STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243
PHONE: 615-532-0191 FAX: 615-532-0686

November 8, 2018

Mr. Eric Broomfield, PE
Hethcoat & Davis
278 Franklin Road, Suite 200
Brentwood TN 37027

RE: Mount Pleasant Water System (PWSID# 0000488)
Maury County
Project Number DW 18-1329
Standard Specifications for Water Line Construction

Dear Mr. Broomfield:

This letter acknowledges receipt of five copies of standard construction specifications for the Mount Pleasant Water System. We have reviewed the specifications and found them satisfactory. The specifications have been stamped to indicate our approval. This approval is valid for three years and will expire on November 8, 2021. You must then either resubmit the standard specifications or request in writing for extension of approval.

The approved standard specifications may be referenced on any plans submitted for approval before the expiration date. We are retaining one copy of the specifications for our records, and are returning the remaining copies to you. All addenda, revisions or correspondence concerning these specifications should contain the DW Project Number as referenced. If you have any questions contact us at (615) 532-0191.

Very truly yours,

R. William Hench

R. William Hench, P.E.
Drinking Water Engineering
Division of Water Resources

RWH/ DWS-35

cc: Columbia Field Office – Water Resources
Mount Pleasant Water System

TECHNICAL SPECIFICATIONS AND DESIGN CRITERIA

FOR

WATER SUPPLY & DISTRIBUTION FACILITIES

FOR

CITY OF MOUNT PLEASANT

OF

DW 18 1329

MAURY COUNTY, TENNESSEE

APPROVED FOR CONSTRUCTION
THE DOCUMENT BEARING THIS STAMP HAS BEEN RECEIVED AND REVIEWED BY THE
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
AND IS HEREBY APPROVED FOR CONSTRUCTION BY THE COMMISSIONER

NOV 06 2018

THIS APPROVAL IS VALID FOR ONE YEAR
THE APPROVAL SHALL NOT BE CONSTRUED AS CREATING A PRESUMPTION OF CORRECT OPERATION OR AS WARRANTING BY THE COMMISSIONER THAT THE APPROVED FACILITIES WILL REACH THE DESIGN GOAL
BY
FOR THE COMMISSIONER
TITLE

CITY OF MOUNT PLEASANT, TENNESSEE • 1824 •

ERIC THOMAS BROOMFIELD
REGISTERED ENGINEER
No. 00114175
STATE OF TENNESSEE
11/17/18

Issue Date August 2018

Approved by: _____
CITY OF MOUNT PLEASANT

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TECHNICAL SPECIFICATIONS AND DESIGN CRITERIA

FOR

WATER SUPPLY & DISTRIBUTION FACILITIES

FOR

CITY OF MOUNT PLEASANT

OF

MAURY COUNTY, TENNESSEE

MANAGEMENT

MRS. KATE COLLIER CITY MANAGER
MR. DONNY GROVES, PUBLIC WORKS DIRECTOR

ENGINEER

HETHCOAT AND DAVIS, INC.

Issue Date August 2018

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TECHNICAL SPECIFICATIONS

WATER SUPPLY & DISTRIBUTION FACILITIES

SECTION 1 - PROJECT DEVELOPMENT AND GUIDELINES

1.01 APPLICABILITY

A. These Specifications shall apply to the construction of water lines and other water distribution facilities which are located within the boundaries of the **City of Mount Pleasant of Maury County, Tennessee**.

B. The **CONTRACTOR/DEVELOPER** shall be responsible for the furnishing of all materials (unless materials are to be supplied by **City of Mount Pleasant** under separate agreement), machinery, labor, equipment and services necessary for the construction of water supply and distribution facilities in accordance with these Specifications and as shown on Plans approved by the City of Mount Pleasant.

C. These Specifications set forth the standards for the materials used in the water distribution system and the requirements for their installation and construction. The requirements include all necessary construction work items from clearing, staking, excavating, bedding, water line laying, backfilling, grading, clean-up, erosion control and restoration to property, testing and disinfection, etc., for the proper and complete installation of the facilities that comprise the water distribution system.

1.02 DEFINITIONS

A. **APPLICANT** – The person or entity seeking water service from the City of Mount Pleasant.

B. **BOARD** – The governing Board for the City of Mount Pleasant consisting of five voting members.

C. **CONTRACTOR** – The contractor shall be the installer of water system additions and shall be under the employ of the Developer for a site.

D. **DEVELOPER** – The person on entity owning and developing a new site or property within the confines of the City of Mount Pleasant.

E. **CITY** – The **City of Mount Pleasant** providing water service to portions of Maury County.

F. **CITY ENGINEER** – The engineer of record for all City water improvements. The City Engineer is appointed by the Mount Pleasant Board and serves at the direction of Mount Pleasant's City Manager.

G. **CITY PLANS** – Plans developed by the City Engineer for all Mount Pleasant water improvements.

H. **CITY MANAGER** – The City Manager for the City of Mount Pleasant.

I. **OWNER** – See CITY.

J. **PLAT** – Document showing general layout of all property lines, right-of-ways, easements, utilities, encumbrances, ownership, map and parcel information.

K. **SITE ENGINEER** – Engineer of record for the site development and working for the Developer.

L. **SITE PLANS** – Plans developed by the Site Engineer showing all improvements to a new development at the direction of the Developer.

M. **STATE** – The State of Tennessee, Division of Water Resources

1. 03 DESIGN CRITERIA - The following design guidelines for the preparation of water service and water line extension plans constitute the minimum requirements of the **City**. The **City** reserves the right, at its option, to impose requirements above the minimum standards set forth herein.

A. In all development applications, the **Developer** or the **Site Engineer** will be required to submit water demand information for domestic, fire and irrigation demands to assist in the proper sizing of water lines and appurtenances.

B. Where underground electrical lines exist or are proposed, the water line shall be located on the opposite side of the roadway. In commercial developments, the minimum separation between underground electrical and proposed water lines shall be 10' horizontal separation. Vertical separation shall be in accordance with applicable of Mount Pleasant Power System requirements.

C. Where gas lines exist or are proposed, a minimum 10' horizontal separation between the water line and gas line must be maintained.

D. Where sanitary sewerage lines exist or are proposed, a minimum 10' horizontal separation must be maintained with the water line. At crossing points, a minimum 18" vertical separation must be maintained with the water line at the higher elevation.

E. Where storm drainage lines exist or are proposed, a minimum 10' horizontal separation must be maintained with the water line. At crossing points, a minimum 12" vertical separation must be maintained with the water line at the higher elevation.

F. Water lines shall be located a minimum of 30 inches below the lower of the proposed grade over the water line or if driveways are anticipated, below the grade line of the roadway at the edge of pavement.

G. Maximum proposed grading across the **City** easement shall be limited to 5 Horizontal to 1 Vertical (5H:1V). If 5H:1V cannot be maintained within water service meter locations, retaining walls may be utilized to create areas suitable for meter pit installations.

H. Minimum water line size is 8" except that 6" water lines may be used on short dead end sections not exceeding 300 feet in length or on looped sections not exceeding 800 feet in length subject to the approval of the **City.** 4" water lines may be considered for short runs where fire service is available within 500' of a separate 6" water line. 1" – 3" sizes are only permitted for meter service connections.

I. Restrained joint systems for water line installations shall be designed using the Ductile Iron Pipe Research Association (DIPRA) or EBAA™ joint restraint calculation equations. Soil conditions and bedding types shall be based on each specific location of the water line. Design pressure shall be for 175 psi with a safety factor of 1.5. Restrained joint piping may be considered in locations where poor soil conditions exist which would impact the ability of concrete kickers to be effective OR in locations where extreme vertical alignment changes are required OR where proximity to other utilities limits the space available to install kickers or transfer loads to other utilities. Restrained joint piping will be noted on the design plans where applicable.

J. Fire hydrants shall be installed at the ends of 6" and larger dead end water mains. Blow-off assemblies at ends of 4" water lines will be considered for special situations. All fire hydrants shall be installed with isolation valves. Fire hydrant locations must be approved by the applicable governmental jurisdiction as well as by the **City**. All private fire lines must be metered and reduced pressure backflow preventers are required. Bonnets will be color coded in accordance with NFPA 291. Color coding will be as directed by the City Engineer. Private fire hydrants inside developments and behind the fire meter shall be painted silver.

K. Water valves shall be provided at a maximum spacing of 1000 feet along a water main and on all lines at intersection nodes. All water meters shall be served by independent valve so that any meter can be isolated without impact to other meter services. The valves are to be located within the **City** easement.

L. Automatic air release or fire hydrant assemblies should be provided at all high and low points along the water line or directed by the **City**.

M. When water extensions are proposed in new developments, the **Master Plans** and/or **Preliminary Plats** must be provided to the **City** for review and approval.

N. Steel casing pipe shall be provided for water line crossings under all arterial and collector roads. Casing pipe beneath commercial driveway ramps and other high traffic areas shall be as determined by the **City**. All carrier pipe inside cased crossings shall be restrained joint utilizing grip ring gaskets.

O. All water lines located inside roadways or beneath parking areas and/or sidewalks shall be ductile iron.

SECTION 2 - GENERAL INFORMATION

2.01 GENERAL RECITALS

A. All applicable Federal and state laws, municipal ordinances, the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the construction throughout. All permits required for the work shown on the Plans shall be obtained by the **Contractor** and/or **Developer** at his cost prior to the commencement of said work.

2.02 SAFETY

A. The **Contractor** shall comply with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by AGC of America, Inc. and the safety and health regulations for construction by the O.S.H.A. The **Contractor** shall furnish and install all necessary temporary works for the protection of the work and the public including, but not limited to: barricades; warning signs; and lights. The **City** is not responsible for the safety requirements related to work being installed by the **Contractor**.

2.03 LOCATING OF UNDERGROUND UTILITIES

A. The **Contractor** is to contact the Owner of all underground utilities before beginning construction in the area. Contractor shall determine exact location of all existing utilities prior to beginning construction in accordance with *State of Tennessee, Title 65 – Public Utilities and Carrier, Chapter 31 Underground Utility Damage Prevention Act.* Carefully protect from damage all utilities in the vicinity of the work at all times. The **Contractor** shall, at his own expense, furnish all labor and tools to either verify and substantiate or definitely establish the location of underground utilities prior to the commencement of excavation.

2.04 SURVEYING

A. For water line construction within platted subdivision developments, the **Developer** shall be responsible for the surveying activities that are requisite to insuring that the water line is installed within the **District** easement. This work, at a minimum, requires that a letter from a **Tennessee Registered Land Surveyor** certifying that the perimeter of each easement has been staked according to the approved Plans and recorded easement documents shall be provided to the **City** prior to initiation of the water line construction. Surveying work includes setting of sufficient right-of-way monuments and/or lot pins as necessary to define the **City** easement and proposed water meter locations. All grading work shall be completed with the roads constructed to subgrade and lot comers staked prior to the installation of water mains and water services. Confirmation that the water line has been installed within the easement is a requisite to the release of the construction bond.

2.05 PROTECTION OF PROPERTY

A. Care shall be taken by the **Contractor** to protect any utilities, trees, shrubs, driveways, or other incidentals, existing items or structures, etc., which are to remain and are not to be disturbed by the construction. The **Contractor** shall assume responsibility for any damages to such public or private property.

2.06 EROSION CONTROL

A. The **Contractor** shall be responsible for providing and maintaining an erosion control plan and implementing same to ensure that the construction does not harm the waters of the State of Tennessee. This plan shall comply with P.6. 100-4, Section 319, TCA 69-3-101, et. seq., Subsection 69-3-108 and Subsection 69-3-114 and the Division of Construction Grants and Loans General Permit for Utility Line Crossings, Chapter 1200-4-7.09.

B. As the **Contractor** is the party responsible for determining the means and methods of construction and their implementation, it follows that the responsibility for compliance with the aforementioned laws and regulations shall rest solely with the **Contractor**. Effective and continuous erosion control measures shall be installed and maintained throughout the prosecution of the Work.

2.07 CLEARING AND GRUBBING

A. Clearing and grubbing of the site shall include the removal of all trees, thickets, stumps; fence rows, obstructions, or other deleterious materials and/or material deemed unsuitable by the **City**. Said items shall be properly disposed of off-site by the **Contractor**. Stockpiling of said material shall not be permitted on the site.

2.08 OBSTRUCTIONS TO BE REMOVED AND REPLACED

A. The **Contractor** shall be responsible for the removal, safeguarding and replacement of fences, walls, structures, culverts, street signs, billboards, shrubs, mailboxes, or other obstruction which must be moved to facilitate construction. Such obstructions must be restored to at least their original condition.

2.09 ACCESS TO THE WATER SUPPLY SYSTEM

A. No valve, fire hydrant or cutoff shall be operated except by a representative of the **City**. "Cut-ins" or taps to live mains shall be made only in the presence of a representative of the **City**.

B. All water used for testing, filling of lines, and disinfection shall be done through a meter supplied by the **City**. The **Contractor** shall be responsible for the payment for the water used. There shall be a backflow prevention device between the meter and the main feeding the water.

2.10 INSPECTION BY THE CITY

A. Inspection by the **City** does not relieve the **Contractor's** responsibility to comply with these ***Technical Specifications*** and requirements of other permit holding agencies 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**.

B. Newly installed water lines shall not be covered until such time that the **City** inspector has had the opportunity to review the installation. Covering of water line without the approval of the **City** inspector may result in the **Contractor** being required to uncover the line to show proper installation.

C. If deficiencies are noted by the **City** inspector, he will notify the **Contractor** of the deficiency. Deficiencies shall be corrected within 1 working day. No new work will be accepted for service nor will pressure testing or bacteriological testing occur until such time that any deficiency has been corrected.

2.11 TEMPORARY WATER METERS

A. Temporary meters regardless of size (3/4", 1", 2", 3") shall require a meter deposit and payment of a meter maintenance fee. The **Contractor** shall enter into an Agreement with the **City**. Any violation of the terms of the Agreement can result in forfeiture of the deposit. Meters shall be returned in good condition to the **City**. In the event the meter is not returned, **Contractor** is responsible for the full replacement price of the meter. The meter deposit fees and maintenance fee schedule are available at the **City** office.

2.12 NOTIFICATIONS

A. The **Contractor** shall notify the **City** 30 days in advance of proposed start of construction for any **TDEC** approved water improvements.

B. **Contractor** shall notify the **City** a minimum of 72 hours in advance of work to be performed around or near existing water lines. **Contractor** is responsible for notification of all agencies that hold other permits on the project, e.g. TDOT, local governments, railroads, TDEC, etc. The **City** will advise the TDEC, Division of Water Supply of the start of construction after the pre-construction meeting is held.

2.13 PRE-CONSTRUCTION MEETINGS

A. Prior to beginning construction on any project which will connect to **City** water lines, the **Contractor** shall schedule a meeting with the **City Manager** or their designated representative and a pre-construction meeting shall be held. Topics of the meeting will include discussion on items such as schedule or work, submittals, approved plans, inspection schedule, permits, easements and other topics as related to the new installation.

2.14 SUBMITTALS/SHOP DRAWINGS

A. Prior to beginning construction, the **Contractor** shall submit one (1) electronic copy in .pdf format to the **City**. Submittals shall include catalog cuts, details, certificates of materials, dimension sheets, etc., necessary to provide details of material to be supplied for the project in accordance with these specifications and the approved plans. Submittals will be approved within 14 working days and notification of approval and any exceptions to the submittals will be provided back to the **Contractor** by email or hardcopy. Materials installed without approved shop drawings are subject to rejection by the **City**.

2.15 APPROVED PLANS

A. A copy of the plans approved by the **City** and the **Tennessee Department of Environment and Conservation** shall be maintained onsite during the time of water line construction. The approved TDEC plans shall bear the Red approval stamp issued by the State.

2.16 SERVICE CONNECTIONS

A. Service connections to water main shall not be made at points beneath proposed or existing driveways.

B. All service connections to the **City** system shall include **customer owned** pressure reducing valves on the customer side of the water meter to protect the customer side of the service from high pressures that may exist. The **Applicant** should contact the **City** to determine the normal operating pressure within the area where service connection is to be made.

C. All service connections to the **City** system shall include a cutoff/isolation valve on the customer side of the water meter.

D. All domestic and irrigation service connections in newly developed single lot residential areas will be minimum of 3/4-inch. Residential fire sprinkler service connections shall be a minimum of 1-inch. Fire, domestic and irrigation service connections for commercial, retail, apartments, multi-family and other developments shall each be sized for their specific water demands and as noted on the **City** approved plans.

SECTION 3 – MATERIALS

3.01 GENERAL

A. All materials to be incorporated in the project shall be furnished by the **Contractor** and shall be first quality, new and undamaged material conforming to all applicable portions of these specifications.

3.02 CEMENT

A. Cement shall be Portland Cement of a brand approved by the **City** and shall conform to "Standard Specifications for Portland Cement", Type 1, ASTM Designation C150, latest revision. Cement shall be furnished in undamaged 94 pound, one (1) cubic foot sacks, and shall show no evidence of lumping.

3.03 CONCRETE FINE AGGREGATE

A. Fine aggregate shall be clean, hard uncoated natural sand conforming to ASTM Designation C33, latest revision, "Standard Specifications for Concrete Aggregate".

3.04 CONCRETE COARSE AGGREGATE

A. Coarse aggregate shall consist of clean, hard, dense particles of stone or gravel conforming to ASTM Designation C33, latest revision, "Standard Specifications for Concrete Aggregate". Aggregate shall be well graded between 1-1/2" and #4 sieve sizes.

3.05 WATER

A. Water used in mixing concrete shall be clean and free from organic matter, pollutants and other foreign materials.

3.06 READY MIX CONCRETE

A. Ready-mix concrete shall be secured only from a source approved by the **City**, and shall conform to ASTM Designation C94, latest revision, "Specifications for Ready-Mix Concrete". Before any concrete is delivered on the job site, the supplier must furnish a statement of the proportions of cement, fine aggregate and course aggregate to be used for each mix ordered, and must receive the **City Engineer's** approval of such proportions.

3.07 CONCRETE

A. All concrete shall be air-entrained and have a minimum compressive strength of 3000 pounds per square inch in twenty-eight (28) days. The concrete shall be proportional and produced to have a slump of 3" with a 1" tolerance.

3.08 STEEL REINFORCING

A. Reinforcing bars shall be intermediate grade steel with a yield strength of 60,000 psi conforming to ASTM Designation A15, latest revision, "Standard Specifications for Billet Steel Bars for Concrete Reinforcement". Bars shall be deformed with a cross sectional area at all points equal to that of plain bars of equal nominal size.

3.09 CRUSHED STONE

A. Crushed stone for bedding or backfill shall consist of 1/2" to 3/4" washed coarse aggregate meeting the requirements of Section 903 of the Tennessee Department of Transportation Standard Specifications (Size No.6).

3.10 DUCTILE IRON PIPE AND FITTINGS

A. Ductile iron pipe shall be in conformance with the requirements of ANSI A21.51/AWWA C151 for ductile iron pipe centrifugally cast in metal or sand-lined molds. It shall be manufactured and tested in accordance with ASTM A536.

B. Pipe shall be furnished in lengths of 18' to 20' and shall be plain end ductile iron pipe with push-on single gasket joints. Pipe shall be manufactured by: American Cast Iron Pipe Company; U. S. Pipe; Clow; McWane; or Griffin. The joints shall be equal to the Fastite joint as manufactured by American Cast Iron Pipe Company or "Tyton" by U. S. Pipe.

C. Pipe bells shall have a tapered angular opening and a cast or machined retaining groove for the gasket. The gasket groove shall have a flared design so that maximum deflection can be provided. The plain spigot end of the pipe shall be beveled to simplify installation.

D. Gaskets shall be furnished with the pipe and shall be of high quality vulcanized rubber. Gaskets shall be made in the form of a solid ring to exact dimensions for fitting the gasket groove so that the joint is watertight for a pressure range of vacuum to 350 psi.

E. Lubricant shall be furnished with the pipe in sufficient quantity to provide for proper installation. The properties of the lubricant shall be such as to have no deleterious effect on either water quality or the rubber gasket.

F. All fittings shall be ductile iron mechanical joint fittings which conform to the specifications of ANSI A21.53/AWWA C153 as manufactured by American Cast Iron Pipe Company, U. S. Pipe and Foundry Company, Union Tyler, Griffin or approved equal. Import fittings are expressly prohibited. All fittings shall be installed using EBAA MegaLug restraints or MJ FieldLok restraints by Union Foundry or US Pipe. Imported fittings are prohibited.

G. Pipe and fittings shall be furnished with a standard thickness cement lining that conforms to ANSI A21.4/AWWA C104, on the inside with a bituminous seal coat approximately 1 mil thick applied to the cement lining in accordance with the manufacturer's standard practice. The pipe and fittings shall be furnished with a bituminous coating on the outside.

H. Restrained push-on joint pipe and fittings when required by the **City** shall be 'TR Flex" by U. S. Pipe and Foundry Company, "Super-Lock" by Clow Corporation, Flex Ring ® by America Cast Iron Pipe Co., or approved equal.

I. Where noted on the drawings, restrained joint pipe may be accomplished by the use of gripper-style restraint gaskets. Gripper style restraint gaskets shall be Fast-Grip® by American Cast Iron Pipe Co., Field-Lok 350® by US Pipe Co., Sure Stop 350® by McWane Pipe Co., Talon™ RJ Gasket by Griffin Pipe Co. or approved equal.

3.11 PVC WATER PIPE AND FITTINGS

A. All plastic water pipe shall be made from clean, virgin, NSF-approved, Type **I**, Grade **I** polyvinyl chloride (PVC) , conforming to ASTM resin specification D-1784. All pipe shall meet or exceed minimum requirements of Commercial Standard CS 256-63 and ASTM D.2241 for type 1120 material made to pressure ratings or SDR classifications as called for on the Plans or minimum SDR-21 wall thickness. Samples of pipe and joints shall be submitted to **Engineer** along with physical and chemical data sheets for his approval before purchase of pipe.

B. Pipe length shall not exceed twenty feet (20') unless approved by **City**. Provision must be made for proper transporting, handling and storage of pipe. Pipe and fittings are to be assembled with non-toxic lubricant as recommended by manufacturer and approved by **City**.

C. Pipe joints shall be the coupling or bell and spigot type utilizing rubber ring compression gasket(s) (ASTM D1869). Provision shall be made for thermal expansion and contraction to be taken up at the joint. Pipe joint shall conform to ASTM D3139 latest revision.

D. Fittings shall be mechanical joint, ductile iron, conforming to ANSI A21.53/AWWA C153 and approved by **City**. Proper adapters shall be used when connecting to piping of different material or dimensions, as approved by **City**. Fittings shall have pressure ratings at least equal to that of connected piping. The end of the pipe installed in all fittings, valves, hydrants, etc., shall not be beveled but shall be square cut. Import fittings are expressly prohibited.

E. Manufacturer shall have pipe tested in accordance with provisions of Commercial Standard CS256-63. Manufacturer shall furnish the City three (3) copies of certified statement to the effect that all items have met or exceeded requirements of the applicable specification. Test certificates will be required unless noted otherwise on drawings and shall cover all pipe used on this project.

F. All pipe and fittings shall be subjected to a rigid inspection after delivery to the site, and before being placed in the work. Any item found defective by such field inspection will be rejected and shall be immediately removed from the premises.

G. Marking shall include the following on each length of pipe: manufacturer's name, nominal size, class pressure rating, "PVC 1120", and NSF seal of approval.

H. All pipe shall have a 12 gauge THHN solid copper wire with coating, installed in such manner that detection with **City** equipment is possible. The detection wire shall be continuous and shall be connected to the copper service lines, valve boxes, hydrants, etc. In the event plastic service lines are used, said wire shall be installed with service pipe.

3.12 COPPER PIPE FOR WATER SERVICES

A. Water Service Line may be copper Type K, soft annealed conforming to ASTM B88 for sizes ¾" through 1".

B. Water Service Line may be copper, Type K, rigid, conforming to ASTM B88 for 2" pipe.

3.13 PEX PIPE FOR WATER SERVICES

A. Water service line (3/4" and 1") may be crosslinked polyethylene (PEX), Type A rated for 160 psi working pressure at 73.4^{0}F. PEX pipe shall meet the requirements of ANSI/NSF 61 and AWWA C904 and be rated for buried installation. Pipe shall be Uponor – Wirsbo®, AquaPEX; Rehau, Municipex® or equal. PEX shall be blue or white in color.

B. All PEX pipe shall be installed with 12 gauge, THHN solid copper wire with coating.installed in such manner that detection with **City** equipment is possible. The detection wire shall be continuous and shall be connected to the copper service lines, valve boxes, hydrants, etc.

C. All ¾" and 1" PEX pipe shall be installed with insert stiffeners to prevent the collapse of water service tubing. Stiffeners shall be MARS Company, A Division of Floyd S. Salser Jr. & Associates.

3.14 GATE VALVES

A. All valves on water lines 2" in diameter and greater shall be gate valves.

B. Gate valves shall be resilient seated and conform to the requirements of AWWA C515 (latest revision) as manufactured by M & H, American Darling, U.S. Pipe or approved equal.

C. The valve body, bonnet and bonnet cover shall be cast iron, ASTM A126, Class B, and fully coated with a fusion bonded epoxy to a minimum thickness of 8 mils.

D. All valves shall open left (counterclockwise) with non-rising stems and shall be provided with a two-inch (2") square operating nut. The stem seal shall be the O-ring type. Valve nut extensions with set screws and centering rings as manufactured by Custom Fabrications shall be installed to limit the depth from finish grade to the nut to 36-inches.

E. Valves shall be furnished with mechanical joint ends in accordance with ANSI A21.11 unless otherwise shown or directed and shall be provided complete with valve box.

F. Valve shall be suitable for installation in a vertical position in buried pipe lines.

G. The **Contractor** shall specify that the valves are to be shipped complete and in a completely closed position by the manufacturer.

H. Number of turns to operate valve shall be as listed below in order to closely resemble conventional distribution valve practices:

Pipe and Valve Size	Turns to Open
2"	6.5
3"	10
4"	13.5
6"	19.5
8"	25.5
10"	31.5
12"	37.75

3.15 BRONZE GATE VALVES

A. Valves on water lines smaller than 2 inches shall be 125 lb. bronze gate valves with non- rising stem, screw over bonnet, solid-wedge disc and threaded ends. Valve shall be equipped with a handwheel and open to the left. Valve shall be ASME/ASTM B62 rated with operating pressure of 200 psi for temperatures up to 150 degrees F.

3.16 BALL VALVES

A. Ball valves where indicated on the drawings for water appurtenances shall be bronze body ASTM B584, full port (sizes up to 1") and conventional port (sizes 1-1/4" up to 3"). Valves shall meet the requirements of MSS-SP-110. Trim shall be stainless steel. Stem shall be blow-out proof. Valve shall be rated for 600 psi operating pressure and furnished with a zinc coated, steel operating handle. The valve ball shall be brass ASTM B124 or ASTM B16. Packing and thrust washer material shall be PTFE.

3.17 TAPPING SLEEVES AND TAPPING VALVES

A. Tapping sleeves shall consist of a ASTM 36 steel tapping sleeve as manufactured by Romac Industries, Series FTS421 meeting the requirements of AWWA C223. Tapping sleeves shall be pressure rated for a minimum of 200 psi working pressure and 300 psi test pressure. The flange shall be AWWA Class D or E compatible with ANSI Class 150 bolt circles. Bolts and nut shall be high strength stainless steel meeting AWWA C111. A ¾" NPT type 304 stainless steel test plug shall be provided. Flange and outlet gaskets shall be SBR. The coating of the sleeve shall be fusion bonded epoxy in accordance with AWWA C213.

B. The tapping valve shall conform to all applicable specifications for gate valves.

3.18 VALVE BOXES

A. Valve boxes shall be reinforced concrete. Outside dimensions shall be 19-1/4" x 17". Valve boxes shall be installed with the length of the box perpendicular to the water lines. Inside dimensions shall be 13-1/4" x 11". Height of the box shall vary from 12" to 18". Each valve box shall be supported by four (4) concrete footing blocks, each having dimensions of 12" x 12" x 1-1/2" thick.

B. Valve box frame and covers shall be Cast Iron No 8006 as manufactured by John Bouchard & Sons Co. or approved equal.

C. Valve box castings shall be set so that the orientation of the word "WATER" on the lid is perpendicular to the direction of the water line on which the valve is located. Fire valve box covers shall be painted bright red with red enamel pint.

3.19 FIRE HYDRANTS

A. Fire hydrants shall be iron bodied fully bronze mounted hydrants as manufactured to equal or exceed AWWA Specification C-502, latest revision. Hydrants shall be suitable for 150 psi working pressure and shall be subjected to a test pressure of 300 psi. All fire hydrant materials provided and installed shall be in compliance with the minimum requirements of the "Reduction of Lead in Drinking Water Act".Fire hydrants shall be: American Darling B-84-B-5.

B. Inlet connection shall be a six inch (6") mechanical joint. Main hydrant valve shall be compression type, opening against the pressure and closing with the pressure, with a 5-1/4" valve opening.

C. All hydrants shall be equipped with two (2) 2-1/2" hose nozzles, one (1) pumper nozzle, breakable safety flange and safety stem coupling. Bronze nozzles shall be securely locked to prevent them from blowing off. Hose threads shall be National Standard. Nozzle caps shall be equipped with non-kink chains.

D. Hydrants shall be the dry barrel type with an oil reservoir and provision for automatic lubrication of stem threads and bearing surfaces each time the hydrant is operated. Double O-ring seals shall be provided to keep water out of the hydrant top. Direction of opening shall be left and so marked on the bonnet in cast letters and arrow.

E. Hydrants shall be provided with automatic multiport drain ports arranged to momentarily flush under pressure each time hydrant is operated. A positive stop shall be provided on the operating stem to prevent over travel when operating valve.

F. Fire hydrants shall be supplied with a bituminous coating for buried portion of hydrant and a brilliant red or yellow enamel finish for above ground portions of the hydrant. Bonnet color shall be in accordance with NFPA 291 and shall be determined by the City Engineer.

G. All fire hydrants shall be accompanied by a 6-inch gate valve and valve box for isolation of the hydrant from the water main.

3.20 BLOW-OFF ASSEMBLIES

A. Blow-off assemblies, where called for on plans, shall be as set forth on the standard details. Blow-off assemblies shall be provided with an isolation valve.

3.21 CASING PIPE AND APPURTENANCES

A. Where called for on the drawings, water pipe shall be installed in casing pipe with casing spacers and the end of casing pipe shall be sealed with neoprene casing end seals manufactured by Advance Products or equal. Casing pipe shall be at least twice the diameter of carrier pipe. Steel casing pipe shall have a minimum yield strength of 35,000 psi and meet requirements of ASTM A 252. Joints between sections shall be fully welded. Casing pipe shall have minimum wall thickness as follows:

Pipe Diameter	Wall Thickness
6" to 12"	0.250"
14"	0.312"
16" to 30"	0.375"
36" and larger	0.500"

B. Heavy duty two-piece, stainless steel band casing spacers shall be utilized on all casing pipe installations. Spacers shall be Advance Products and Systems Stainless Model SSI or approved equal. A casing spacer shall be installed on each end of each joint located 1' from the bell and spigot of pipe. One (1) additional spacer shall be installed equally separated on the remaining length of

pipe, i.e., a minimum of 3 spacers per 20' joint of pipe are required. Carrier pipe inside casing shall be installed with Fast-tight grip ring restraint devices on each joint.

C. Casing ends shall sealed with casing end seals. Casing end seals shall be 1/8" thick neoprene rubber with 1/2" wide T304 stainless steel worm gear bindings. Seals shall be pull on Type AC as manufactured by Advance Products and Systems or approved equal.

3.22 SERVICE ASSEMBLIES (3/4" and 1" RESIDENTIAL SERVICES)

Services shall not be installed in driveways or paved areas. Service connection to the water main will be limited to points where the depth of the water main is no deeper than 60".

A. **Fittings** - All water service materials provided and installed shall be in compliance with the minimum requirements of the "Reduction of Lead in Drinking Water Act". Line setters to consist of 180° ball type, cut-off, dual check valve assembly; compression fittings on both ends; and can be no more than a 7" rise. Approved manufacturer are Ford, Mueller, or McDonald.Approved manufacturers are Ford, Mueller, and McDonald.

B. **Meter Box** - Meter Boxes shall be a molded plastic box with cast iron lid made by Carson Plastic, 1118BCF. The cast iron lid shall have a 1-7/8" hole adjacent to the corner of the lid to facilitate the radio read installation.

C. **Water Meters** - Meters shall be furnished by **Developer.** Meters are to be Neptune (3/4" -1" SR meter or approved equal) equipped with Radio Read R900-I Radio Transmitter as manufactured by Neptune. Water meters shall be installed no deeper than 18". Meter sizing shall be determined by flow requirements provided by the **Applicant** and based on Table 5.6 of AWWA Manual of Supply Practices-Sizing Water Service Lines and Meters, No. M22. Meters shall meet the requirements of AWWA C700 and be lead free. Water meters for residential fire sprinkler services shall be a minimum of 1-inch.

D. **Service Saddles** – Service saddles for installation shall be Rockwell 311 or approved equal.

E. **Service Pipe** – Service pipe shall be **Type K Copper or PEX.** Service pipe under streets or roadways shall be installed in 3" diameter Schedule 40 PVC or DR 11 HDPE casing pipe. Depth of pipe is to be no less than eighteen inches (18") and no more than twenty-four inches (24").

3.23 SERVICE ASSEMBLIES (2" through 4" COMMERCIAL)

Service assemblies shall not be installed in driveways or paved areas. Where service assemblies are installed in sidewalk locations, the meter hatch shall be rated for H20 traffic loading. Service connection to the water main will be limited to points where the depth of the water main is no deeper than 60". The **Developer** or his agent is responsible for filing an application for commercial water service and for supplying information for any requested commercial domestic and irrigation system in order to confirm meter sizing.

A. **Fittings –** All water service materials provided and installed shall be in compliance with the minimum requirements of the "Reduction of Lead in Drinking Water Act".

B. **Valves –** Meet the requirements of Paragraph 3.14.

C. **Meter Box Assemblies** - 2" through 4" domestic meter assemblies shall be furnished and installed by the **Developer**. Meter vaults shall consist of precast concrete meter boxes. Size of meter boxes shall be as detailed on Standard Drawings. Box shall be furnished with an appropriately sized aluminum Halliday brand hatch with locking device. Where meter boxes are installed in sidewalk locations, the hatch shall be rated for H20 traffic loading. The hatch shall be furnished with two (2), 2-inch holes for placement of the meter antenna. Meter vaults shall be placed atop 12 inches of graded No. 57 or 67 crushed stone. Two (2), 1.5" holes shall be provided in two corners of the vault to allows for drainage of the vault. Meter vaults shall be set level and remain level after backfilling is completed. The top of the meter vault shall extend at least 3 inches above the final finished grade. Shop drawings are to be submitted for approval.

D. **Water Meters** – Meters shall be furnished by the **Developer**. Meters within the Water Meter & Box Assembly are to be Neptune Tru-Flow compound water meters equipped with Radio Read R900-I Pit Radio Transmitter. 2-inch meters shall be furnished without a strainer. 3-inch and 4-inch meters shall be furnished with a strainer. The meter assembly is to include a 2-inch brass ball valve with test port. All water meters shall meet the requirements of AWWA C702 and be NSF 61 compliant and be constructed of lead free materials. In 2-inch meter applications, a 2-inch, lead-free, horizontal swing, Y-pattern, bronze body check valve shall be provided after the meter (customer side). In 3-inch and 4-inch applications, a wafer-style, double door, rubber-seat, spring-actuated, iron body check valve shall be provided after the meter (customer side). Meter sizing shall be determined by flow requirements provided by the **Applicant** and based on Table 5.6 of AWWA Manual of Supply Practices-Sizing Water Service Lines and Meters, No. M-22. Shop drawings shall be submitted.

E. **Service Saddles** - Service saddles for installation shall be Rockwell 311 or approved equal.

F. **Service Pipe** - Service pipe shall **be Type K Rigid Copper or PEX**. Depth of pipe is to be no less than thirty inches (30") and no more than forty-two inches (42") underground. Service pipe under streets or roadways shall be installed in 4" diameter Schedule 40 PVC casing pipe.

G. **Reduced Pressure Backflow Preventer** – A reduced pressure backflow device is required on all meters (domestic or irrigation service). Height of backflow preventer shall be no less than twelve inches (12") from floor or no higher than five feet (5') from floor installed horizontally, and must have adequate drainage. Drain must be two (2) times normal pipe size. Example: for 1" backflow preventer, drain must have a 2" pipe. Backflow preventors are not to be installed in pits below grade level and shall be enclosed in a freeze proof enclosure.

3.24 FIRE SERVICE ASSEMBLIES (4" through 10" METERS)

A. Fire Services shall not be installed in driveways or paved areas. . If meter pits are installed in sidewalks, the hatch shall be rated for H20 traffic loading. Service connections to the water main will be limited to points where the depth of the water main is no deeper than 60".

B. The **Owner/Developer** or his agent is responsible for filing an application for commercial water service and for providing information for any requested fire protection system in order to determine fire meter sizing.

C. The following is a list of materials and requirements for 4" through 10" fire meters:

1. **Meter** - Meters shall be furnished by **Developer.** 4"-10" fire service meters shall be Neptune High Performance Protectus® III meters. Meter shall be furnished with strainer and appropriately sized low-flow, bronze bondy bypass meter. Bypass meter shall be furnished with lockable ball valves on each side of the bypass meter and shall also include a check valve behind the bypass meter. The main meter shall include an integral detector check valve (stainless steel spring-loaded type). Both meters shall be equipped with Radio Read R900-I Radio Transmitter. Water meters shall beet the requirements of AWWA C703 and be NSF 61 compliant and be certified lead-free. Meter sizing shall be determined by flow requirements provided by the **Applicant** and based on Table 5.6 of AWWA Manual of Supply Practices-Sizing Water Service Lines and Meters, No. M22.

2. **Pipe** - All pipe to be Ductile Iron Pipe (D.I.P.).

3. **Valves** – Meet the requirements of Paragraph 3.14. Each meter shall be preceded by a below-ground gate valve with valve box. Valve shall be separate and independent of the tapping sleeve and tapping valve used to make the connection to the water main. Fire meter valve boxes shall be as noted below.

4. **Connection to Main** - Tapping sleeve and valve at the water main with a valve box at surface level. If a tee has been installed in the main, a valve with box must be installed adjacent to main. Pipe size of connection to the main shall be at a minimum equal to the size of the fire meter.

5. **Reduced Pressure Backflow Preventer** - A reduced pressure backflow preventer, of appropriate size and design is required. **A double check valve is not acceptable.** The backflow prevention device may be installed either inside of the building or if located outside of the building, in an aboveground, freeze proof protection device installed in a horizontal position, that is approved by the City of Mount Pleasant (Hot Box or approved equal).

6. **Meter Vault** - Meter vault design and specifications:

a. The vault shall be precast concrete. Minimum interior dimensions of the precast concrete vault shall be as set forth on the Standard Details. The meter vault shall be set atop twelve-inches (12") of graded crushed stone.

b. The width of the meter vault shall have inside dimensions as set forth on the Standard Details with sufficient length and height to permit operation of the O.S. & Y. valves on each end of the assembly and allowing for the removal of either the meter or strainer unit or the complete assembly.

c. Meter pit shall include a precast floor. Openings and sectional joints shall be sealed to prevent groundwater intrusion. All exterior lifting holes shall be filled with grout.

d. Positive drainage must be provided so that water will not stand in the meter pit. Two (2) one and one-half inch (1.5") drain hole shall be provided in each corner of the vault to allow for drainage.

e. Hatch - A Halliday or Bilco Vault Door with sized as noted on the Standard Details shall be provided and offset immediately over the meter assembly. Each hatch shall include two (2), two-inch (2") holes in the hatch for placement of the antenna. If the meter vault is located in a sidewalk area, the hatch shall be rated for H20 traffic loading.

3.25 AIR RELEASE VALVE ASSEMBLIES

A. Materials and requirements for air release valve assemblies are: 1" corporation stop; 1" brass or type L copper nipple; 1" bronze ball valve rated for minimum 300 psi working pressure; 1" brass or type L copper nipple; A.R.I. D-050 combination air release valve/air vacuum valve with 1/16" orifice; and Carson 1118 BCF poly-plastic meter box, with cast iron meter reader.

B. Air release valve assemblies shall be located at high points in water lines and outside of traffic areas. The service tap for the corporation stop shall be placed directly atop the water line at the high point. The 1-inch service line from the tap to the air release valve shall be installed in a continuous uphill gradient with no sags or dip which would trap air.

3.26 CHECK VALVES

A. Check valves shall be included with 2-inch through 4-inch meter applications. Check valves shall be located immediately past the water meter (customer side). For 2-inch applications, the check valve shall be lead-free, bronze check valves rated for 200 psi non-shock cold working pressure. Valve configuration shall be horizontal-swing, re-grinding type, Y-pattern and feature a reweable seat and disc. Check valve shall meet the requirements of NSF 61 and NSF 372. Valve body shall be marked to signify lead free. Valve shall be Nibco, Inc. Model T-413-Y-LF or equal. For 3- and 4-inch applications, the check valve shall be lead free, ductile iron body check valve rated for 250 psi working pressure. The disc shall be bronze and all internals shall be stainless steel. The stabilization sphere shall be Buna-N. The valve shall be compliant with NSF 372 and be UL/FM rated. Valve shall be Nibco, Inc., Model KW-900-W-LF or equal.

SECTION 4 – EXCAVATION AND BACKFILL

4.01 GENERAL

A. The **Contractor** shall perform all required excavation and backfilling incidental to the installation of water mains and other appurtenances. Excavation shall be carried to the depths indicated on the drawings or as necessary to permit the installation of pipe, bedding, and appurtenances. A minimum depth of cover of 30" extending from the top of the water main to finish grade is required. The maximum depth of cover is normally limited to 60" unless otherwise approved by the **City**. Care shall be taken to provide a firm, undisturbed, uniform surface in the bottoms of trenches and excavations for structures. Where the excavation exceeds the required depth, the **Contractor** shall bring the excavation to proper grade through the use of an approved backfill material (generally crushed stone or lean concrete, depending upon the nature of the facility to be placed thereon). In the event unstable or unsuitable soil conditions are encountered at the bottom of the excavation, the **Contractor** shall continue the excavation until suitable material is encountered. The undercut area shall be refilled with 1" to 2" crushed stone up to the level of the grade line shown on the Plans with the top 6" to consist of *1/2"* to *3/4"* crushed stone for bedding.

B. The **Contractor** shall take such precautions as may be necessary to avoid endangering personnel, pavement, adjacent utilities or structures through cave-ins, slides, settlement or other soil disturbance resulting from his operations.

C. Backfilling shall be carried out as expeditiously as possible, but shall not be undertaken until the City representative has been given the opportunity to inspect the work. The **Contractor** must carry out all backfilling operations with due regard for: the protection of pipes, structures and appurtenances; the use of prescribed backfill materials; and procedures to obtain the desired degree of compaction.

D. The **Contractor** shall be responsible for storage of excavated material, disposal of surplus excavated material, trench dewatering and other operations incidental to excavation and backfilling operations.

4.02 CLASSIFICATION OF EXCAVATION

A. All excavation shall be unclassified.

4.03 TRENCH EXCAVATION

A. Trenches shall be neatly excavated to the alignment and depth required for the proper installation of pipe, bedding material and appurtenances. Trenches shall be opened up far enough ahead of pipe laying to reveal obstructions, but in general shall not include more than three hundred feet (300') of continuous open trench at any time. No open trench shall be left overnight and attention is directed to Article 4.03, Paragraph E. The **Contractor** will be required to follow up trenching operations promptly with pipe laying, backfill and clean-up, and in event of failure to do so, may be prohibited from opening additional trench until such work is completed.

B. The **Contractor** shall plan his operations so as to cause a minimum of inconvenience to property owners and to traffic.

C. No road, street or alley may be closed unless absolutely necessary, and then only if the following conditions are met by the **Contractor**:

1. Permit is secured from appropriate State, County or Municipal authorities having jurisdiction.

2. Fire and Police Departments are notified before road is closed.

3. Suitable detours are provided and are clearly marked.

4. Suitable signage in accordance with the Manual of Uniform Traffic Control Device's shall be provided.

D. No driveways shall be cut or blocked without first notifying the occupant of the property. Every effort shall be made to schedule the blocking of drives for the occupants convenience, and except in case of emergency, drives shall not be blocked for a period of more than eight (8) hours.

E. The **Contractor** shall furnish and maintain barricades, signs, flashing lights, and other warning devices as necessary for the protection of public safety. Flagmen shall be provided as required on heavily traveled streets to avoid traffic jams or accidents.

F. Trench width shall be held to a minimum consistent with proper working space for assembly of pipe. Minimum trench width shall be outside diameter of pipe bell plus six inches (6") on each side of the pipe centered in the trench. Maximum trench width up to a point one foot (1') above top of pipe shall be limited to the 4/3 of outside pipe diameter measured at the bell plus twenty four (24") inches. Boulders, large stone, shale and rock shall be removed to provide clearance of twelve inches (12") below and on each side of the pipe.

G. Trench walls shall be kept as nearly vertical as possible with due consideration to soil conditions encountered and when necessary, sheeting or bracing shall be provided to protect life and property as per the requirements and recommendations of O.S.H.A.

H. Where unstable soil conditions are encountered at the trench bottom, the **Contractor** shall remove such additional material as may be directed by the **City Engineer** and replace the excavated material with crushed stone backfill as indicated in Section 4.01.

I. The **Contractor** shall excavate by hand wherever necessary to protect existing structures or utilities from damage or to prevent over depth excavation in the trench subgrade.

J. The trench shall be excavated to sufficient depth to permit a minimum of thirty inches (30") of cover to be maintained over the top of water mains.

K. The bottom of the trenches shall be excavated to allow for 6" of crushed stone bedding and must be shaped by hand and bell holes must be dug so that the full

length of pipe is fully supported on the crushed stone trench bottom. Blocking shall not be used and neither shall the pipe be laid on a crushed stone trench bottom that has not been leveled to provide support throughout the full length of the pipe.

L. The **Contractor** is advised to the fact that the thirty inches (30") depth of cover is a minimum and may be exceeded in instances where obstructions are encountered in trenching operations but not to exceed 60 inches. The **Contractor** will be permitted to lay the water pipe above the obstruction only if the minimum cover required can be obtained while providing a cushion at least six inches (6") thick between the bottom of the pipe and the top of the obstruction. Where the minimum cover and the required clearance cannot be obtained the **Contractor** will be required to lay pipe under the obstruction. The **Contractor** will also be required to gradually increase the depth of trench when approaching cuts, creek banks, or other changes in grade in order to avoid the use of fittings, wherever it is practical to do so.

4.04 EXCAVATION FOR STRUCTURES

A. Excavation for structures shall be only as large as may be required for the structure and for working room around the structure. In earth, excavation shall generally extend to the outer limits of the structure at the bottom, and shall slope outward at such angle as may be required for stability of excavated face. In rock, excavation shall be carried to a point six inches (6") outside the structure so that no rock is left within six inches (6") of the finished structure.

B. Care shall be taken as the excavation approaches the desired grade to avoid over depth excavation and provide a firm and undisturbed soil surface on which footings, slabs or foundations are to be placed. Should the **Contractor** excavate below the desired grade level, the excavation shall be brought to grade by the use of lean concrete or crushed stone at the expense of the **Contractor**. The use of tamped earth backfill under foundations, footings or slabs will not be acceptable.

C. Where structures rest partially or wholly upon rock, the rock shall be excavated to a point twelve inches (12") below bottom of structure and crushed stone shall be used to bring the excavation back to grade, provided however, that where the structure will rest completely on sound solid rock, the **City** may at their discretion permit the footing, foundation or slab to be placed directly upon the rock surface.

D. Where the **Contractor** is permitted to place concrete directly on the rock, all dirt and weathered rock shall be removed and any seams or crevices shall be cleaned and filled with lean concrete (2,500 psi) prior to placement of the structural concrete.

E. Should the material found at the desired subgrade appear to be unstable or otherwise unsuitable for support of the structure, such condition shall be immediately called to the attention of the **City**. The **City** may direct that such unsuitable material be removed and replaced with lean concrete (2,500 psi) or compacted crushed stone.

F. Prior to placement of concrete, all subgrade bearing areas shall be clean and free of loose soil, debris, and ponded water.

4.05 ROCK EXCAVATION

A. Rock excavation shall consist of loosening, removing and disposing of all rock larger than 9 cu. ft. in volume, which in the opinion of the **City** can only be removed by blasting or other equivalent methods. Such materials to be classified as solid rock shall include boulders, bed rock, or solid concrete but shall not include pavement or shaly materials that can be ripped or loosened by other methods.

B. Where rock excavation is encountered in trenches the excavation shall be carried to a depth of twelve inches (12") below the bottom of the pipe. The rock shall also be removed to a width of at least six inches (6") beyond the outside of the pipe bell on each side so that no rock is left within six inches (6") of the outside wall of the pipe. Where rock is excavated in the bottom of the trench, the trench shall be brought back to grade by the use of crushed stone.

C. The **Contractor** shall exercise all necessary precautions in blasting operations. Suitable blasting mats shall be provided and utilized as required. Blasting shall be done only by experienced blasters properly licensed in the State of Tennessee. Careless shooting, resulting in the ejection of stones or other debris during blasting, shall be corrected immediately by the **Contractor**.

D. No blasting shall be done unless the **Contractor** has taken out the necessary insurance and has conducted a pre-blast survey and has provided copies of same to the **City** so as to fully protect and indemnify the **City** from all possible claims for damages resulting from any blasting operations. Blasting shall be performed in a manner that meets all recognized safety precautions and in accordance with the regulations of the State of Tennessee and in compliance with any Federal, or local laws or ordinances. In addition, the **Contractor** shall exercise the necessary care to safeguard and adequately protect stored blasting materials.

E. Where rock is encountered in the immediate vicinity of gas mains, telephone cables, building footings, gasoline tanks, or other hazardous areas the **Contractor** shall remove the rock by means other than blasting. Care shall be taken in blasting operations to see that pipe or other structures that were previously installed are not damaged by blasting. Blasting shall not be permitted within twenty-five feet (25') of an existing pipe line.

F. Excavated rock that cannot be utilized in trench backfill as permitted under Section 4.09 shall be removed from the site.

4.06 REMOVAL OF WATER

A. The **Contractor** shall be responsible for handling run-off, and ground water in such a way as to maintain trenches and excavations in a dry condition until the work is completed. Pumps, piping, well points, labor, fuel, and other facilities necessary to control, intercept, remove and/or dispose of water shall be provided by the **Contractor** at his own expense.

B. Water shall be kept out of trenches and other excavations to the extent necessary to protect the supporting strength of the foundation material, permit efficient and satisfactory assembly or replacement of facilities, and to prevent floating or misalignment. Water removed from trenches or other excavated areas shall be discharged to natural drainage way in such a fashion as to avoid any damage to adjacent properties or other facilities. The dewatering activities shall be conducted in strict compliance with the Erosion Control Plan.

4.07 STOCKPILE OF EXCAVATED MATERIAL

A. Excavated material shall be stockpiled as to avoid danger to workmen, water line, or traffic, and to cause minimum inconvenience through blocking of drives, sidewalks, natural drains, etc.

4.08 DISPOSAL OF SURPLUS EXCAVATED MATERIAL

A. Excavated material that is unsuitable or is surplus for backfilling shall be removed from the job site and disposed of at the **Contractor's** expense. The **Contractor** shall not dispose of suitable excavated material until the backfilling operations are completed. The **Contractor** shall be responsible for the disposal of said material in compliance with applicable laws and regulations.

4.09 TRENCH BACKFILL

A. Backfilling of trenches will commence and proceed immediately after water line construction is completed and inspected by the **City**. Backfilling of the trench will not be permitted until after inspection and approval of the assembled water line by the **City**. Water line that has been backfilled prior to the **City** inspection and approval of the assembled pipe line will be uncovered at the sole expense of the **Contractor**.

B. Backfill of a dirt/earth trench from the bottom of the water line to a point 12-inches above the top of the pipe shall consist of select backfill with no stone or material greater than 2-inch dimension placed uniformly on both sides of the pipe and compacted by hand ramming and tamping in layers not exceeding 6-inches in thickness. Graded crushed stone (No. 67) may also be used as backfill in the select backfill area. Where the trench is located in rock, the backfill shall consist of graded crushed stone (No. 67) from a point 12-inches below the pipe to a point 12-inches above the pipe. The additional crushed stone backfill shall not be placed until the pipe has been inspected and approved for backfill by the **City**.

C. Backfill of the trench from the point twelve inches (12") above the top of the pipe to the finish grade line shall be as follows:

1. Public Streets or Roads - Backfill and pavement replacement for water line trenches cut across public streets or roadways shall meet the requirements of the agency having jurisdiction over the street and/or roadway. At a minimum, backfill shall consist of clean crushed stone placed (No. 67) in 6" lifts and properly compacted by suitable mechanical means.

2. Paved Driveways and Parking Areas - Backfill under paved private driveways or paved parking areas shall consist of clean crushed stone

(No. 67) placed in loose 6" lifts and properly compacted by suitable mechanical means.

3. Open field or other areas not subjected to traffic loads - The backfill for open field or other areas not subjected to traffic loads may consist of suitable excavated material placed by machine in loose lifts the depth of which shall be determined based on the quality of the excavated material by the **City** and **City Engineer** but in no case shall exceed 12". The backfill shall be compacted by means of a suitable rubber tired vehicle such as a front end loader or tractor running longitudinally along the trench. Additional fill material that is compacted in a like manner by rubber tired vehicle shall be used to provide a slight mount (6" - 8" high) over the trench. No rock larger than six inches (6") in any dimension shall be permitted within the backfill material. No rock larger than 1/2" is permitted in the top six inches (6") of the backfill which shall consist of fine loose earth that is free of clods, vegetative matter and other objectionable material.

5. At locations adjacent to the existing pavement or at locations adjacent to other improvements subject to damage as a result of settlement or displacement, the backfill material shall consist of clean crushed stone (No. 67), placed in loose 6" lifts and properly compacted.

6. Backfill around structures shall be performed in accordance with the requirements for pipe line backfill with special care being given to its placement and compaction to prevent damage to the utility structure.

7. Backfill of trenches cut across paved areas shall be temporarily paved by placing Class A, Grade D crushed stone to the top twelve inches (12") of the backfill. This temporary pavement shall be maintained by the **Contractor** until the permanent pavement is restored or until the' project is accepted by the **City**.

4.10 STRUCTURE BACKFILL

A. Backfill around structures such as meter boxes shall be done with care to prevent damage to the structure or to place uneven loading on the walls of the structure. Backfill shall be carefully placed and tamped with hand tamps, small plate vibrators, jumping compactors or small backhoe buckets (12" width). Excavated material may be reused for backfill material provided it is free of debris, topsoil, roots, stumps, frozen material, muck, rock exceeding 6-inches in size, bricks, asphalt, broken concrete or other deleterious materials. The top six inches of backfill shall be clean dirt free of rocks and debris.

4.11 TRENCH BEDDING & BACKFILL MATERIAL

A. Crushed stone bedding and backfill where required by these specifications shall be 3/4" to No. 4 washed stone conforming to MSHTO M-43 gradation No. 67 and shall meet the requirements of Section 903 of the Tennessee Department of Transportation Standard Specifications.

B. Where dirt excavation is encountered and where approved by the **City**, select excavated soil with no rock larger than two (2) inches may be used in the bedding zone from 6 inches below the pipe to a point 12 inches above the top of the pipe. Care shall be taken to create bell holes in the soil bedding so that the

pipe is uniformly supported and not resting only on the bells. Dirt backfill shall be placed in 6 inch lifts and compacted. Careful attention shall be given to insure soil is evenly distributed beneath the pipe haunches.

C. Backfill above the crushed stone bedding may consist of excavated material including excavated material which contains broken rock that makes up to 3/4 of the total volume of the backfill provided that there are sufficient spalls and earth materials to fill all voids completely. The maximum dimension of individual stones shall not exceed six inches (6") and the backfill material shall be placed and spread in uniform layers not exceeding twelve inches (12") in depth.

D. Earthen backfill material shall be of a moisture content sufficient to allow for proper compaction. If earth material is too dry to allow thorough compaction, the Contractor shall provide sufficient water to bring the material to a proper moisture content. Conversely, earthen backfill material that is too wet shall be spread and dried prior to placement.

E. Borrow material for backfill. Where sufficient suitable backfill material is not available from trench excavation, additional material may be obtained from other sources which shall be approved by the **City**. The **Contractor** is responsible for all arrangements and costs requisite to borrow excavation. The borrow pit shall be subject to the applicable sections of these Specifications.

F. Flowable Fill

1. Flowable fill shall be placed at locations as directed by the **City** or as noted on the Plans or as required by the governing agency. The flowable fill shall be covered or otherwise protected while in the plastic state. No embankment or base shall be placed on the flowable fill prior to final set or hardening. Prior to placement of flowable fill, pipe and bedding shall be installed in accordance with these specifications. All sections of pipe shall be anchored or braced to prevent vertical or horizontal movement. The **Contractor** shall make provisions to form up, or provide earthen beams to prevent flowable fill from escaping at ends of trench.

2. When directed by the **City,** flowable fill shall be of the excavatable variety designed, proportioned and delivered to the project meeting the following performance requirements.

Property	Specification Limit
Air content (ASTM D 6023)	Maximum 30%[1]
Load Application (ASTM D 6024)	24 hours maximum in any condition
Consistency	8 in. (20 cm) min. as tested in (a)
Compressive strength (ASTM D 4832)[2]	30-psi (207kPa) minimum at 28 days
Compressive strength (ASTM D 4832)[2]	140-psi (965kPa) maximum at 98 days

[1] – when using air entrained mixture design

[2] – ASTM D 4832 – 4 x 8 in (10 x 20 cm) cylinder molds may be used. The preferred capping method to be used is wet suit neoprene restrained in rigid retainers. EFF designs will take longer periods of time to have sufficient bearing strength before backfilling is allowed.

SECTION 5 – PAVEMENT AND SIDEWALK REPAIR AND REPLACEMENT

5.01 GENERAL - The **Contractor** shall be responsible for the repair and replacement of any pavement (asphalt or concrete) and sidewalk either damaged or removed by his operations as an incidental part of the installation of the water line.

A. The repair and replacement of pavement over trenches in public roads and streets shall be made in accordance with the specifications of the jurisdictional entity (i.e., City of Mount Pleasant or the State of Tennessee Department of Transportation).

B. The repair and replacement of pavement over paved trenches in private streets, driveways or parking areas shall be made in accordance with the more stringent of either these specifications or the details shown on Plans approved by the **City**. In every case, the pavement replacement shall be of an equal or higher quality than the pavement that has been damaged and/or replaced.

C. Sidewalks are to be repaired by replacing to the nearest existing construction joint. Concrete driveways are to be repaired by replacing to the nearest existing construction joint unless otherwise directed by the **City**.

D. The **Contractor** is responsible for the maintenance and repair of the pavement replacement throughout the warranty period of the Contract.

E. The work and materials for pavement repair and replacement shall be in conformance with the Standard Specifications of the Tennessee Department of Transportation.

F. The **Contractor** shall obtain all necessary excavation, roadway and right-of-way work permits from the respective roadway governing authority prior to undertaking work in roadways.

5.02 PAVEMENT AND SIDEWALK REMOVAL

A. Where existing pavement and/or other paved areas such as driveways or sidewalks must be disturbed during construction of the water line project, the **Contractor** shall take all necessary steps to minimize damage to adjacent pavement. The pavement or sidewalk shall be cut or sawed in a straight line before removal so that the pavement or sidewalk may be removed and the trench excavated without damage to the adjacent pavement. Suitable precautions shall be taken to protect the pavement edges which shall be trimmed to a neat line prior to pavement replacement.

5.03 PAVEMENT REPLACEMENT

A. Trenches in pavement areas should be backfilled as soon as possible to minimize potential damage to adjacent pavement. The **Contractor** is responsible for scheduling his operations and to arrange for **City** inspection of the water line installation so that backfill operations can be prosecuted in an expeditious fashion.

B. Upon completion of the backfill, a temporary pavement patch will be provided. The temporary pavement shall consist Class A, Grading D crushed stone mineral aggregate base with a double bituminous surface conforming to Tennessee

Department of Transportation Standard Specification 903.05, 904.02, and 904.03, respectively.

C. The **Contractor** shall be responsible for maintaining the temporary pavement in a manner satisfactory to the **City** and the governing roadway authority throughout the construction period and shall, when so notified by the **City,** promptly repair any defects or settlements in said repair.

D. Permanent pavement replacement shall extend a minimum of one foot (1') beyond the trench line on both sides of the trench and shall include replacement of any pavement damaged as a result of the **Contractor's** operations. Where the cut edge of pavement is less than one foot (1') from the edge of the trench or where the edge has been damaged and/or otherwise disturbed during construction, the **Contractor** shall cut or saw the adjacent pavement in a straight line and remove same to provide a neat edge prior to pavement replacement. Irregular or uneven pavement patches will not be permitted. All permanent pavement replacement shall meet the requirements of the governing entity.

E. Smoothness - The finished pavement replacement surfaces shall conform to the lines and grades that existed prior to construction. No deviations, variations or irregularities exceeding 1/4" in any direction when tested with a twelve foot (12') straightedge will be permitted in the finished pavement. No depressions or bird-baths that do not drain will be permitted. The **Contractor** shall correct all such defects to the satisfaction of the governing entity.

5.04 SIDEWALK REPLACEMENT

A. Preparation of sidewalk subgrade, installation of expansion joints, placement of reinforcement, finishing of concrete, protection and curing of concrete, backfilling and cleanup shall be in accordance with Section 701 of the Tennessee Department of Transportation Standard Specifications.

B. Concrete for the sidewalk replacement shall be Class A as set forth in Section 603.04 of the Tennessee Department of Transportation Standard Specifications.

C. Sidewalks shall be reinforced with 6-inch woven wire fabric. (6 x 6-W1.4 x W1.4) or fiber-mesh reinforced concrete.

D. Sidewalks shall be finished with a broom finish perpendicular to the direction of pedestrian travel.

SECTION 6 – INSTALLATION OF WATER LINE AND APPURTENANCES

6.01 GENERAL - The **Contractor** shall be responsible for the installation of the water line and appurtenances in accordance with these specifications and in conformity with the recommended procedures of the manufacturer. Water line and appurtenances shall be installed to the lines and grades delineated on the water line plans as approved by the **City**.

6.02 INSTALLATION OF WATER LINES

A. Installation of ductile iron water line shall be in accordance with the latest version of AWWA C600.

B. PVC pipe shall be installed in strict accordance with manufacturer's recommendations and with the Uni-Bell Handbook of PVC pipe and Uni-Bell Publication 9 "Installation Guide for PVC Pressure Pipe". Fittings shall be installed as described for Ductile Iron and in accordance with manufacturer's recommendations.

C. Water lines shall be laid on trench bottoms improved with 6-inches of crushed stone bedding or dirt with no rock larger than 2 inches which have been carefully graded by hand to provide continuous support for the entire length of the line except where bell holes are to be dug. Fittings, valves and hydrants shall be installed at the locations required on the Plans. All valve and hydrant stems are to be installed plumb.

D. The water line shall be installed, except as indicated on **City** approved plans, to provide a minimum of thirty inches (30") of *cover over* the top of pipe measured from the subgrade of the road. The maximum depth of *cover* shall not exceed sixty inches (60"), except as indicated on the Plans or in areas where the **City** representative shall instruct the **Contractor** to increase the depth of line in order to eliminate the use of fittings such as at creek crossing approaches; or in areas adjacent to roadways where future driveway connections are anticipated.

E. The **Contractor** shall exercise care in the handling, storage and installation of the water line and shall use such tools and mechanical equipment that is suitable for the safe and efficient prosecution of the work. Pipe, fittings, valves, and hydrants shall be carefully unloaded from the trucks and lowered into the trench by suitable equipment. In no case is any portion of the water line to be rolled or dumped from trucks or trailers into the trench that may result in damage to the pipe or linings. Pipe shall not be stored or left in roadside ditches. Open ends of pipe and valves shall be covered until ready for installation.

F. Pipes strung out along the route of the proposed installation shall not be lowered into the trench until they have been swabbed to insure the removal of dirt, debris, or other foreign objects that may have accumulated within them. All unnecessary material shall be removed from the bell and spigot ends of each pipe and they shall be wiped clean before connection. Failure to keep water line clean will result in the **City** representative requiring special handling measures including flushing and disinfection.

G. The pipe and fittings shall be inspected for defects immediately before being lowered into the ditch.

H. Whenever pipe laying operations are suspended for any reason including lunch or temporary interruptions, the open ends of the pipe that have been installed shall be closed by means of a watertight plug. If pipe laying operations are

suspended by inclement weather or by water infiltration into the trench, a watertight seal shall be provided and not removed until the trench has been pumped completely dry. Pipe shall not be installed in a trench containing standing water. If the **Contractor** so chooses, he may improve trench conditions by providing additional crushed stone bedding, the use of which shall be considered incidental to the project.

I. Cutting of pipe shall be in accordance with the manufacturer's specification with respect to the cut and machining of the ends.

J. Pipe shall be laid with the bell ends facing in the direction of laying and shall be jointed in accordance with the manufacturer's recommendations. Pipe gaskets shall be properly lubricated with pipe manufacturer recommended lubricant.

K. Pipe deflections used in order to avoid obstructions or to plumb stems shall not exceed the manufacturer's recommended deflection for the joint.

L. **Water Line - Sanitary Sewer/Storm Drainage Relationships**. In locations where the water line is to cross over a sanitary sewer/storm drainage line, a full length of water line pipe with standard mechanical joints shall be centered over the sewer line so that the joints are equi-distant and as far as possible from the sewer. A minimum of an eighteen inch (18") vertical separation is required for sanitary sewer and twelve inches (12") for storm drainage separation. In locations where the water line is to be laid parallel to a sanitary sewer/drainage line, a minimum separation of ten feet (10') measured edge to edge is to be maintained. In areas where such separation is not possible, the water line shall be installed within a carrier pipe and located a minimum of eighteen inches (18") above the sanitary sewer line. In no case shall the water line be installed either through or in contact with a sanitary sewer manhole.

M. Where noted on the plans or as otherwise directed by **City** personnel, restrained joint pipe with restrained joint fittings or push-on joint pipe utilizing grip restraint gaskets and restrained mechanical joint fittings shall be installed for the required length of pipe to be restrained. **Contractor** shall observe the installation requirements for length of restrained pipe to be installed.

6.03 INSTALLATION OF FIRE HYDRANTS

A. Fire hydrants shall be located as shown on the Plans and as directed by the **City**. The hydrant shall be set in a vertical position at the edge of the street right-of-way with the pumper nozzle facing the street.

B. The hydrant shall be set on footer blocks, with a concrete thrust block poured behind hydrant or shall be installed with rods and Mega-lug style restraint devices between the valve and hydrant. A minimum of seven (7) cu. ft. of crushed stone shall be provided around the hydrant for drainage.

C. Where concrete is utilized, the concrete shall have horizontal and vertical bearing areas of at least three (3) square feet against the undisturbed trench bottom and side respectively, but shall not cover the flanges or drain ports.

D. Hydrants shall be set so that the finished ground level will be six inches (6") below the breakable flange or at the bury level indicated on the hydrant.

E. The lower barrel of the hydrant shall be of sufficient length to enable the hydrant head to be installed horizontally even though the hydrant may be located in an embankment.

F. Installed hydrants shall be properly lubricated.

G. No more than one hydrant extension shall be used to adjust to finished grade.

H. All fire hydrants shall be installed with a 6-inch gate valve and valve box preceding the hydrant to allow for isolation from the water main.

6.04 THRUST BLOCKS, RESTRAINT DEVICES, ANCHOR RODS, AND REVERSE THRUST BLOCKS

A. GENERAL

1. All bends, tees, valves, dead-ends, tapping tees, and at other points of unbalanced pressure must be restrained to prevent separation of the water line and appurtenances. Restraint may be provided as noted below.

B. THRUST BLOCKS

1. Poured-in-place concrete thrust blocks must be provided if plans do not otherwise denote the use of restrained joint pipe. All tapping tees shall be installed with a thrust block on the back side of the tee from the branch. Thrust blocks shall conform to details and minimum bearing areas as shown in the Standard Detail - TSW-014 and shall bear against the undisturbed trench face. Concrete used in the thrust blocks shall have a minimum of 4000 psi compressive (f_c) strength.

2. Where concrete thrust blocks are poured, the mechanical joint fitting must still be installed with mechanical joint style restraint devices.

3. The **City** reserves the right to require concrete thrust blocks in locations where other restraint devices are not practical.

4. Concrete for thrust blocks shall not be poured in freezing condition, in frozen trenches or in standing water.

5. Fittings shall be protected with plastic sheeting when pouring concrete to prevent covering bolts on fittings and restraint devices.

C. RESTRAINT DEVICES

1. Where noted on the plans, restrained joint pipe and restrained joint fittings and appurtenances are required. Restraint may include push-on fittings with restrained joints; mechanical joint fittings with mechanical restraint devices (EBAA Mega-Lug™); gripper type restraint gaskets at pipe joints; or combinations thereof.

2. Strict adherence shall be given to the restraint tables provided in the plans. At a minimum the following restraint requirements must be met:

   a. Pipes shall be restrained on each side of fitting for the length noted on the plans utilizing gripper type restraint gaskets and push-on joint pipe. Restrained joint pipe may also be used.

   b. All horizontal and vertical fittings shall be restrained. Mechanical joint fittings shall utilize mechanical restraint devices for each side of the fitting. In lieu of mechanical joint fittings, push-on restrained joint fittings may be used.

   c. Each side of valves shall be restrained with mechanical joint restraint devices.

   d. Fire hydrants shall include anchor rod between hydrant shoe and valve and between valve and tee. A mechanical restraint device shall be included on the hydrant shoe and on each side of the valve.

   e. All ductile iron pipe 3-inch and larger employed at meter vaults shall be restrained.

   f. The **City** reserves the right to alter the restraint requirements to fit actual field conditions.

3. Where restrained joint fittings and pipe are employed, concrete thrust blocks **are not** required.

D. ANCHOR RODS

1. Anchor rods and anchor clamps shall be stainless steel and be a minimum diameter of ½-inch. A minimum of 2 rods shall be provided on pipe through 6-inch diameter. Three (3) rods shall be provided on 8-inch and 10-inch pipe and four (4) rods on 12-inch pipe. Miscellaneous bolts, clamps, etc. shall be stainless steel.

2. Anchor rods where utilized shall be adequately secured to the fitting or valve to be anchored.

3. The **City** reserves the right to require anchor rods in locations where other restraint devices are not practical.

E. REVERSE RESTRAINT DEVICES

1. Reverse restraint devices shall be utilized in locations where other means of dead-end restraint are deemed to be not adequate or where future extensions of water lines are to occur.

2. Concrete for reverse restraint devices shall be the same as specified for thrust blocks.

3. Rods and hardware shall be the same as specified for anchor rods.

4. Reinforcing material shall be as set forth in Chapter 3.

5. Reverse thrust devices shall be as noted on Detail TSW-014.

6. The **City** reserves the right to require reverse restraint devices in locations where other restraint devices are not practical.

6.05 VALVE AND VALVE BOX INSTALLATION

A. Valve boxes shall be centered over the valve operating nut and installed in a vertical position. Box shall be of the proper length to extend to the ground surface and allow the adjustable upper section to be positioned approximately midway between upper and lower limits. Backfill shall be carefully tamped around valve box and suitable support shall be provided under and around the upper section to prevent future settlement. Provide concrete valve footing blocks on each corner (4 required) of the concrete valve box.

B. Valve boxes shall be placed so that the lettering of the word "WATER" shall be aligned perpendicular to the direction of the water line. Cover of valve box shall be flush with finished grade or sidewalk or paved area.

C. Valve boxes shall be placed on the valve immediately in front of the fire meter (City side) so that the lettering of the word "WATER" shall be aligned perpendicular to the direction of the water line going into the fire meter. The valve box lid shall be painted bright red with red enamel paint for easy location by the fire department.

D. Valves shall be set plumb so that operating nut is pointed straight up. Valve operating nut shall be centered in the valve box. Where top of valve operating nut is deeper than 60 inches, a 1.25 inch square tubular operating extension stem shall be provided to bring the operating nut to within 30 inches of the surface. A plate with opening shall be provided in the valve box to maintain the centering of the valve extension shaft.

6.06 CONNECTIONS TO EXISTING MAINS THAT ARE IN SERVICE

A. The **Contractor** shall make connections to existing mains as shown on the Plans approved by the **City**. Connections to existing mains currently in service shall be made with tapping sleeves and valves without taking the existing main out of service and shall be made only in the presence of a representative of the **City**.

B. The **Contractor** shall make his own arrangements for use of a tapping machine. The **City** does not provide taps.

C. The tapping equipment shall be disinfected with a sodium hypochlorite spray application prior to being used for tapping of the **City** water line.

D. Contractor shall prepare the trench with an opening of sufficient size to accommodate the tapping machine prior to beginning the tap. Suggested minimum working length is 7 feet.

E. It shall be the responsibility of the **Contractor** to measure outside diameters of existing pipes before ordering tapping sleeves, or other fittings intended for connecting to existing mains.

F. Pipe shall be cleaned of all dirt and debris where tapping saddle is to be located.

Tapping saddle shall be installed in the direction of the new line. Do not rotate the tapping saddle on the existing pipe as it may damage the liner. Tighten and torque all tapping saddle bolts in accordance with the manufacturer's recommendations. After initial application of the saddle and tightening of the bolts, wait a minimum of 24 hours and then re-tighten the bolts and re-check the torque. **City** personnel shall be present to witness torqueing of tapping sleeve bolts. **Checking bolt tightness without a torque wrench will result in tapping sleeve being failed and unready for tapping.** Verify operating pressure of line to be tapped with **City** personnel.

G. Install the tapping valve. Provide adequate support to the tapping valve. Prior to tapping the line, the tapping sleeve and valve shall be air tested. For lines up thru 24-inch, the air test shall be 100 psi and the duration of the test shall be for a maximum of 5 minutes.

H. Perform the tap. Provide adequate support of the tapping machine so as to not impart undue stress on the water line or tapping saddle assembly. Upon completion of the tap, close the tapping valve and remove the tapping machine. Check for any leaks and repair if any are evident. Make the coupon available for inspection by **City** personnel.

I. A concrete kicker shall be poured behind each tapping saddle prior to backfilling and connecting the new line.

6.07 CONNECTIONS TO EXISTING MAINS NOT IN SERVICE

A. Where connections are to be made to pipe previously installed but not placed in service, the **Contractor** shall remove existing plugs, restraint devices and concrete kickers and make the tie in by use of mechanical joint sleeves. Plugs removed from existing mains shall remain the property of the **City** and shall be protected from damage or loss until they are turned over to the designated representative of the **City**. New pipe to be installed into existing connections shall be restrained by means of gripper restraint gaskets. **City Engineer** shall compute the minimum length of pipe requiring restraint gaskets.

B. Where existing mains must be valved off to make connections, the **Contractor** shall notify the **City** not less than twenty-four (24) hours prior to the making of the proposed connection and the actual time of the service interruption shall be subject to approval by the **City.**

C. It shall be the responsibility of the **Contractor** to measure outside diameters of existing pipes before ordering tapping sleeves, or other fittings intended for connecting to existing mains.

D. Disinfection process for connections to existing mains shall follow the requirements of AWWA C651. All disinfection procedures shall be observed by **City** personnel.

6.08 SERVICES

A. Services shall be installed as indicated on Plans and at locations as directed by the **City**. Care shall be taken to maintain no less than 18 inches and no more than 24" cover over service lines up through 2-inch diameter, including ditch crossing locations. Service lines 3 inches and larger shall be installed with cover requirements the same as main water lines. All service line crossings of paved

roads shall be installed by boring and jacking and installing PVC or HDPE casing pipe.

B. When water service lines are installed beneath roadways, all ¾ and 1-inch services must be encased in 3" Schedule 40 PVC or 3" DR 11 HDPE casing beginning a distance 1' from the corporation stop to a point 1' from the outside of the meter box. 2-inch service line must be encased in a minimum of 4" Schedule 40 PVC or 4" DR 11 HDPE.

C. Residential service lines installed using PEXa pipe shall include 14 gauge THHN wire atop the pipe for location purposes. Locator wire shall be extended through service casings where applicable. Wire shall be terminated in meter boxes, valve boxes or other readily accessible locations for use with the detection equipment. Length of terminations shall extend at least 36" and be neatly coiled.

D. ¾ and 1-inch service connections shall be made to ductile iron water lines with corporation stops tapped directly onto the main. ¾ and 1-inch service connections shall be made to existing PVC water lines with service saddles and corporation stops threaded directly into the service saddle. 2-inch service connections may be installed by use of service saddles or tapped tees. 2-inch corporation stops shall be threaded directly into the service appurtenance. If a tapped tee is used, then the corporation stop will require iron pipe threads. If a tapped tee is installed on the water line for service connection, then both ends of the tee shall include mechanical restraint devices. Services 3-inch and larger shall be connected by use of tapping tees or cut-in tees as depicted on the plans.

6.09 CASINGS, CASING SPACERS AND CASING END SEALS

A. Casings shall be installed where noted on the plans and shall be twice the diameter of the carrier pipe unless otherwise noted.

B. Casing wall thickness shall be as set forth in Section 3.22 of these specifications.

C. All carrier pipe installed inside casings shall be installed with grip-ring style restraint gaskets.

D. Casing sections shall be fully welded to insure integrity of casing. Casing shall be installed so as to maintain true alignment in both the horizontal and vertical axes. Drastic variations in either vertical or horizontal alignment will not be permitted.

E. Carrier pipe shall be installed utilizing casing spacers. A spacer shall be installed one foot from the bell and from the spigot of the pipe section. One (1) additional spacer shall be installed equi-distant over the remaining section of pipe. A minimum of three (3) spacers per 20' joint of pipe is required. Casing spacers shall be arranged to allow carrier pipe to be generally centered inside the casing.

F. Upon completion of installation of carrier pipe inside the casing pipe, synthetic neoprene end seals shall be installed to seal both ends of the casing pipe.

6.10 USE OF PEX PIPE

A. PEX pipe is only allowed on residential, single-family service lines (3/4", 1", or 2"). PEX is not allowed on 2-inch commercial, multi-family residential or institutional service lines. For these type services, Type K, drawn (hard) copper and/or brass nipples is required.

SECTION 7 – TESTING AND DISINFECTION

7.01 GENERAL - Upon completion of the pipe laying and backfill operations, all water lines shall be disinfected and subjected to the pressure and leakage tests. In the event the pressure or leakage test is unsatisfactory, or bacteriological tests indicate that disinfection is incomplete, corrective measures shall be taken and the tests repeated until satisfactory results are obtained.

7.02 PRESSURE TESTING

A. The **Contractor** shall furnish the pump, pipe, connections, gauges and all necessary apparatus for the performance of the pressure test.

B. All water lines including services shall be subjected to a hydrostatic pressure of 200 psi for a period of two (2) hours. No air testing of pipe is permitted.

C. The pipe shall be filled with water at least 24 hours prior to testing. All air shall be expelled from the line prior to applying test pressure by use of fire hydrants or air release valves. Filling of new pipes shall be done through connections that have backflow prevention devices in place to protect existing main during filling of new main.

D. Any defective work revealed by the test shall be repaired or replaced by the **Contractor**.

E. **City** personnel shall be present to witness and approve all pressure testing activities. If **City** personnel are not present for witnessing, test results will not be accepted.

7.03 DISINFECTION

A. All chlorination disinfection and testing procedures shall meet the latest requirements of **TDEC**.

B. The **Contractor** shall furnish all labor and necessary equipment and apparatus including injection pumps, pipe connections, chlorine and caps for the pipe for making the test. The **Contractor** shall pay for water used in the test. The **City** will compute the total amount of chlorine to be provided in the new line for disinfection and inform the **Contractor** of the correct total amount to employ.

C. All new water lines and appurtenances shall be disinfected prior to being placed in service.

D. The new water main shall be kept isolated from the active distribution system using a physical separation until satisfactory bacteriological testing has been completed and the disinfectant water flushed out, water required to fill the new main for hydrostatic pressure testing, disinfection and flushing shall be supplied through a temporary connection between the distribution system and the new main. The temporary connection shall include an appropriate backflow prevention device consistent with the degree of hazard and shall be disconnected from the new main during the hydrostatic pressure test.

E. Methods of chlorination for new lines shall be as set forth in Section 4.4 of the AWWA Standard C651 "Disinfecting Water Lines".

F. Final connections to existing mains shall be as set forth in Section 4.6 of the AWWA Standard C651 "Disinfecting Water Lines".

G. While chlorination is underway, valves, hydrants and branch lines shall be manipulated to insure disinfection.

H. Chlorine residual testing shall be performed using DPD color comparator method.

I. Disinfection procedures when cutting in or repairing existing mains shall be as set forth in Section 4.7 of the AWWA Standard C651 "Disinfecting Water Lines".

J. Standard Sampling Protocol

1. Install the water line(s) with designated amount of chlorine.

2. Contractor shall fill the water line with water from a test jumper with appropriate backflow device. (No direct connections to existing mains are allowed).

3. The City will check the new line(s) for chlorine residual of at least 300 mg/l. Contractor shall provide sample test points as needed to allow for testing.

4. Highly chlorinated water shall reside in the new line for a minimum of 24 hours.

5. After 24 hours, the new line shall be flushed to a level of normal system chlorine residual. Final flushing and disposal of heavily chlorinated water shall be in accordance with all Federal, State and local agencies to prevent damage to the environment. A neutralizing chemical shall be applied to the water to be wasted to neutralize the residual chlorine.

6. The new line shall sit for a period of 48 hours.

7. After 48 hours, bacteriological samples shall be collected by the **City** at every 1,500 linear feet of line (beginning and end) and at each branch. Collected samples shall be delivered by the **City** to **TDEC** laboratory for testing. No bacteriological sampling will be conducted on Friday or prior to a TDEC observed holiday.

8. New lines will be released for service connection upon laboratory results indicating "negative" results for coliform.

K. Results of disinfection test and record of compliance from the laboratory will be maintained by the **City.**

L. If initial disinfection fails to produce satisfactory bacteriological results, the new main shall be re-flushed and re-sampled. If check samples also fail to produce acceptable results, the main shall be re-chlorinated until satisfactory results are obtained.

SECTION 8 – WARRANTY AND MAINTENANCE OBLIGATIONS

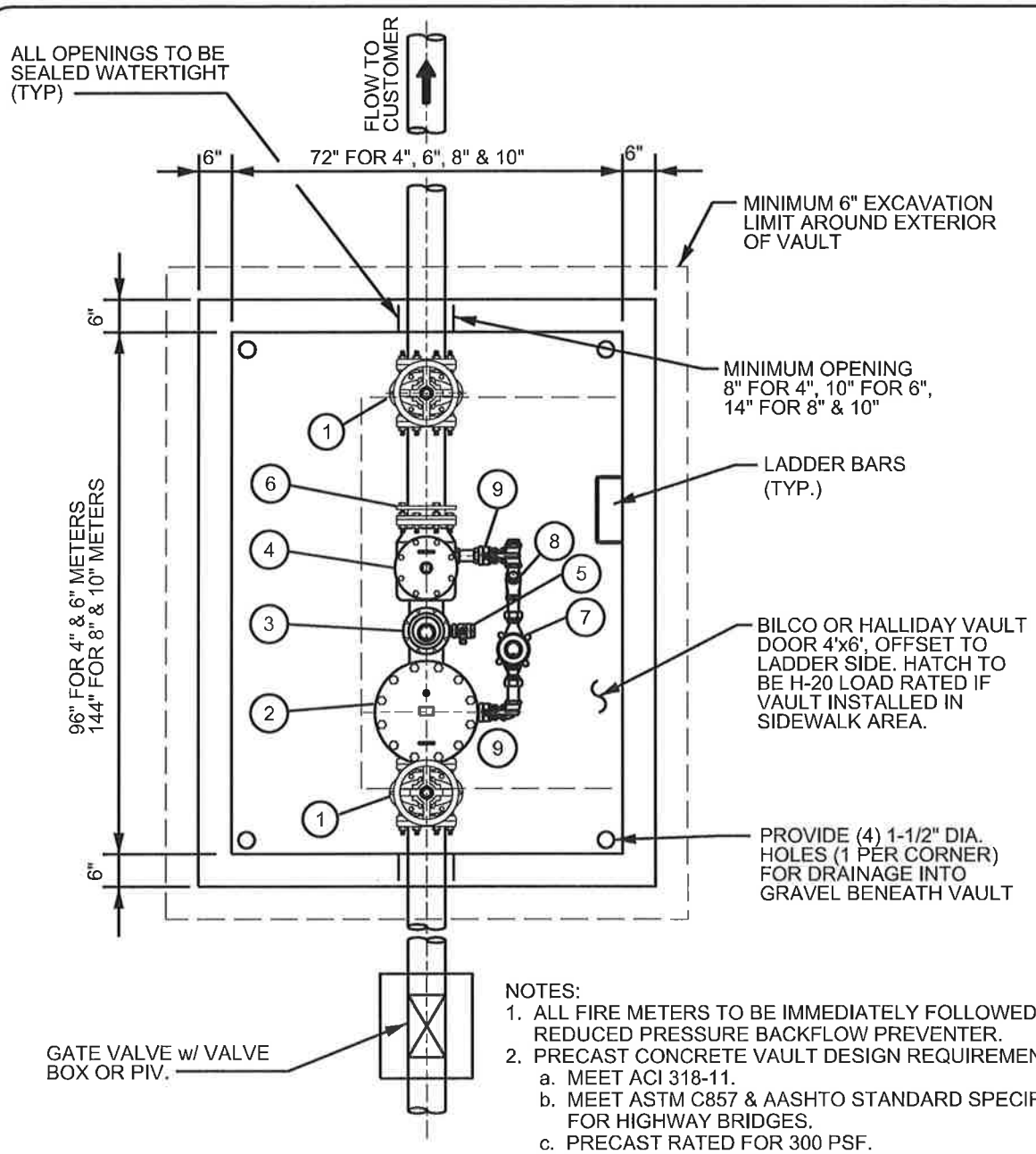
8.01 WARRANTY

A. The work performed by the **Contractor/Developer** shall be guaranteed against defects in materials or workmanship for a period of one (1) year following the date of formal acceptance of the work by the **City**. In the event defects in materials or workmanship should appear, the **Contractor/Developer** shall promptly make the necessary corrections. When the defects are not of an emergency nature, the **Contractor/Developer** will be notified and will be given a period of two weeks in which to make the necessary corrections. Should the defects be of an emergency nature which in the opinion of the **City** requires immediate correction, the **Contractor/Developer** will be notified and requested to make the necessary repairs immediately. Should this be impractical or if the **Contractor/Developer** should fail to respond to the request for corrective action within the specified period, the **City** may proceed to have the defects corrected and shall bill the **Contractor/Developer** for all charges in connection therewith, including labor, materials and equipment rental. Such charges will be deducted from the **Developer's** maintenance bond.

8.02 MAINTENANCE OBLIGATION

A. Upon acceptance of new water system lines and appurtenances by the **Board**, the **Developer** shall post a maintenance bond. The maintenance bond shall be in effect for the entire period of one (1) year. The maintenance bond shall be in the amount of 25% of the value of the performance bond.

LIST OF STANDARD DETAILS



PLAN

NOTES:

1. ALL FIRE METERS TO BE IMMEDIATELY FOLLOWED BY A REDUCED PRESSURE BACKFLOW PREVENTER.
2. PRECAST CONCRETE VAULT DESIGN REQUIREMENTS
   a. MEET ACI 318-11.
   b. MEET ASTM C857 & AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
   c. PRECAST RATED FOR 300 PSF.
   d. CONCRETE COMPRESSIVE STRENGTH @ 28 DAYS = 5000 PSI.
   e. REINFORCEMENT: ASTM A615,GRADE 60
   f. JOINT SEALANT: BUTYL RUBBER, CONSEAL CS-102 (CONTINUOUS @ EACH JOINT).
   g. BROOM FINISH ON TOP SLAB EXTERIOR
   h. PROVIDE 4 LIFTING RINGS PER SLAB TOP
3. REFER TO TSW-001B FOR ELEVATION DETAILS OF METER.

REVISIONS	DATE

4", 6", 8" OR 10" FIRE SERVICE METER ASSEMBLY (PLAN)

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

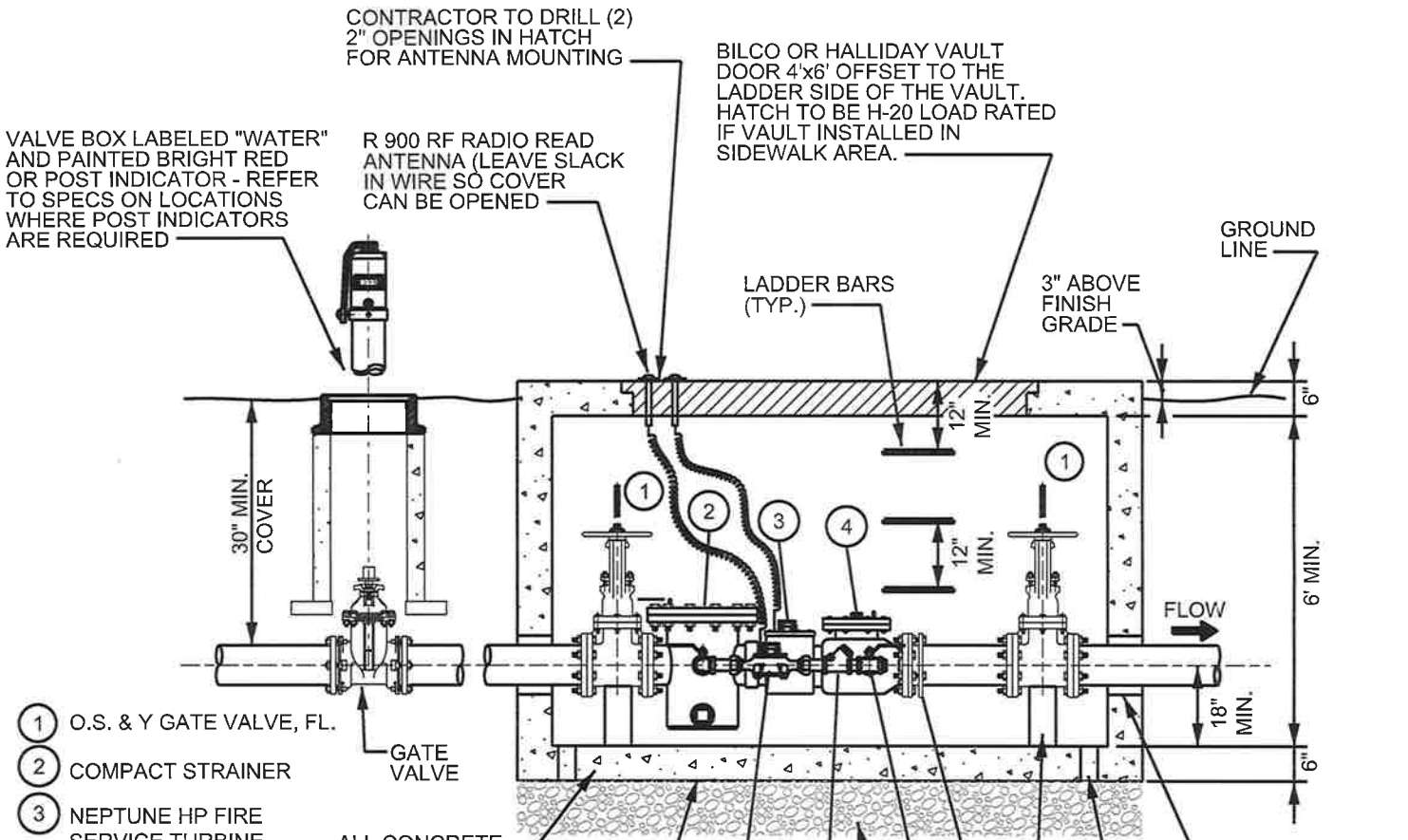
TSW-001A
DRAWING No.

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

FIRE SERVICE, 4", 6", 8" OR 10" METER ASSEMBLY (ELEVATION)

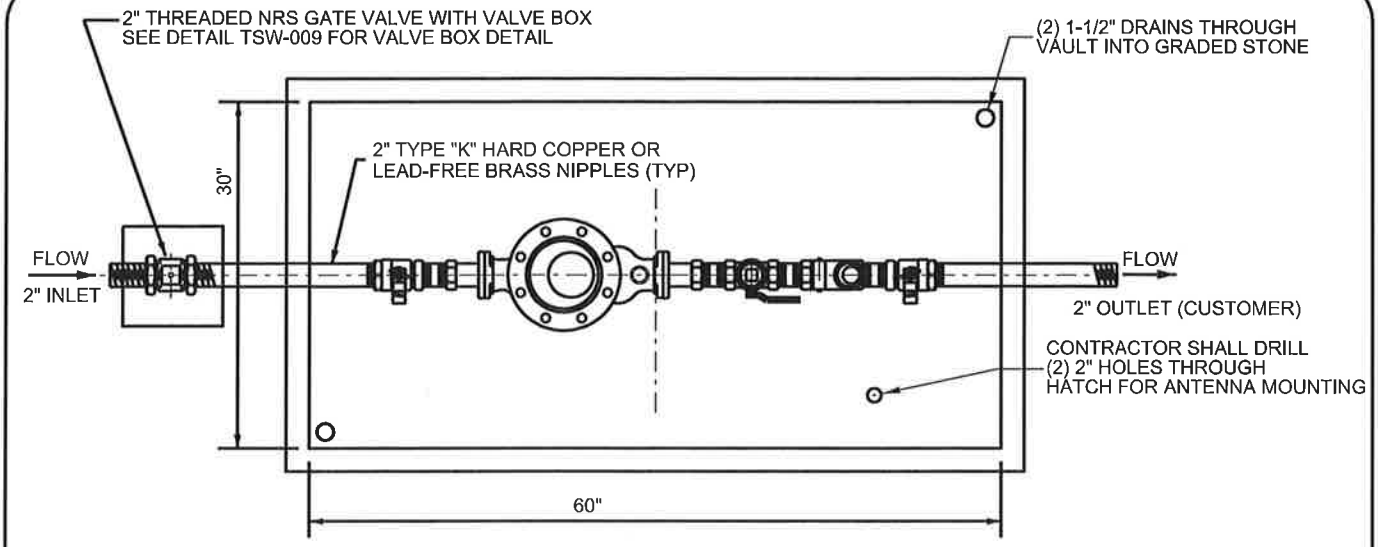
REVISIONS	DATE

DRAWING No. TSW-001B

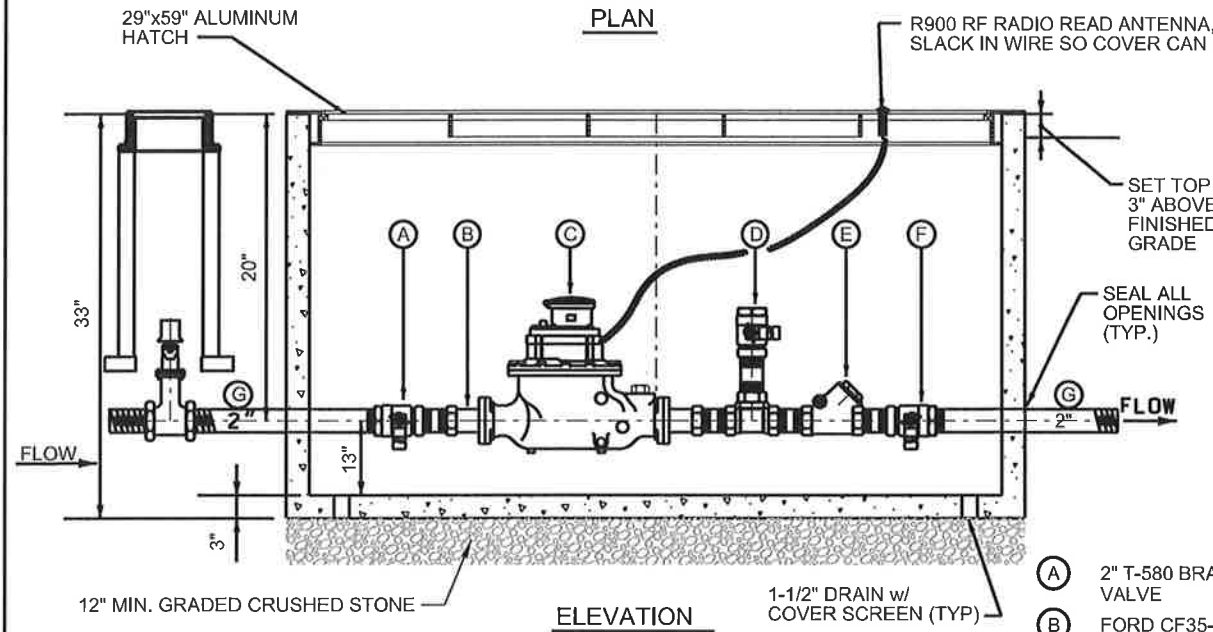


1. O.S. & Y GATE VALVE, FL.
2. COMPACT STRAINER
3. NEPTUNE HP FIRE SERVICE TURBINE METER, UL / FM RATING
4. CHECK VALVE, FL.
5. 2" TEST VALVE (SEE TSW-001A)
6. FLANGE COUPLING ADAPTOR
7. TURBINE METER ON BYPASS
   1" ON 4", 1½" ON 6",
   2" ON 8" OR 10"
8. BYPASS CHECK VALVE
9. BYPASS BALL VALVE

ELEVATION



PLAN



ELEVATION

NOTES:

1. BASE AND WALLS SHALL BE AN INTEGRAL CAST UNIT NO SEPARATE BASE WILL BE PERMITTED.
2. ALL COMPOUND METERS ARE TO BE FOLLOWED BY REDUCED PRESSURE BACKFLOW PREVENTER, PRESSURE REDUCING VALVES ARE ALSO RECOMMENDED ON CUSTOMER SIDE OF METER
3. PRECAST CONCRETE VAULT DESIGN REQUIREMENTS
   a. HATCH TO BE SET ON TOP OF BOX
   b. WEIGHT 2,115#
   c. CONCRETE COMPRESSIVE STRENGTH @ 28 DAYS = 4500 PSI.
   d. REINFORCEMENT: #4 BARS @ 6" C/C E.W.
   e. HANDLED WITH UTILITY ANCHORS
4. HATCH TO BE H-20 TRAFFIC RATED IF VAULT IS LOCATED IN SIDEWALK AREA.

- (A) 2" T-580 BRASS BALL VALVE
- (B) FORD CF35-77 LIK-PAK METER COUPLING AND
- (C) 2" NEPTUNE TRU-FLOW COMPOUND METER
- (D) 2"x2" TEE
  S" T-580 BRASS BALL VALVE
  2" BRASS PLUG
- (E) 2" BRASS CHECK VALVE
- (F) 2" T-580 BRASS BALL VALVE
- (G) 2" BRASS NIPPLE

(ALL ASSEMBLIES TO BE LEAD FREE BRASS)

REVISIONS	DATE

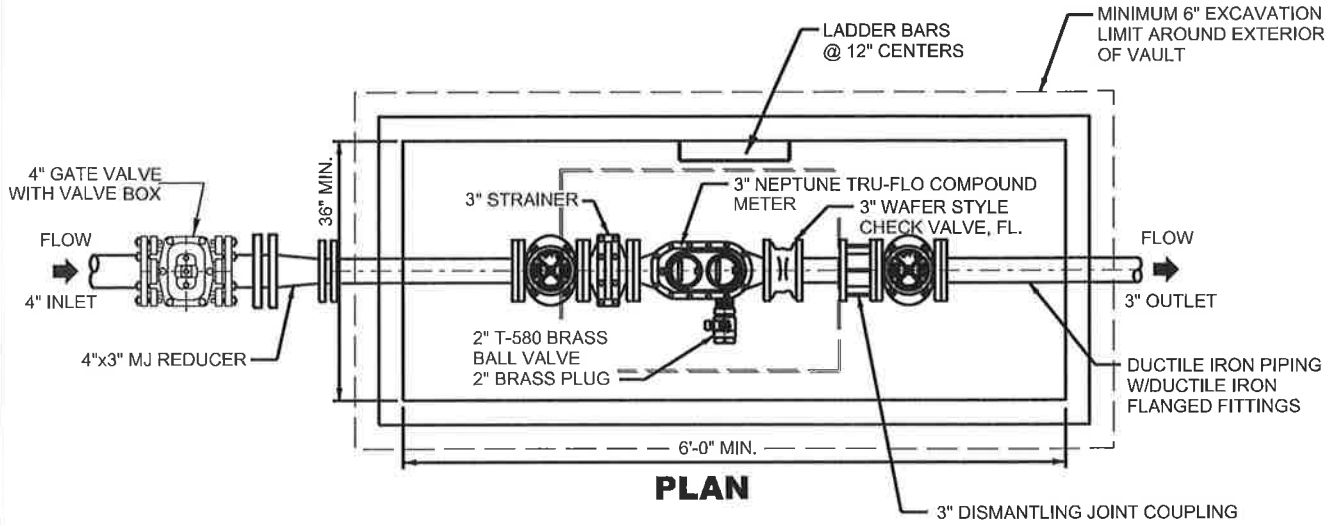
PRECAST METER VAULT WITH HATCH FOR 2" COMPOUND DOMESTIC METER

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

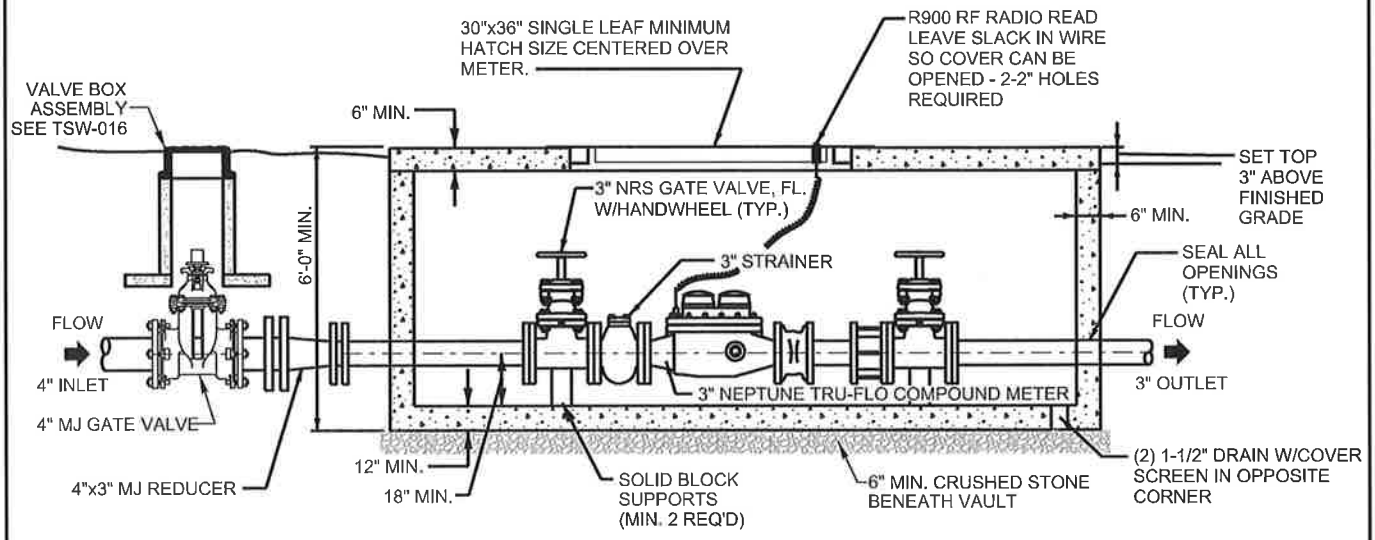
TSW-002
DRAWING No.

NOTES:

1. ALL COMPOUND METERS ARE TO BE FOLLOWED BY A REDUCED PRESSURE BACKFLOW PREVENTER. PRESSURE REDUCING VALVES ARE ALSO RECOMMENDED ON CUSTOMER SIDE OF METER.
2. LOAD FACTOR DESIGN
3. APPLICABLE DESIGN CODES:
   - AASHTO STANDARD SPECIFICATIONS FOR HWY BRIDGE, 17TH EDITION
   - ASTM C857
4. PRECAST RATED FOR UNIFORM 300PSF
5. CONCRETE COMPRESSIVE STRENGTH @ 28 DAYS = 5000 PSI
6. REINFORCEMENT: ASTM A615, GRADE 60
7. HATCH TO BE H-20 LOAD RATED IF VAULT INSTALLED IN SIDEWALK AREA.



PLAN



ELEVATION

REVISIONS	DATE

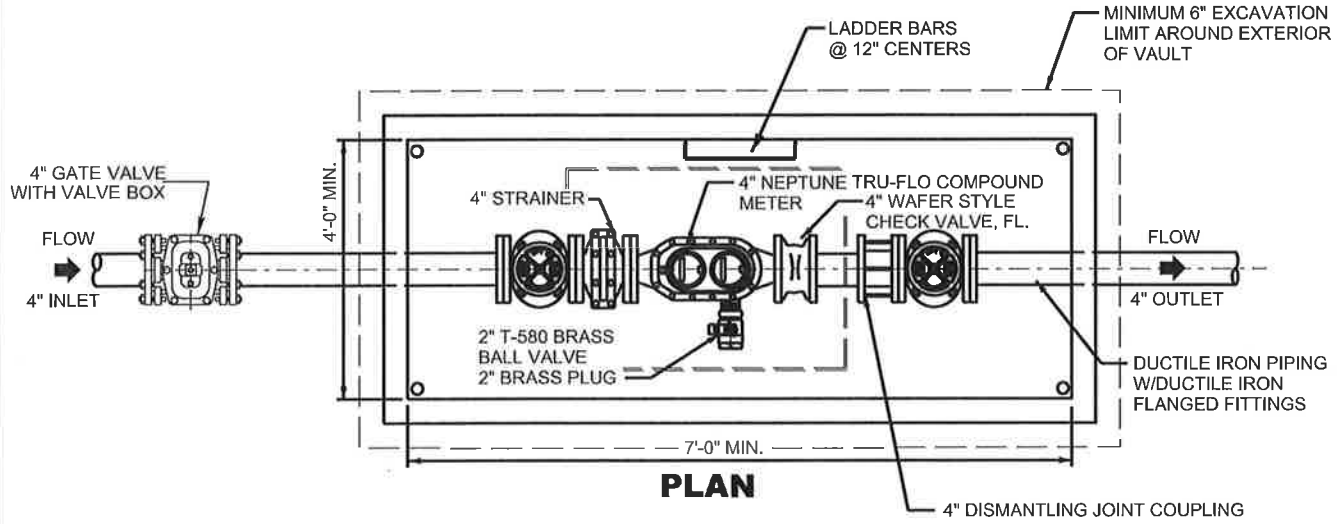
PRECAST METER VAULT WITH HATCH FOR 3" COMPOUND DOMESTIC METER

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

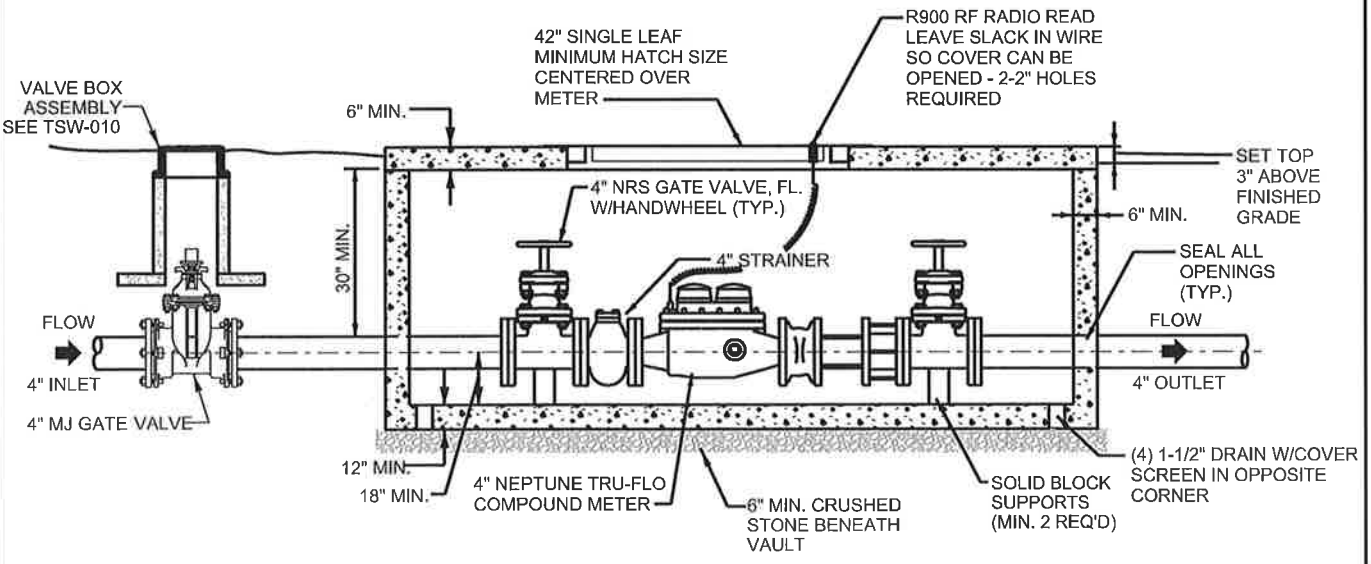
TSW-003
DRAWING No.

NOTES:

1. ALL COMPOUND METERS ARE TO BE FOLLOWED BY A REDUCED PRESSURE BACKFLOW PREVENTER. PRESSURE REDUCING VALVES ARE ALSO RECOMMENDED ON CUSTOMER SIDE OF METER.
2. LOAD FACTOR DESIGN
3. APPLICABLE DESIGN CODES:
   - AASHTO STANDARD SPECIFICATIONS FOR HWY BRIDGE, 17TH EDITION
   - ASTM C857
4. PRECAST RATED FOR UNIFORM 300PSF
5. CONCRETE COMPRESSIVE STRENGTH @ 28 DAYS = 5000 PSI
6. REINFORCEMENT: ASTM A615, GRADE 60
7. HATCH TO BE H-20 LOAD RATED IF VAULT INSTALLED IN SIDEWALK AREA.



PLAN



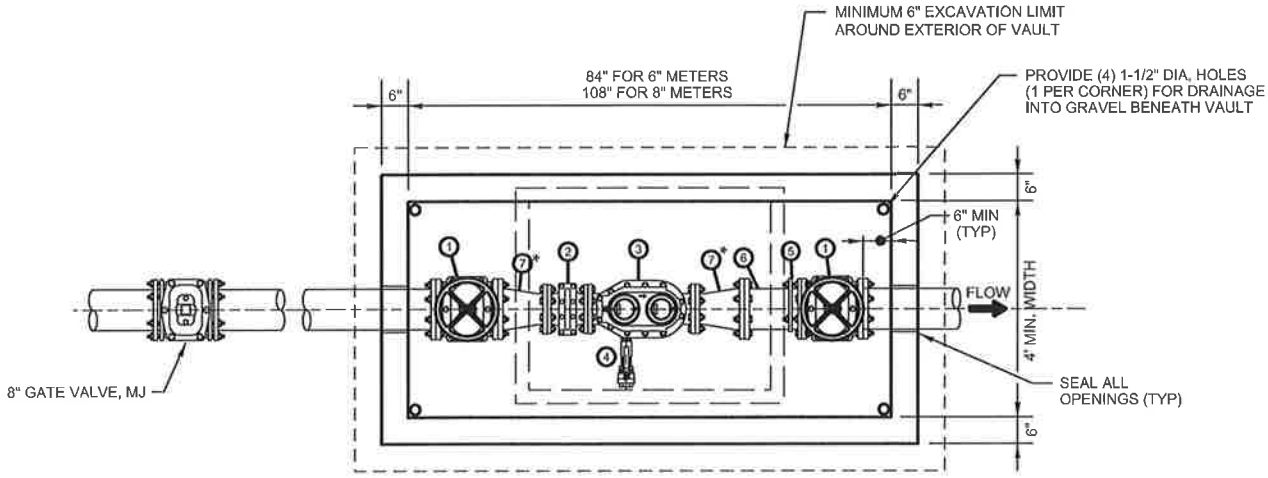
ELEVATION

REVISIONS	DATE

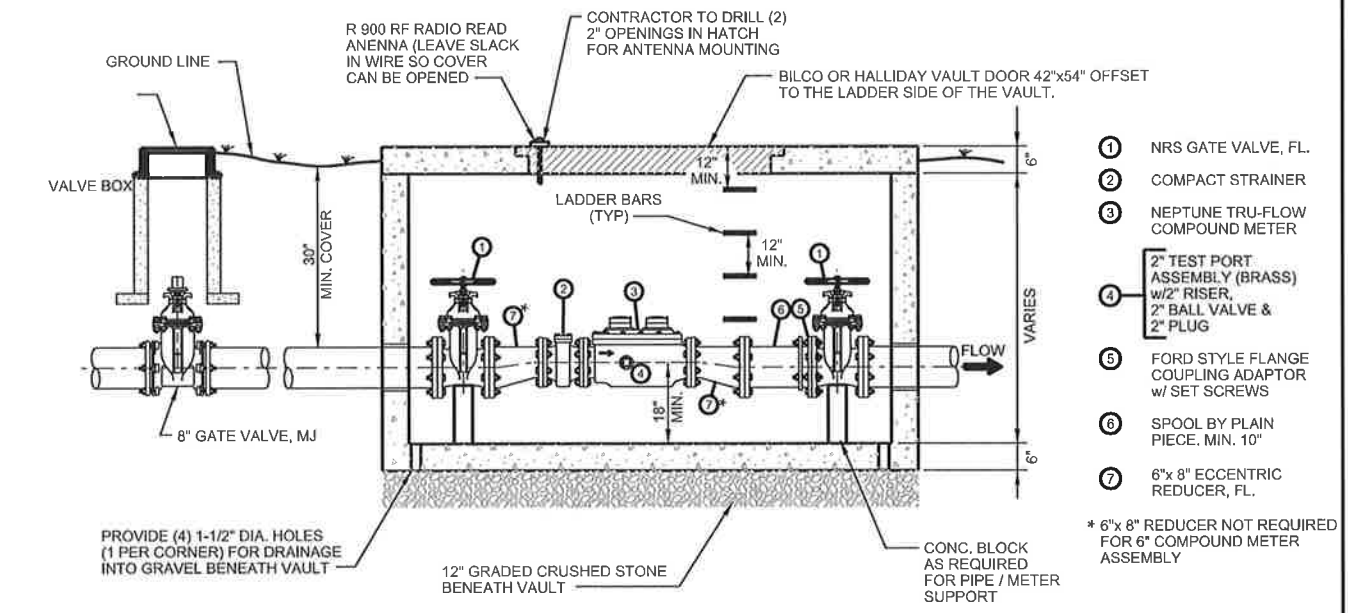
PRECAST METER VAULT WITH HATCH FOR 4" COMPOUND DOMESTIC METER

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-004
DRAWING No.



PLAN



ELEVATION

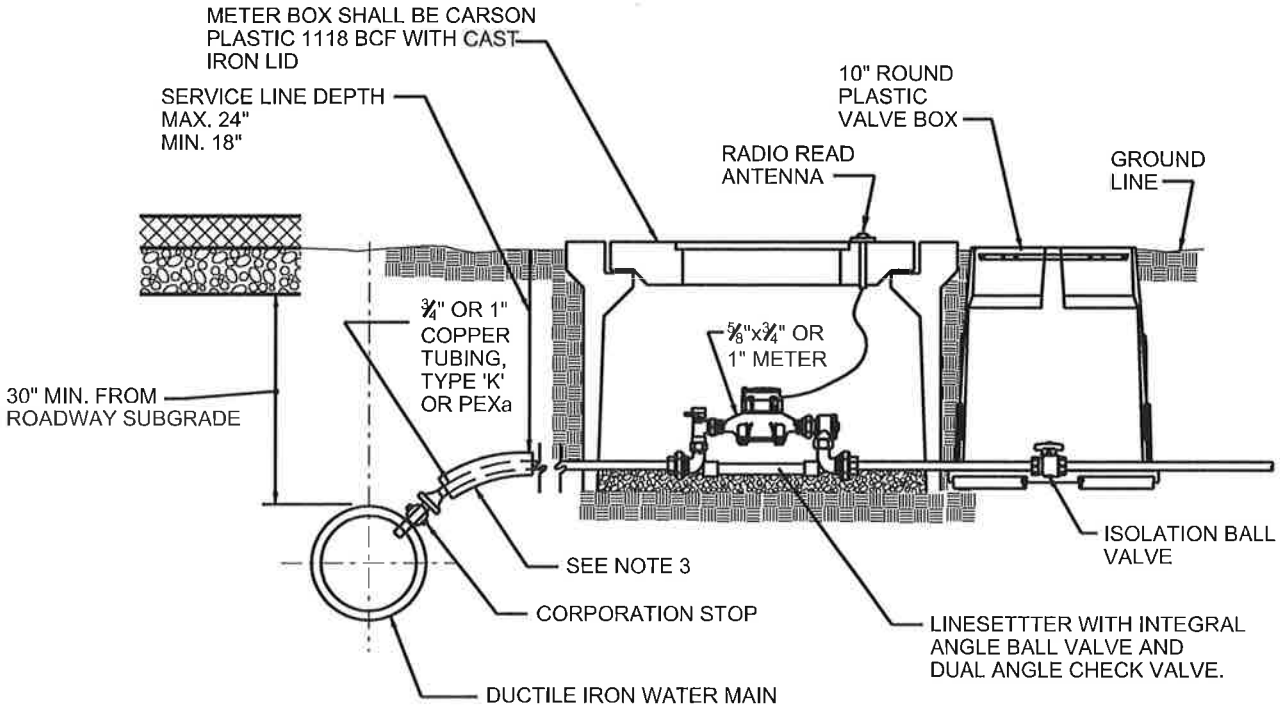
NOTES:
1. ALL FIRE METERS TO BE IMMEDIATELY FOLLOWED BY A REDUCED PRESSURE BACKFLOW PREVENTER.
2. PRECAST CONCRETE VAULT DESIGN REQUIREMENTS
   a. MEET ACI 318-11.
   b. MEET ASTM C857 & AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
   c. PRECAST RATED FOR 300 PSF.
   d. CONCRETE COMPRESSIVE STRENGTH @ 28 DAYS = 5000 PSI.
   e. REINFORCEMENT: ASTM A615,GRADE 60
   f. JOINT SEALANT: BUTYL RUBBER, CONSEAL CS-102 (CONTINUOUS @ EACH JOINT).
   g. BROOM FINISH ON TOP SLAB EXTERIOR
   h. PROVIDE 4 LIFTING RINGS PER SLAB TOP
3. HATCH TO BE H-20 LOAD RATED IT VAULT INSTALLED IN SIDEWALK AREA.

REVISIONS	DATE

6" AND 8" COMPOUND METER

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-005
DRAWING No.



NOTES:

1. TAPS ON ALL PIPES SHALL USE A TAPPING SADDLE.
2. PLACE 3" DEEP OF CLEAN ½" TO ¾" CRUSHED STONE IN BOTTOM OF METER BOX.
3. SERVICES UNDER ROADWAY ARE TO BE INSTALLED INSIDE 3" SCH 40 PVC OR DR11 HDPE CASING PIPE. FROM A POINT 1' BEYOND CORPORATION STOP TO A POINT 1' FROM OUTSIDE EDGE OF METER BOX.
4. PRESSURE REDUCING VALVE IS ALSO RECOMMENDED ON THE CUSTOMER SIDE OF THE METER.
5. PEXa SERVICE TUBING SHALL BE INSTALLED WITH 12 GA. SOLID STRAND COPPER WIRE. TRACER WIRE SHALL BE CONNECTED TO THE CORP STOP AND TERMINATED IN THE METER BOX TO ALLOW FOR CONNECTION TO DETECTION EQUIPMENT.

REVISIONS	DATE

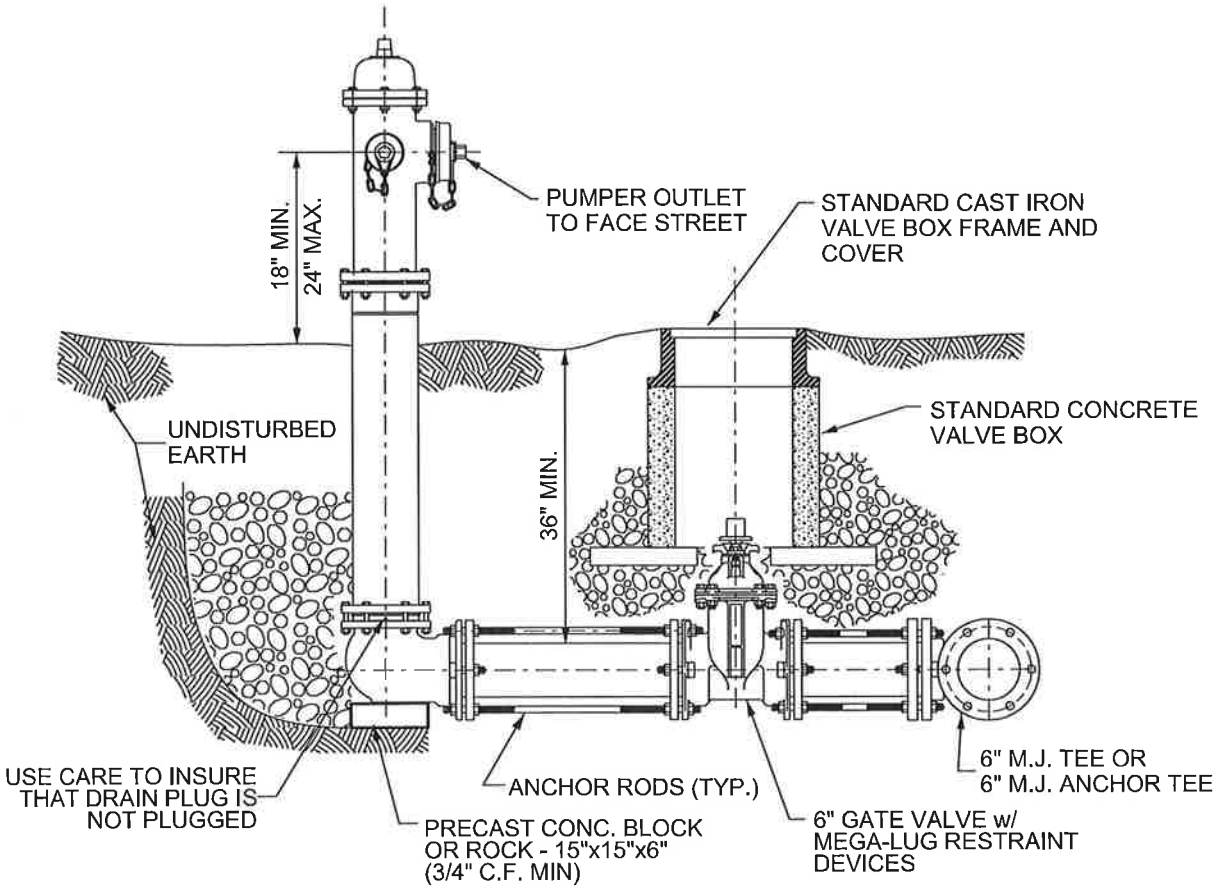
3/4" OR 1" SERVICE ASSEMBLY

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-006
DRAWING No.

NOTES:

1. HYDRANT SHALL BE SET ON CONCRETE VALVE BOX FOOTING BLOCK. OR POURED CONCRETE (CLASS A)
2. CARE SHALL BE USED TO SET HYDRANT PLUMB. THE FIRE HYDRANT SHALL BE LOCATED NOT LESS THAN 12" OR MORE THAN 18" FROM FACE OF CURB TO FRONT OF HYDRANT.
3. A MINIMUM OF 2 CU. FT. OF CRUSHED STONE SHALL BE PLACED AROUND HYDRANT BASE TO ALLOW FOR DRAINAGE.
4. HYDRANTS TO BE PAINTED. REFER TO SPECIFICATIONS FOR BODY AND BONNET COLORS.
5. HYDRANT TEE AND HYDRANT SHOE TO INCLUDE MEGA-LUG RESTRAINT DEVICES.
6. FIRE HYDRANT SHALL NOT SIT CLOSER THAN 5' FROM EDGE OF ANY POWER AND/OR LIGHT POLE.
7. HYDRANT BURY SHALL BE AT LEAST 48" + O.D. IF WATER LINE LOCATED IN ROADWAY AND 36" + O.D. IF LOCATED OUTSIDE ROADWAY.
8. HYDRANT SHALL BE RODDED TO VALVE AND VALVE SHALL BE RODDED TO TEE BRANCH.

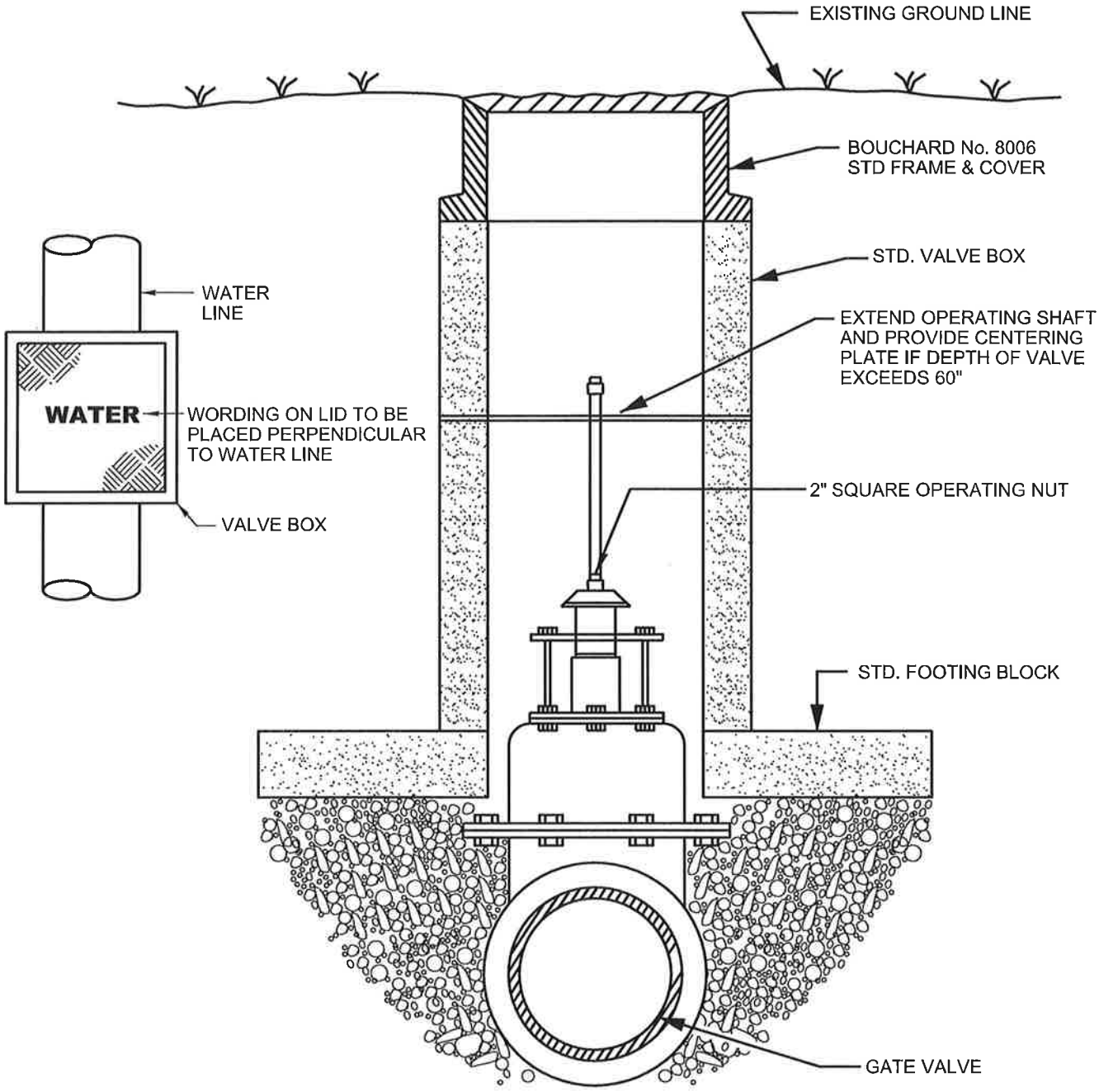


REVISIONS	DATE

FIRE HYDRANT DETAIL

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-007
DRAWING No.

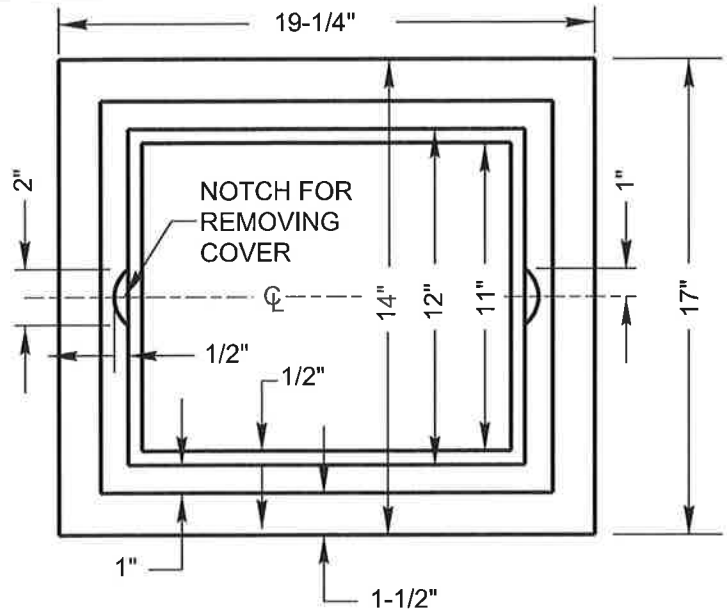


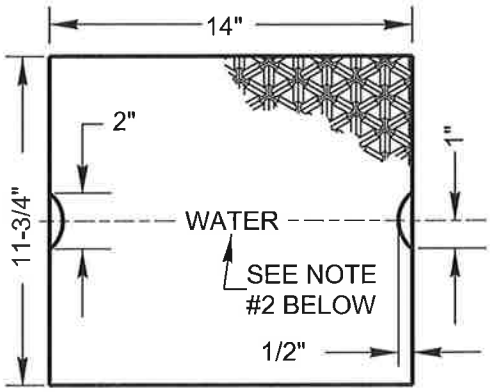
REVISIONS	DATE

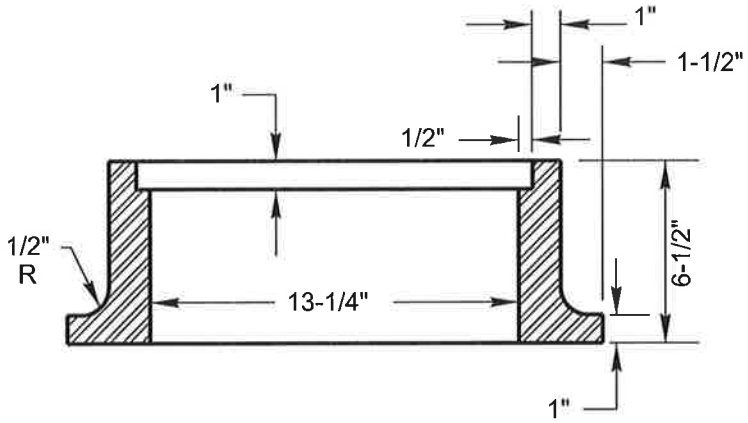
VALVE BOX SETTING DETAIL

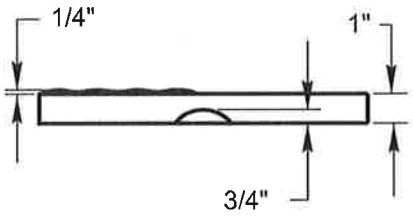
CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-008
DRAWING No.









NOTES:

1. NO OPEN SAND CASTINGS, CASTINGS ARE TO BE MADE OF CAST IRON IN ACCORDANCE WITH CURRENT SPECIFICATIONS. COVER MUST FIT EVENLY ON RABBIT OF FRAME IN ORDER TO EQUALLY DISTRIBUTE WEIGHT OF COVER OVER FRAME MINIMUM WEIGHT OF FRAME 150 LBS. MINIMUM WEIGHT OF COVER 45 LBS.

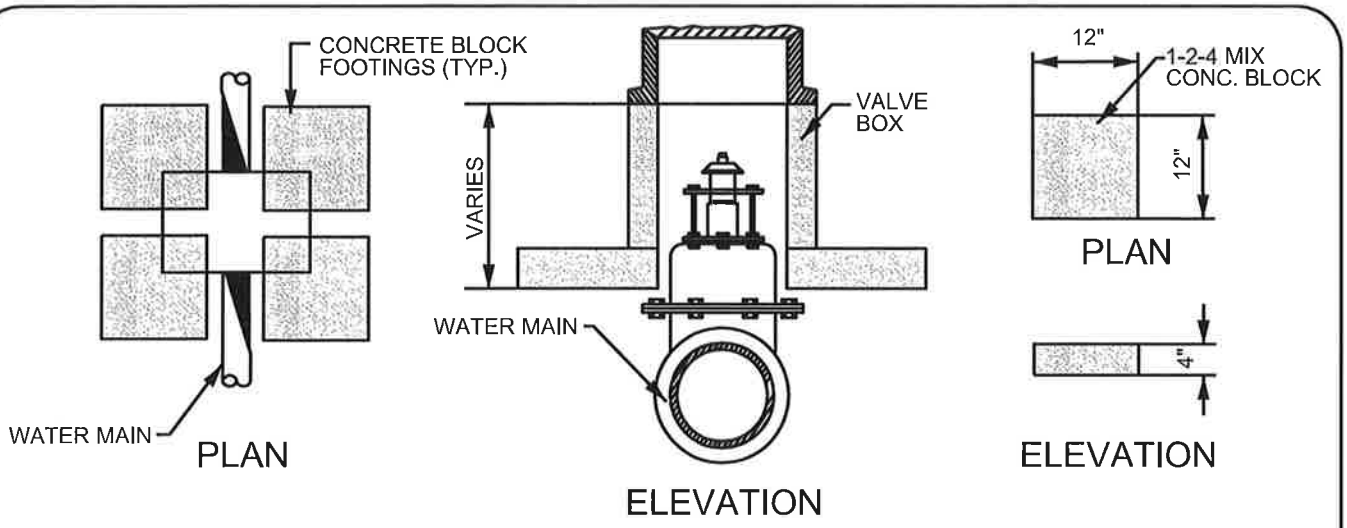
2. VALVE BOX COVERS UPSTREAM (DISTRICT SIDE) OF FIRE METERS SHALL BE LABELED "WATER" AND PAINTED BRIGHT RED.

REVISIONS	DATE

CAST IRON VALVE BOX FRAME AND COVER

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

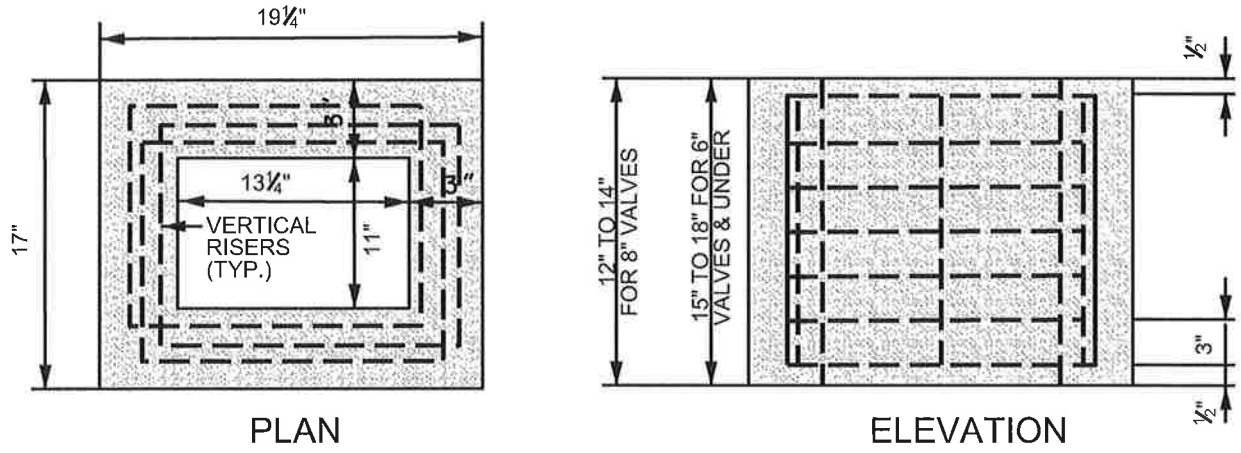
TSW-009
DRAWING No.



NOTES:

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

2) NO REINFORCING STEEL 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 BLOCKS. WEIGHT = 200 LBS. BEARING AREA ON SOIL = 576 SQ. IN.



1) REINFORCING TO BE ¼" STEEL REINFORCING RODS PLACED HORIZONTALLY IN SQUARES 16-1/4" x 14" AND TO STAGGERED APPROX. AS SHOWN ON THE PLAN VIEW, ONE FOR EVERY 3" OF HEIGHT IN BOX. VERTICAL RISERS ARE TO BE 1" SHORTER THAN THE HEIGHT OF THE BOX AND SHALL BE PLACED IN EACH CORNER OF THE BOX USING 8" RISERS TO THE BOX. TOTAL LENGTH OF REINFORCING ROD FOR EACH BOX IS APPROX. 47 FEET.

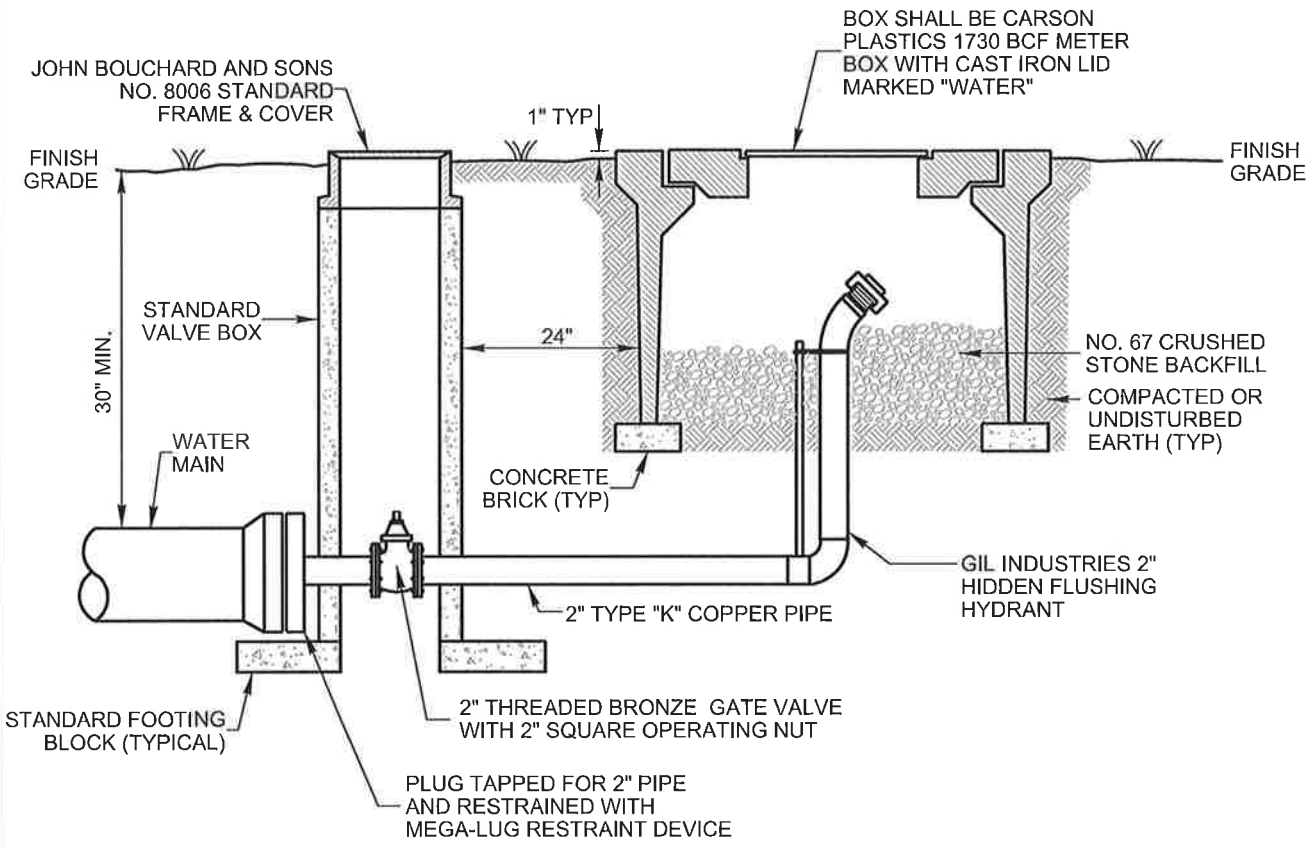
2) CONCRETE MIXTURE TO BE 1 PART CEMENT, 2 PARTS SAND AND 4 PARTS No. 2 CRUSHED STONE OR GRAVEL. TOTAL VOLUME OF MIXTURE FOR EACH BOX IS APPROX. 2 CUBIC FEET.

REVISIONS	DATE

STANDARD CONCRETE VALVE BOX

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-010
DRAWING No.

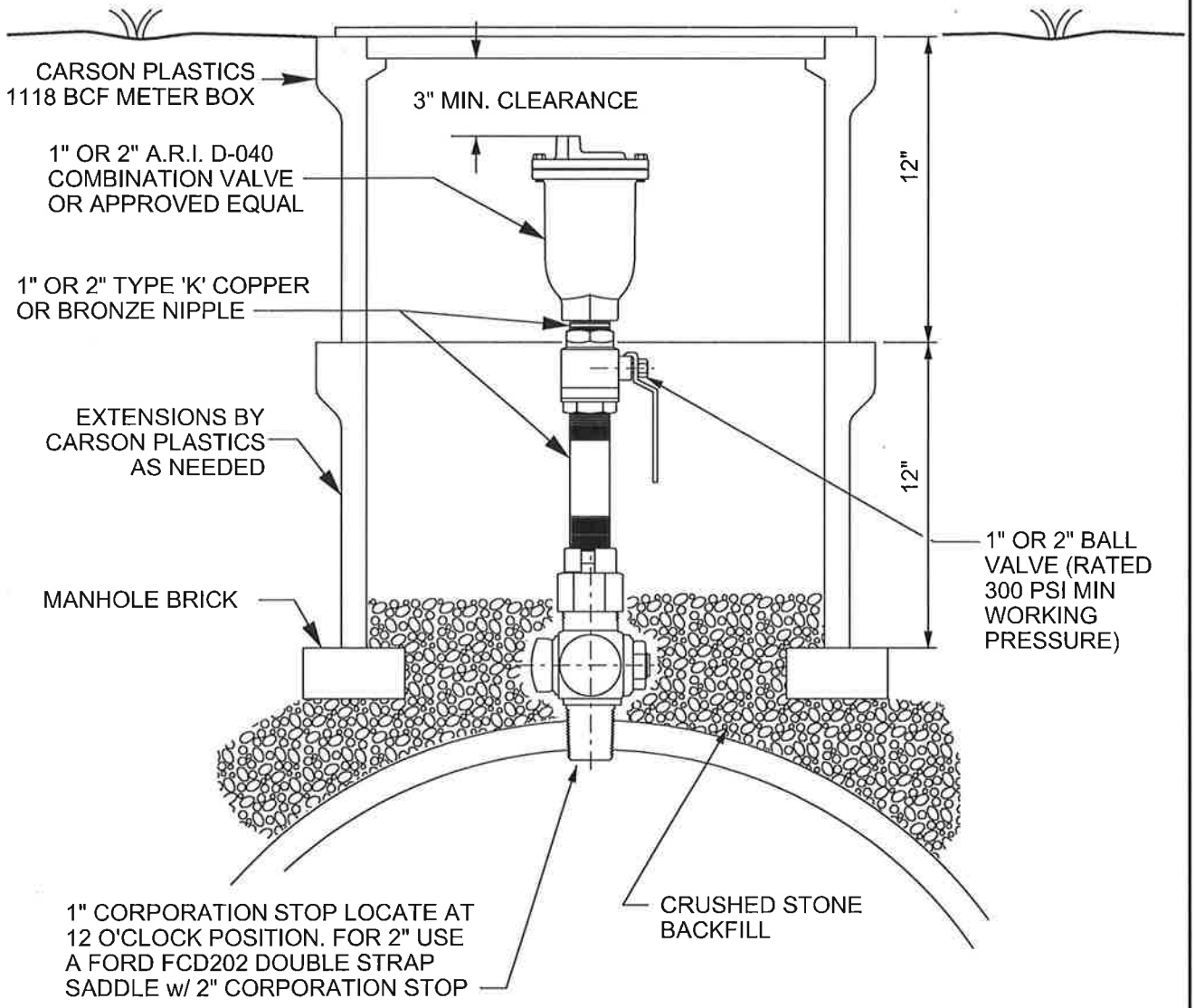


REVISIONS	DATE

2" BELOW-GROUND BLOW-OFF DETAIL

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-011
DRAWING No.



NOTES:

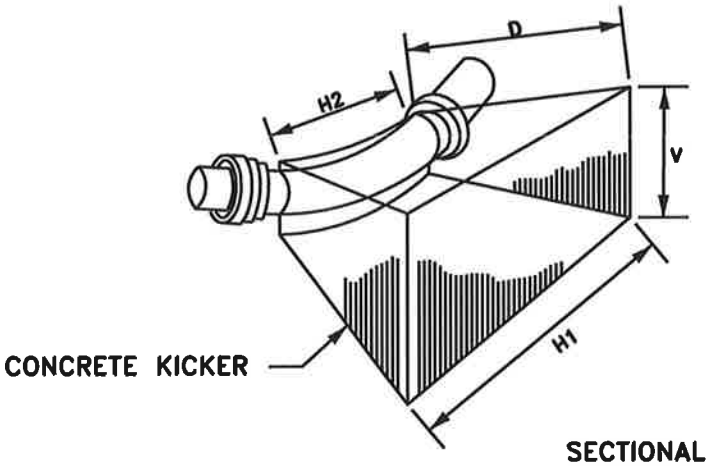
1. ARV TO BE PLACED AT HIGH POINT IN PROFILE OR AS DIRECTED BY MVUD
2. BOX SHALL BE CARSON PLASTICS 1118 BCF METER BOX WITH EXTENSIONS AS NEEDED. PLASTIC COVER WITH CAST IRON READER SLOT.
3. IF PIPE IS LOCATED IN TRAFFIC AREAS, THEN THE ARV ASSEMBLY SHALL BE INSTALLED OUTSIDE TRAFFIC AREAS AND 1" OR 2" TYPE "K" COPPER OR PEXa PIPE SHALL BE RUN TO THE TAP ON THE WATER LINE. 1" OR 2" LINE SHALL BE INSTALLED TO MAINTAIN AN UPHILL GRADIENT TO THE ARV. NO DIPS OR SAGS ARE ALLOWED.

REVISIONS	DATE

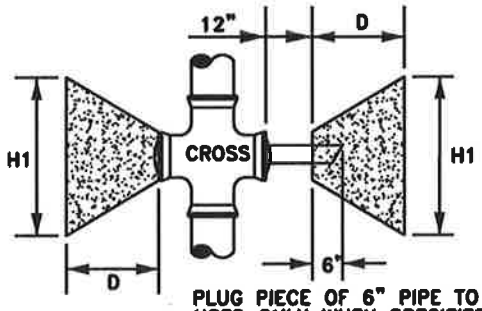
1" OR 2" AUTOMATIC AIR RELEASE VALVE WITH BOX

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

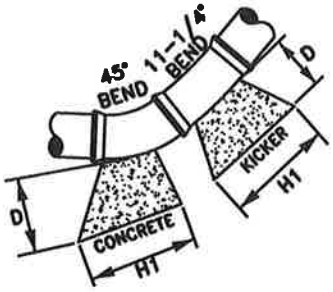
TSW-012
DRAWING No.

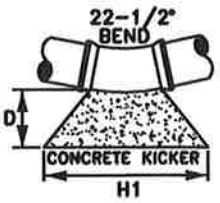


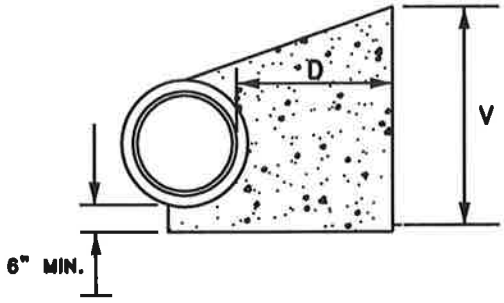
SECTIONAL VIEW
TEES, CROSSES, & BENDS

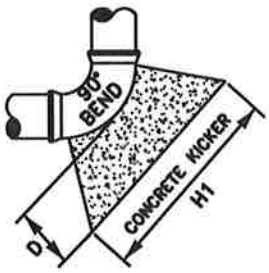


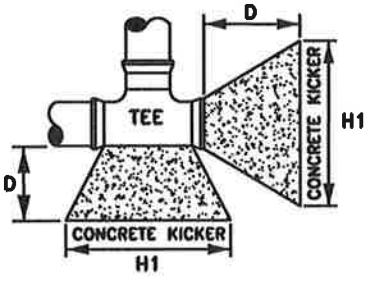
PLUG PIECE OF 6" PIPE TO BE USED ONLY WHEN SPECIFIED ON LAYOUT SHEET











NOTES:

1. IF PLANS CALL FOR RESTRAINED JOINT PIPE AND FITTINGS THRUST BLOCKING IS NOT REQUIRED.
2. THRUST BLOCKS ARE REQUIRED IF RESTRAINED JOINT PIPE AND FITTINGS ARE NOT USED.
3. THRUST BLOCKS ARE REQUIRED AT ALL TAPPING TEES.
4. THRUST BLOCKS MAY BE REQUIRED IN OTHER LOCATIONS WHERE DIRECTED BY THE DISTRICT.
5. CONCRETE FOR THRUST BLOCKS SHALL HAVE 4000 PSI COMPRESSIVE STRENGTH.
6. THRUST BLOCKS SHALL NOT BE POURED IN WET OR FROZEN GROUND.
7. THRUST BLOCKS SHALL BEAR AGAINST UNDISTURBED MATERIAL.
8. PLASTIC SHEETING SHALL BE PROVIDED AT FITTINGS SO AS TO PREVENT COVERING ANCHOR BOLTS WITH CONCRETE.

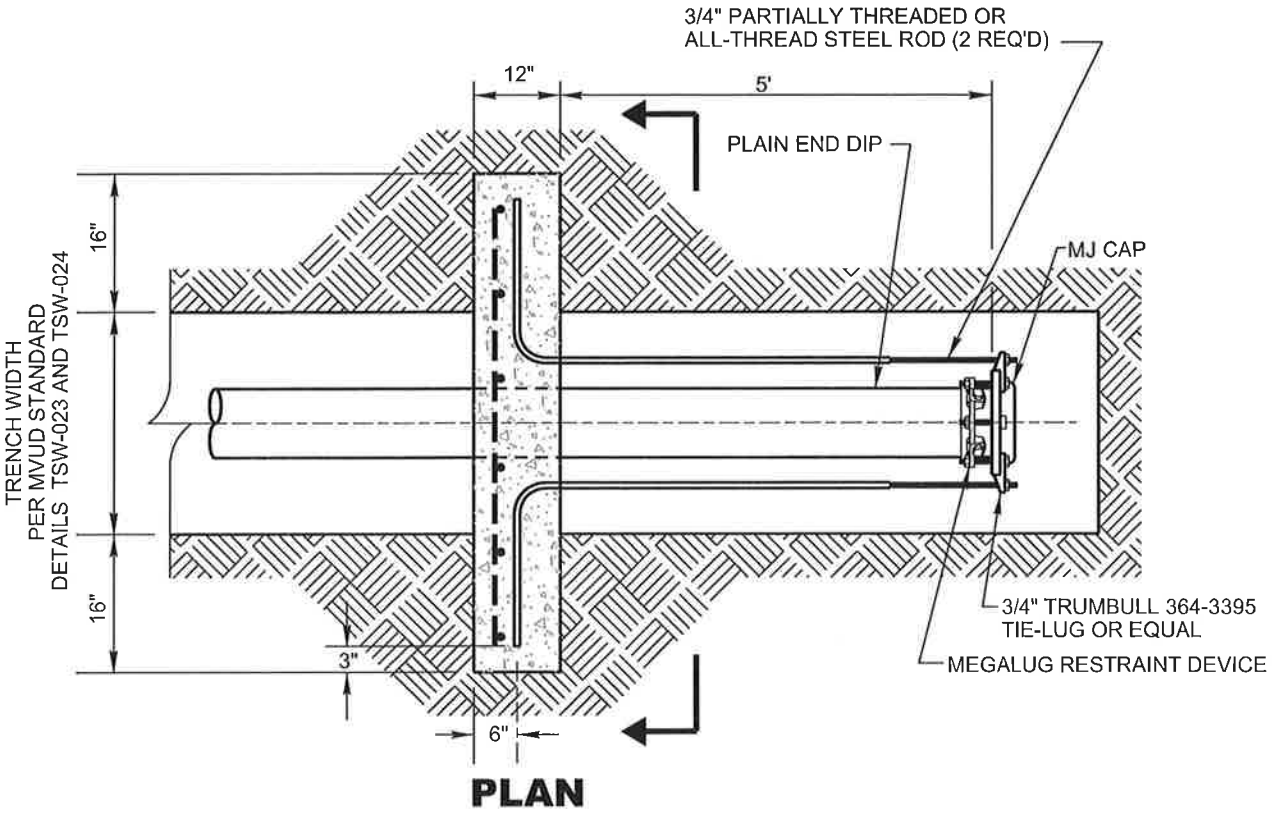
TAPPING SLEEVES TEES, CROSSES & PLUGS					90° BENDS					45° BENDS					22½° BENDS					11¼° BENDS					PIPE SIZE
H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	H1	H2	V	D	C.F.	
24"	12"	12"	18"	2.25	24"	12"	12"	18"	2.25	18"	8"	12"	18"	1.60	18"	8"	12"	18"	1.60	18"	8"	12"	18"	1.60	3"&4"
24"	16"	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"	12"	18"	18"	3.95	24"	12"	18"	18"	3.95	24"	12"	16"	18"	3.40	8"
48"	24"	18"	24"	7.15	54"	32"	24"	18"	10.25	36"	18"	21"	18"	4.60	24"	18"	21"	18"	4.60	24"	18"	21"	18"	4.60	10"
54"	30"	24"	24"	13.40	54"	32"	36"	24"	18.15	42"	18"	24"	24"	9.60	24"	18"	24"	24"	6.60	24"	18"	21"	24"	8.10	12"
66"	34"	36"	24"	22.50	69"	48"	48"	24"	29.00	48"	30"	36"	24"	17.00	36"	30"	27"	24"	11.80	27"	24"	27"	24"	9.10	16"

REVISIONS	DATE

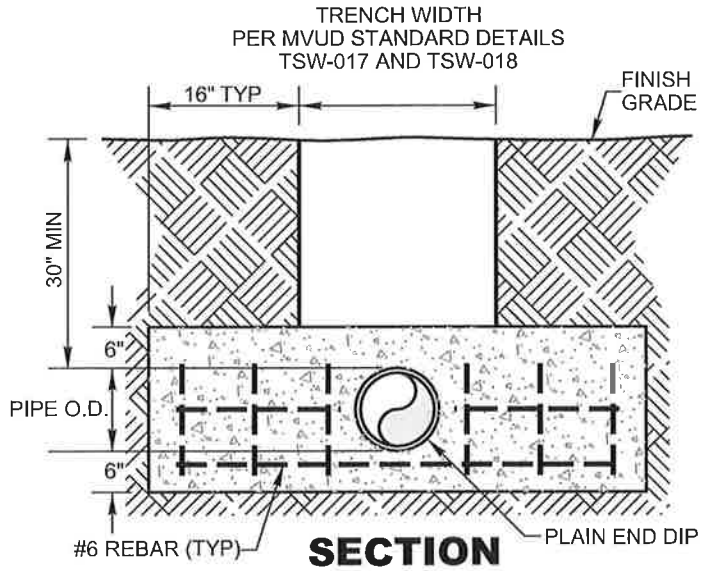
CONCRETE THRUST BLOCK DETAILS

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-013
DRAWING No.



PLAN



SECTION

NOTES:

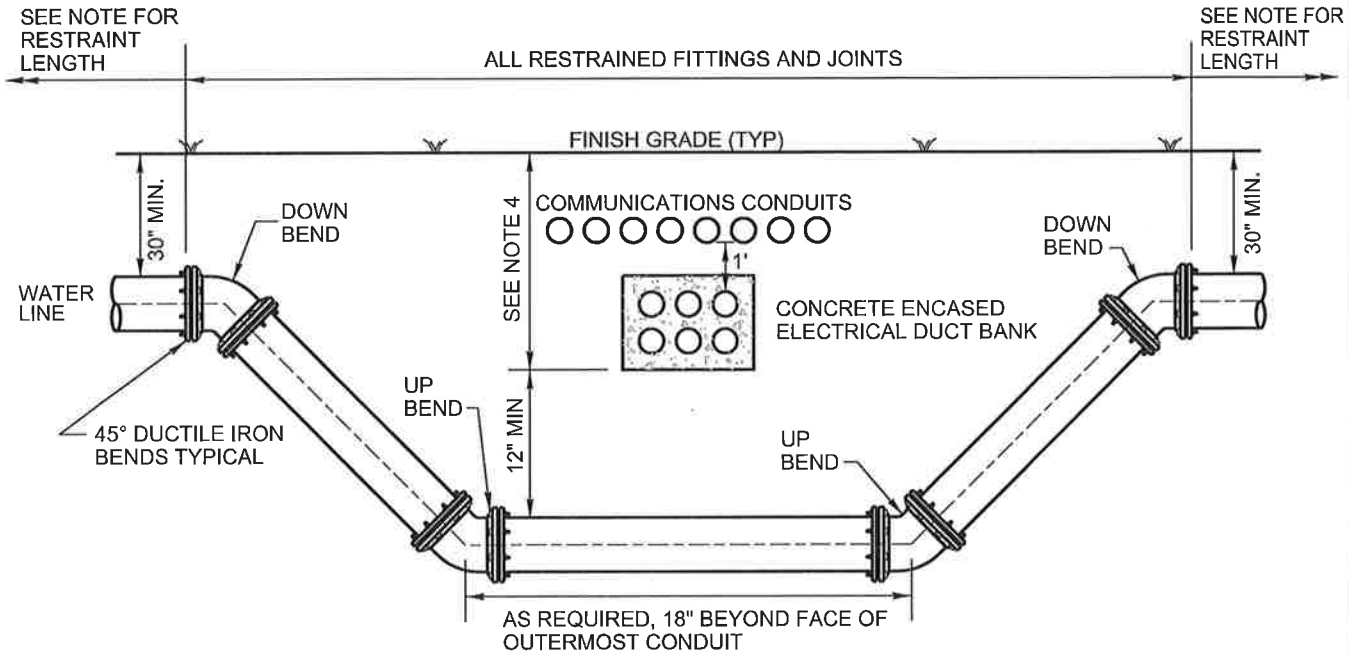
1. ANCHOR BLOCK CONCRETE SHALL BE 4000 PSI
2. ALL STEEL RODS, BOLTS, TIES, ETC. IN CONTACT WITH SOIL SHALL BE COATED WITH TNEMEC HB TNEMECOL OR EQUAL OR BE STAINLESS STEEL.
3. CONCRETE SHALL BE POURED AGAINST UNDISTURBED EARTH
4. DIMENSIONS ARE BASED ON 2000 P.S.F. SOIL BEARING CAPACITY PRESSURE AND 6000 LB. REINFORCING BAR TENSILE STRENGTH

REVISIONS	DATE

REVERSE THRUST BLOCK DETAIL

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-014
DRAWING No.



NOTES:

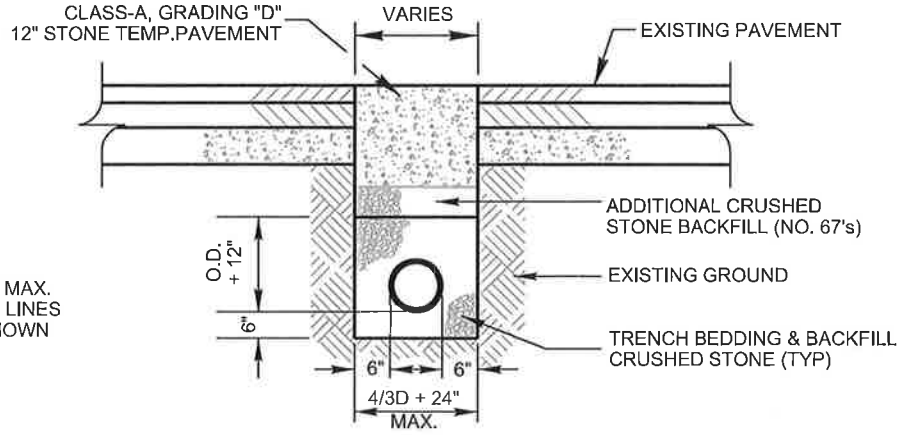
1. GRIP RESTRAINT GASKETS REQUIRED AS FOLLOWS:
   8" VERTICAL UP BEND RESTRAINT LENGTH - 12'
   8" VERTICAL DOWN BEND RESTRAINT LENGTH - 32'
   10" VERTICAL UP BEND RESTRAINT LENGTH - 14'
   10" VERTICAL DOWN BEND RESTRAINT LENGTH - 38'
   12" VERTICAL UP BEND RESTRAINT LENGTH - 17'
   12" VERTICAL DOWN BEND RESTRAINT LENGTH - 45'
   * BASED ON 45° VERTICAL BENDS.
   CALCULATION BASED ON:
   SOIL TYPE GC; SF = 2.0; TEST PRESSURE @ 200 PSI;
   TRENCH TYPE 3, BURY DEPTH = 3' LOW SIDE
   BURY DEPTH = 5'
2. BENDS TO HAVE MECHANICAL RESTRAINT DEVICES (MEGA-LUG OR EQUAL). PIPE JOINTS TO HAVE GRIPPER RESTRAINT GASKETS FOR LENGTHS SPECIFIED HEREIN.
3. CROSSING SHALL ADHERE TO THE LATEST EDITION OF MTEMC DESIGN CRITERIA AND SPECIFICATIONS.
4. SIZE AND DEPTH OF DUCT BANK WILL VARY DEPENDING ON NUMBER OF CONDUITS. REFER TO ELECTRICAL UTILITY PLANS FOR DETAILS.

REVISIONS	DATE

ELECTRICAL DUCT BANK CROSSING DETAIL

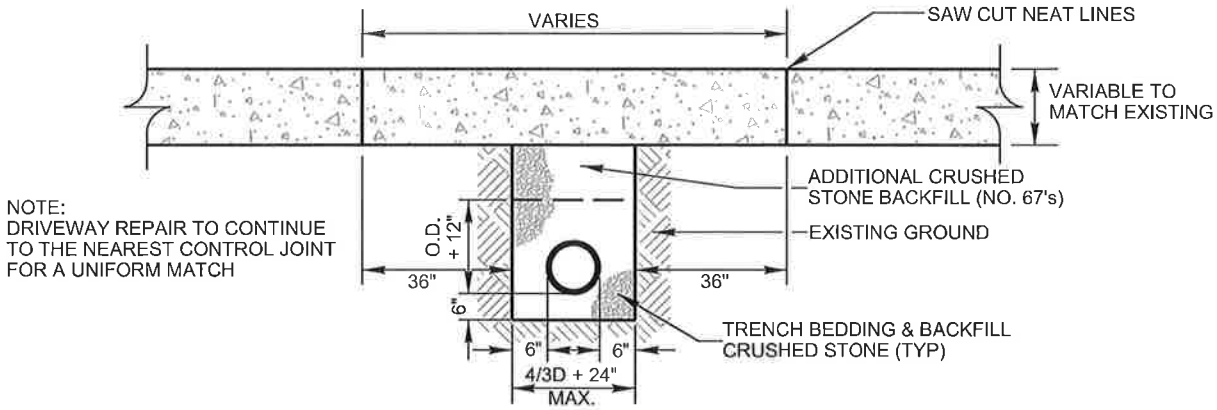
CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-015
DRAWING No.



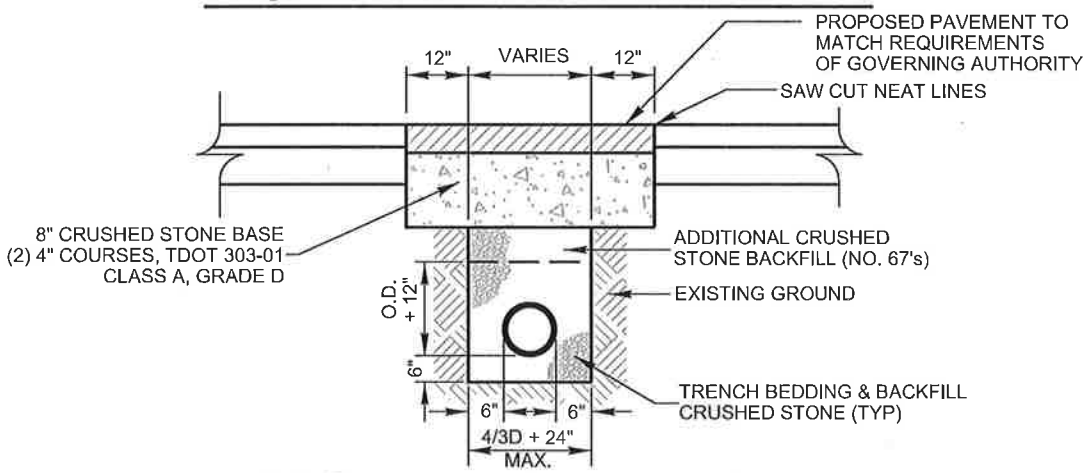
NOTE:
30" MIN. COVER AND 60" MAX. COVER FOR ALL WATER LINES UNLESS OTHERWISE SHOWN ON PLANS.

TYPICAL SECTION TEMPORARY PAVEMENT



NOTE:
DRIVEWAY REPAIR TO CONTINUE TO THE NEAREST CONTROL JOINT FOR A UNIFORM MATCH

TYPICAL SECTION AT CONCRETE DRIVEWAYS



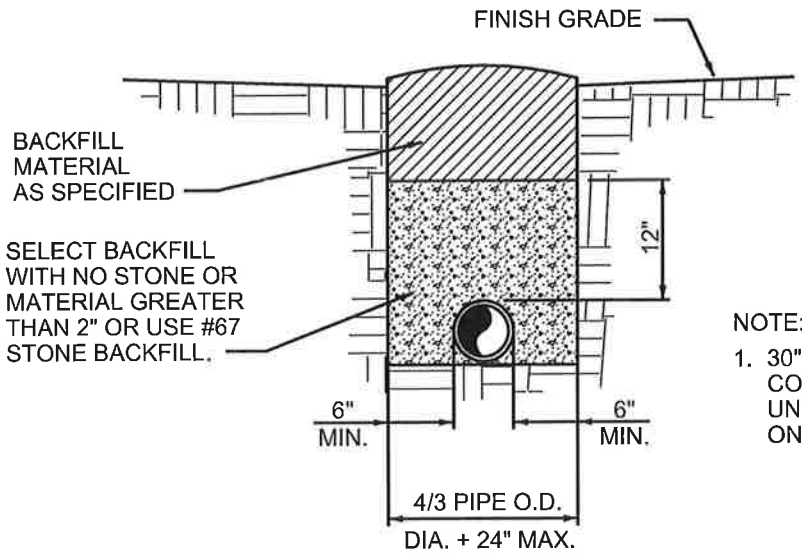
TYPICAL SECTION AT PAVED ROADWAY OR PARKING AREA

REVISIONS	DATE

TYPICAL TRENCH DETAILS IN TRAFFIC AREAS

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

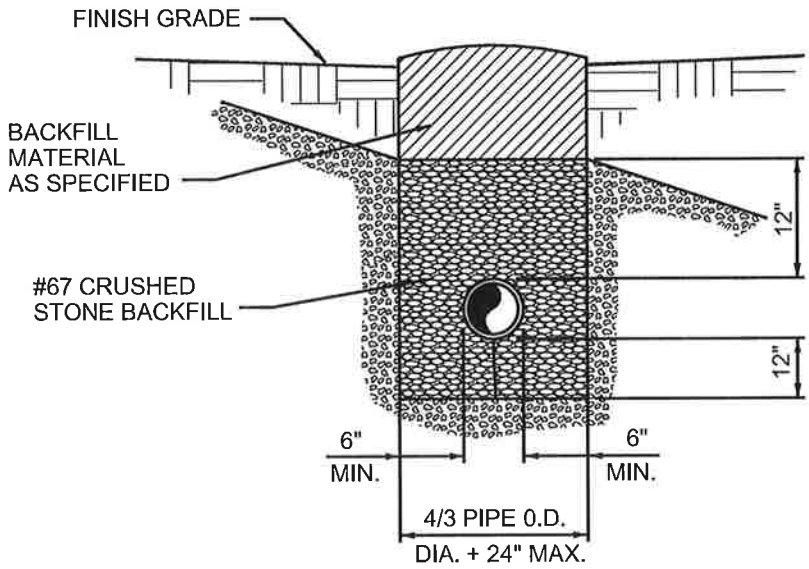
TSW-016
DRAWING No.



NOTE:

1. 30" MIN. COVER AND 60" MAX. COVER FOR ALL WATER LINES UNLESS SHOWN OTHERWISE ON PLANS.

DUCTILE IRON PIPE IN EARTH



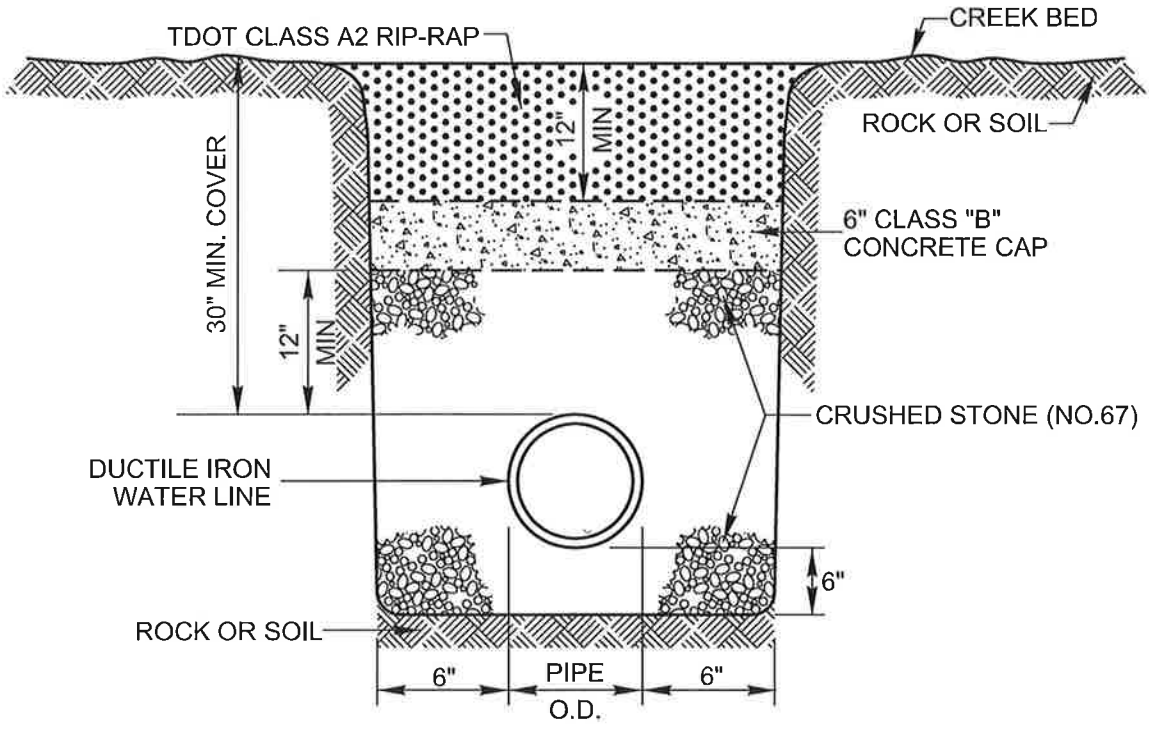
DUCTILE IRON PIPE IN ROCK

REVISIONS	DATE

TYPICAL TRENCH DETAIL NON-PAVED AREAS

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-017
DRAWING No.

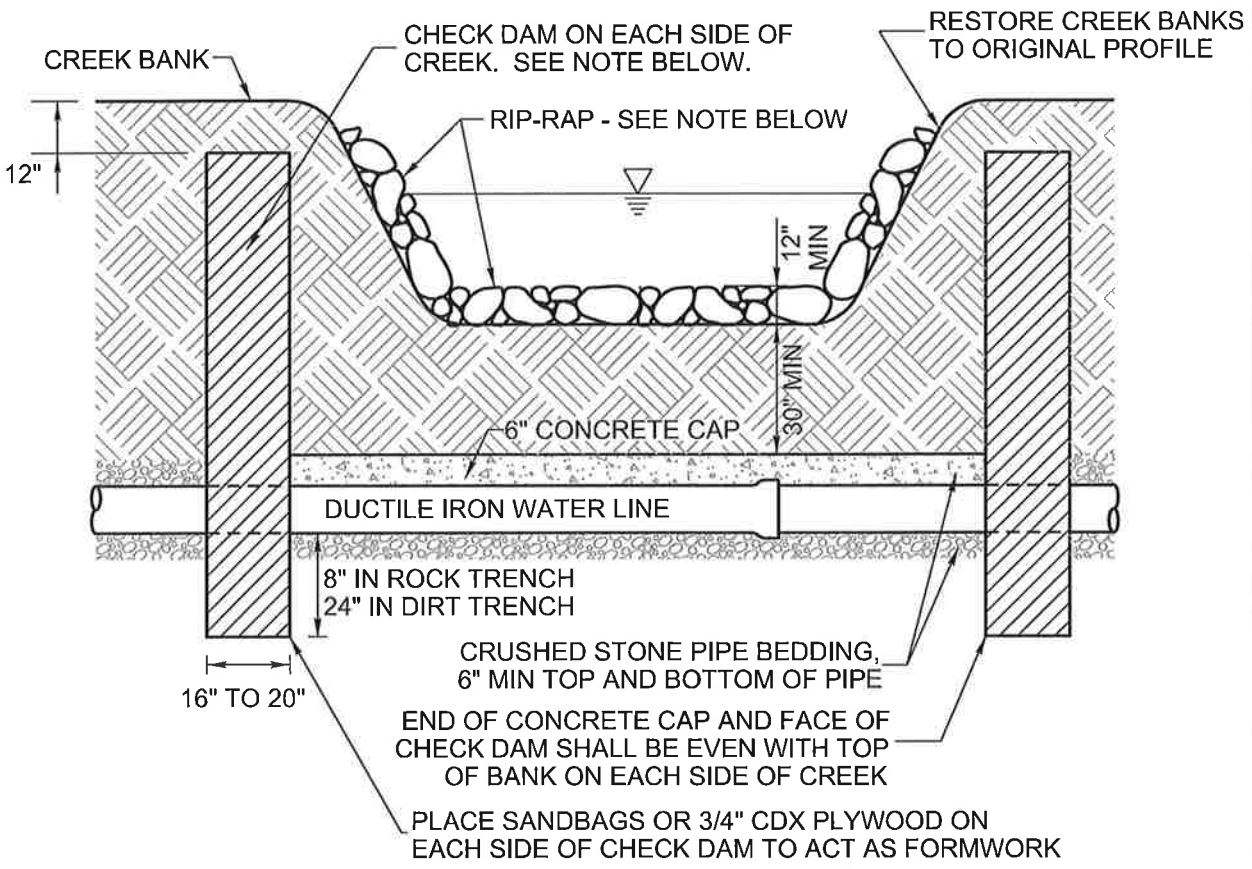


REVISIONS	DATE

WATERLINE STREAM CROSSING DETAIL

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-018
DRAWING No.



NOTES:

1. RIP RAP TO BE MACHINED RIP-RAP, CLASS A-2, VARYING IN SIZE FROM 2 INCHES TO 12 INCHES WITH NO MORE THAN 20% BY WEIGHT BEING LESS THAN 4 INCHES. THE THICKNESS OF THE STONE LAYER SHALL BE 1' MINIMUM.

2. CHECK DAM SHALL BE CONSTRUCTED FROM GENERAL USE FLOWABLE FILL F_C >150 PSI MIN. OR COMPACTED CLAY / BENTONITE.

3. NO BLASTING IS PERMITTED IN CREEK. ROCK SHALL BE REMOVED BY MEANS OF HYDRAULIC HOE RAM OR ROCK SAW.

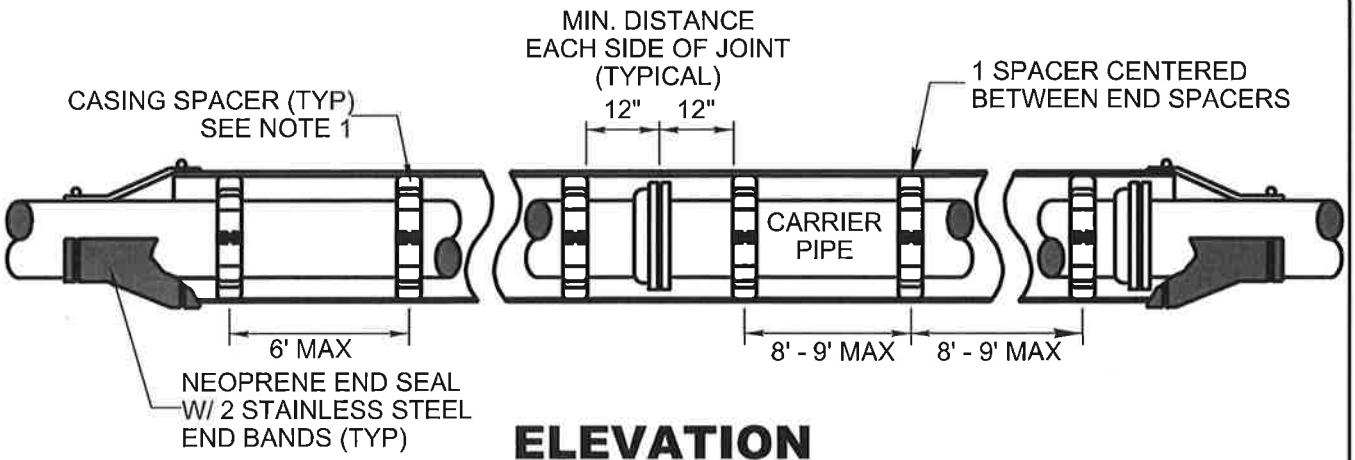
4. INSTALL PLASTIC OR ALUMINUM SIGN, 12" SQUARE MINIMUM SIZE, ON GALVANIZED OR POWDER COATED U-CHANNEL SIGN POST WITH CONCRETE BASE ON EACH SIDE OF CREEK BANK. SIGN SHALL READ "UNDERGROUND WATER LINE BELOW. IN CASE OF EMERGENCY CONTACT THE CITY OF MOUNT PLEASANT AT (931) 379-7717"

REVISIONS	DATE

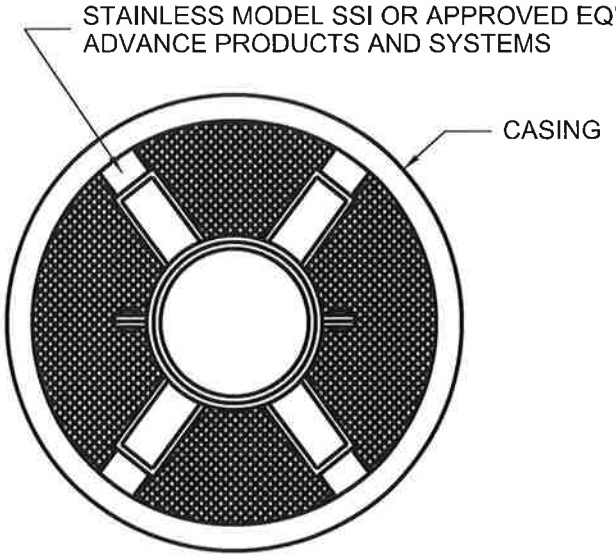
CREEK CROSSING DETAIL

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-019
DRAWING No.



ELEVATION



SECTION

NOTES:

1. REFER TO STANDARD SPECIFICATIONS FOR MIN. CASING WALL THICKNESS
2. MINIMUM REQUIREMENT OF 3 CASING SPACERS PER 20' SECTION OF PIPE

REVISIONS	DATE

CASING SPACERS

CITY OF MOUNT PLEASANT
MAURY COUNTY, TENNESSEE

TSW-020
DRAWING No.