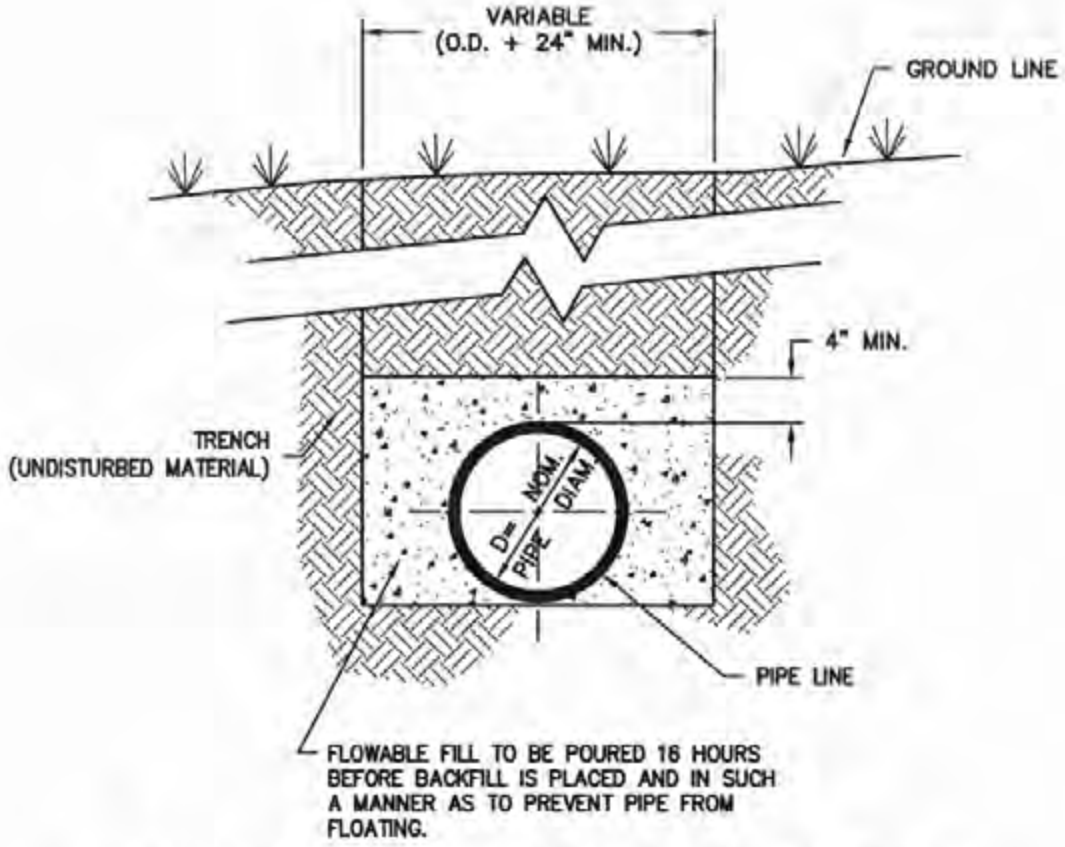
FILE NAME: L: \Engineering\442-56\2015 Updates\Drawings\070 Reduced Pressure Backflow Preventer.dwg



TYPICAL PROTECTION FOR WATER LINES

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STANDARD DETAIL 080

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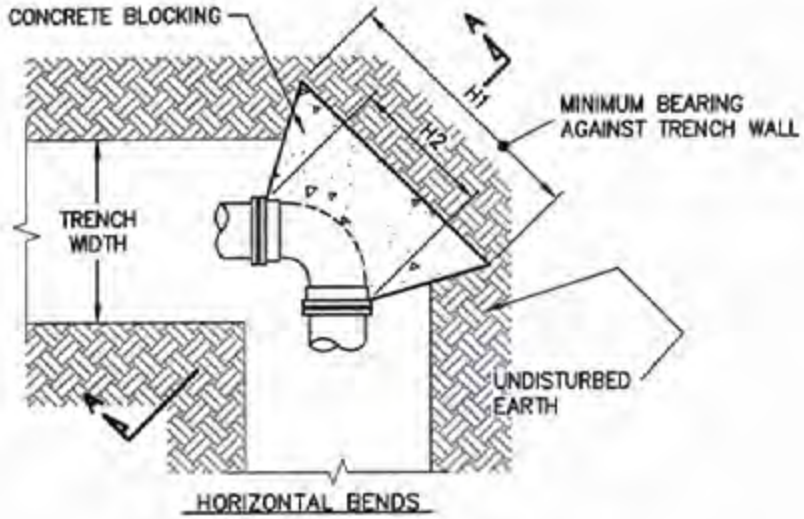
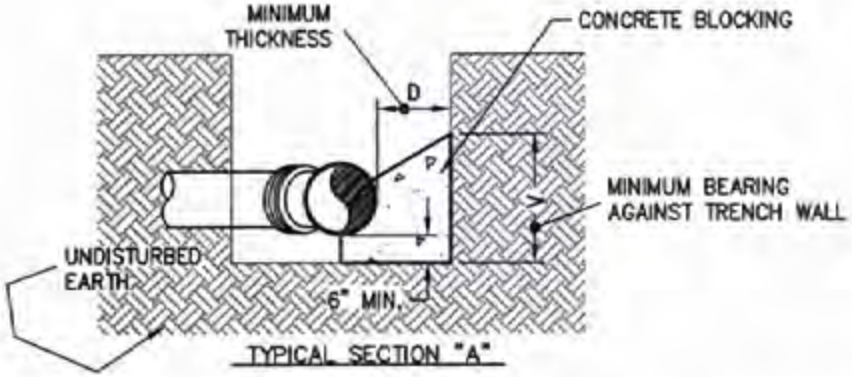
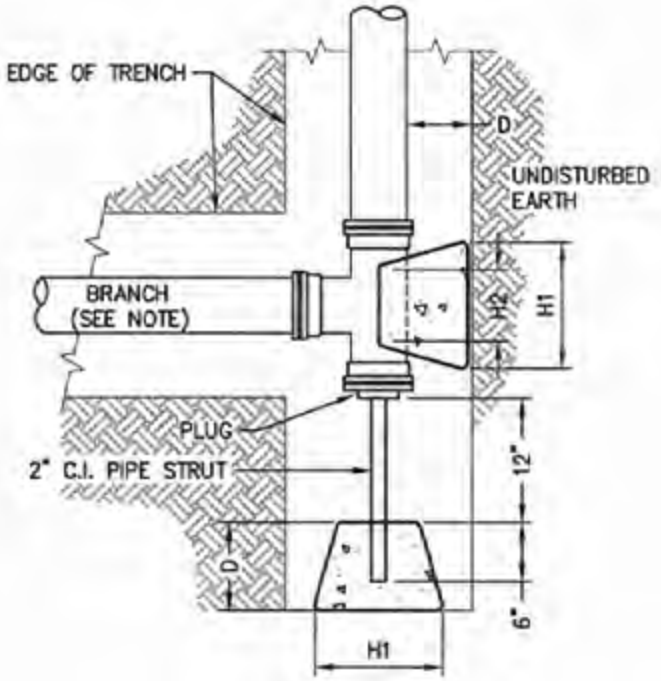


HORIZONTAL BENDS



TYPICAL SECTION "A"



TEES, CROSSES, AND PLUGS
NOTE: DIMENSIONS ARE CONTROLLED BY DIAMETER OF BRANCH MAIN.

TYPICAL CONCRETE KICKERS

N.T.S.

NOTE: SEE SHEET 2 FOR TABLE OF DIMENSIONS FOR CONCRETE BLOCKERS.

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STANDARD DETAIL 081

CITY OF LAVERGNE, TENNESSEE

G & M File No. 442-56

TABLE BASED ON 4,000 PSF SOIL CAPACITY AND 150 PSI WORKING PRESSURES + 50%. DESIGN ENGINEER SHALL SIZE FOR SPECIFIC SITE CONDITIONS AND PRESSURES.

TABLE OF DIMENSIONS FOR CONCRETE BLOCKERS

TEES, CROSSES, & PLUGS					90° BENDS					45° BENDS					22-1/2° BENDS					11-1/4° BENDS					PIPE SIZE
H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	
18"	10"	12"	18"	1.90	18"	41"	45"	18"	1.90	18"	6"	12"	18"	1.50	18"	6"	12"	18"	1.50	18"	6"	12"	18"	1.50	2"&2-1/4"
24"	12"	12"	18"	2.25	24"	12"	12"	18"	2.25	18"	8"	12"	18"	1.60	18"	8"	12"	18"	1.60	18"	8"	12"	18"	1.60	3" & 4"
24"	16"	18"	18"	3.50	30"	16"	18"	18"	4.05	24"	10"	16"	18"	3.20	24"	10"	16"	18"	3.20	24"	10"	16"	18"	3.20	6"
36"	18"	18"	18"	5.05	39"	18"	24"	18"	7.30	30"	11"	18"	18"	3.95	30"	11"	18"	18"	3.95	24"	11"	16"	18"	3.40	8"
48"	24"	18"	24"	7.15	54"	32"	24"	18"	10.25	24"	18"	21"	18"	4.60	24"	18"	21"	18"	4.60	24"	18"	21"	18"	4.60	10"
54"	30"	24"	24"	13.4	54"	32"	36"	24"	18.15	42"	18"	24"	24"	9.60	24"	18"	24"	24"	6.60	24"	18"	21"	24"	6.10	12"
60"	32"	30"	24"	17.9	60"	40"	42"	24"	25.0	44"	24"	30"	24"	13.2	30"	24"	24"	24"	9.20	27"	21"	24"	24"	7.90	14"
66"	34"	36"	24"	22.5	69"	48"	48"	24"	29.0	48"	30"	36"	24"	17.0	36"	30"	27"	24"	11.8	27"	24"	27"	24"	9.10	16"
66"	36"	40"	24"	27.5	69"	48"	48"	24"	33.0	48"	30"	36"	24"	17.0	36"	30"	29"	24"	13.0	27"	30"	29"	24"	11.0	18"
	38"		24"			48"		24"			40"		24"			36"		24"		30"	40"		28"		20"
	42"		24"			60"		24"			48"		24"			42"		24"			42"		32"		24"
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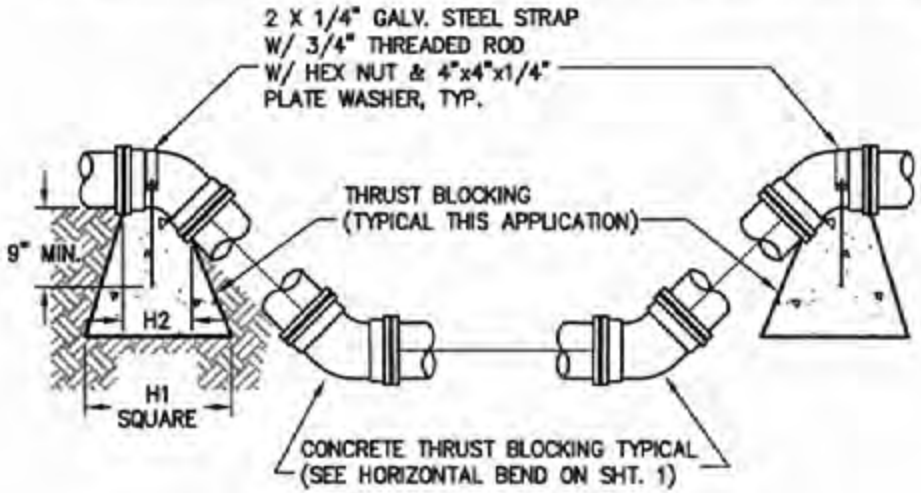

VERTICAL BENDS

TYPICAL CONCRETE KICKERS

NOTES:

1. IF EXACT SIZE PIPE BLOCKING IS NOT SHOWN, USE NEXT LARGER SIZE.
2. THRUST BLOCKING TO BE POURED-IN-PLACE 3000 psi (MIN.) CONCRETE.

Revised September, 2015

STANDARD DETAIL 081

CITY OF LAVERGNE, TENNESSEE

G & M File No. 442-56

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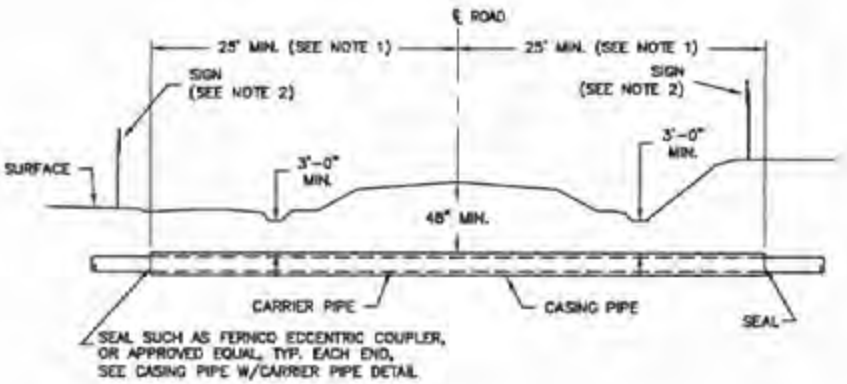
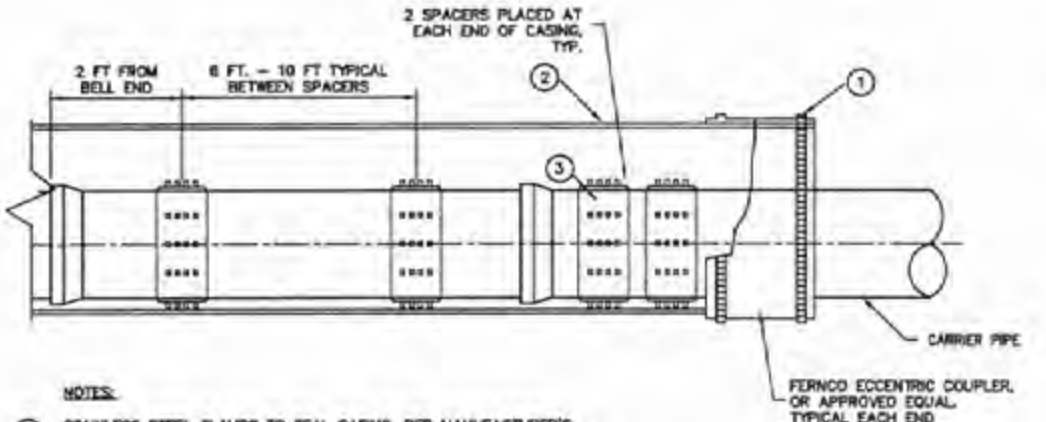


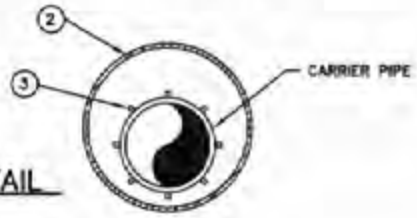
NOTES:

1. CASING SHALL EXTEND TO THE GREATER OF THE FOLLOWING DISTANCES:
   - 1.1. 2' BEYOND TOE OF SLOPE
   - 1.2. 3' BEYOND DITCH LINE
   - 1.3. MIN. OF 25' WHEN CASING IS SEALED AT BOTH ENDS
2. SIGN TO INDICATE LOCATION OF PIPE LINE AT R.O.W. LINE, KIND, OWNERSHIP, AND DEPTH OF PIPE LINE.
3. THE INSIDE DIAMETER OF THE CASING PIPE SHALL BE AT LEAST TWO INCHES GREATER THAN LARGEST OUTSIDE DIAMETER OF CARRIER PIPE. JOINTS OR COUPLINGS FOR CARRIER PIPES LESS THAN 6" IN DIAMETER AND AT LEAST 4" GREATER FOR CARRIER PIPES 6" AND OVER IN DIAMETER.
4. FOR RAILROAD CROSSINGS, THE REQUIREMENTS OF THE RAILROAD COMPANY SHALL DICTATE THE SIZE AND MATERIAL OF THE CASING PIPE.
5. FOR ANY TDOT HIGHWAY CROSSINGS, THE DESIGN AND INSTALLATION OF THE CROSSING SHALL CONFORM TO TDOT REQUIREMENTS.
6. FOR ANY HIGH PRESSURE TRANSMISSION GAS LINE CROSSINGS, THE REQUIREMENTS BY THE GAS LINE COMPANY SHALL BE MET.



NOTES:

1. STAINLESS STEEL CLAMPS TO SEAL CASING, PER MANUFACTURER'S INSTRUCTIONS.
2. CASING PIPE
3. SPACERS TO BE PROJECTION TYPE, HDPE RACI CASING SPACERS, OR APPROVED EQUAL. HEIGHT OF SPACER, SPACING AND INSTALLATION TO BE PER MANUFACTURER'S RECOMMENDATIONS FOR INTENDED USE.



CASING PIPE W/CARRIER PIPE DETAIL

N.T.S.

WATER MAIN ROAD CROSSING UNDER PAVED ROADS AND RAILROADS

N.T.S.

Revised September, 2015

STANDARD DETAIL 082

CITY OF LAVERGNE, TENNESSEE
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