Design Guideline
City of Osage Beach
SECTION 2 - WATER SYSTEM

(Revised July 2024)

OVERVIEW

The City of Osage Beach is authorized to construct, operate, and maintain a water system to serve the inhabitants, business establishments, and infrastructure needs of the city by Title VII Utilities of the City Code. The city water system is operated under license of the Missouri Department of Natural Resources (MoDNR), Drinking Water Division as authorized under 10 CSR 60-3 and 10 CSR – 10 of the Missouri Safe Drinking Water Act and the Missouri Public Drinking Water Regulations. The purpose of this guideline is to establish design policy and guidance for the design and construction of the city water system.

The design, construction, and operation of the city water system will conform to the requirements of the MoDNR regulations, standards, and policies, the City of Osage Beach Design Guideline, and the applicable provisions of the International Plumbing Code and the International Building Code and with reference to requirements of the International Fire Code and the recommendations of the Insurance Services Organization (ISO)

REFERENCED CITY ORINANCES

Chapter 400.110 Subdivision Regulations
Chapter 410.130 Contents
Chapter 410.190 Basic Standards
Chapter 410.320 Waterlines
Chapter 505 Fire Prevention and Protection Code
Chapter 705 Waterworks

GOALS AND OBJECTIVES

The basic goal of the City of Osage Beach is to provide an efficient, cost-effective water system to supply the fire protection and drinking water needs of the city. This guideline will establish the basic parameters, design criterion, and material requirements for the system. The system will be designed to meet all appropriate standards for domestic water supply and to achieve a reasonable fire protection capability. The fire protection requirements will be developed in conjunction with the Osage Beach Fire Protection District.

OVERALL WATER SYSTEM STANDARDS AND CRITERION

The initial water system was designed by Archer Engineers offices in Lee Summit and Springfield, Missouri. A Water Master Plan was developed that establishes the basic requirement for the system. Essentially Osage Beach has two separate water systems, one on each side of the Grand Glaize Bridge. Basic requirements for the supply system are as follows:

The master plan requires chlorination and fluoridation of the water system. No further treatment is proposed at this time. The system will be added to and/or modified as necessary to assure full compliance with MoDNR Regulations.

WATER DISTRIBUTION – BASIC DESIGN CRITERION

A. Fire Demand and Supply

1. Industrial, commercial, and multi-unit residential structures:

   a. Provide not less than 2,000 gpm at a residual pressure of 20 psi at each building site.
   b. Provide two fire hydrants within 300-feet of each structure.
   c. Hydrant spacing in commercial and industrial areas shall not be less than 300-feet.
   d. Provide one hydrant within 125-feet of each fire main entrance into the structure.
   e. Provide fire main service to each structure with indicating type valve at the water main. The minimum size fire service line is 4-inches.
   f. The minimum static pressure at each structure shall be 35 psi.
   g. Commercial buildings, Condominiums and Multi-Family Occupancies, which have a fire suppression system, must also be served by an approved fire hydrant not further than 150-feet, in the line of hose path travel, from the fire department connection.

2. Residential and Undeveloped

   a. Provide not less than 1,000 gpm at a residual pressure of 20 psi.
   b. Provide not less than one fire hydrant within 300-feet.
   c. In the case of a structure or residence that is not connected to city water a fire hydrant must be available within 600-feet.
   d. In undeveloped areas a fire hydrant shall be installed every 600-feet.

B. Fire Main Connections to Structures

1. Where required by the Osage Beach Fire District, NFPA, Internation Fire Code and/or International Plumbing Code a fire main shall be extended into each building as a separate fire main. This entrance main shall be only for fire protection system use. No meters or valves are allowed between the main and the building; except for an indicating shut-off valve at the main and a post indicating valve which shall be located a minimum of 5-feet away from the building. Shut-off valves installed on fire mains shall be of the indicating type that clearly shows if the valve is open or closed.

C. Water Distribution Mains

1. Water distribution mains shall be looped to the maximum extent feasible.

2. The MoDNR standard for a minimum size main is 8-inches. The city standard allows for 6-inch mains in residential areas where a fire flow of 1,000 gpm at a residual pressure of 20 psi can be maintained.

3. The minimum static pressure for domestic service shall not be less than 35 psi.

4. A fire hydrant or blow-off valve shall be installed at the end of all water mains.

5. The maximum design flow velocity shall be 8 fps.

6. An isolation valve shall be installed at not less than every 500-feet commercial, 800-feet residential and:
   a. At each branch main with one valve on the downstream main and one on the branch main.
   b. At loop connections on each leg of the connecting loop.

   Isolation valves shall be of the same nominal size as the main in which they are installed.

DOMESTIC SUPPLY CONNECTIONS AND METER POLICY

A. General Requirements for Customer Service Lines

1. City meter assemblies for single-family residents and all 5/8-inch meter installations will not have a city owned backflow device installed.

2. Industrial and commercial connections and all meter installations of 1-inch and larger shall have a privately owned dual check device installed. This backflow device is exclusive of and specifically not intended for use in lieu of backflow devices required by the customer's use.

3. Materials used for customer service lines shall conform to materials specified herein.

4. All domestic services shall be metered.

5. Meters shall be sized in accordance with the following unless specifically directed otherwise by the Public Works Operations Manager or designee:

Meter size	Meter Demand	Requirements
5/8"x 3/4"	1 to 20 gpm	Single family residence with 2-1/2 baths, small commercial offices or retail establishments. Maximum continuous flow 10 gpm.
1"	3 to 50 gpm	Large residences, swimming pools, lawn irrigation for lawns less than 6000 SF, apartments and condos with less than 10 units, motels of less than 15 units, small to medium restaurants, commercial uses with maximum continuous demand less than 25 gpm.
1-1/2"	5 to 100 gpm	Apartments and condos of less than 30 units, motels of less than 35 units, commercial uses with maximum continuous demand of less than 50 gpm.
2"	8 to 160 gpm	Apartments and condo of less than 60 units, hotels with less than 70 units, commercial uses with maximum continuous demand less than 80 gpm.
3"	4 to 320 gpm	Commercial applications with continuous demand of less than 160 gpm
4"	6 to 500 gpm	Commercial use less than 250 gpm continuous flow (Compound Meter)
	10 to 1,200 gpm	Municipal Use Only (Turbine Meter)
6"	20 to 2,500 gpm	Municipal Use Only (Turbine Meter)

B. Meter Connection Policy

1. Single Family Residential, and small commercial connections

   a. Each individually owned residence or business shall be connected through a single tap on the main, one meter, and receive one billing. Generally single-family residences and small businesses will be set up with a 5/8-inch meter. Individual owners shall confer with the Public Works Operations Manager or designee to determine appropriate size to meet their requirements.
   b. Billing will be at the established monthly rate based upon water usage.

2. Multi-Family Residential Units

   a. The general rule is: one property, one bill. Multi-family residential units are billed based on the number of units times the basic monthly rate plus the water usage over the base amount.
   b. All multi-unit residential buildings that require a separate fire main and sprinkler system shall be constructed with a separate metered domestic supply line and a non-metered fire main entrance. The meter shall be sized to meet the demand requirements of the individual building. On properties with more than one building, each building shall be metered separately.

3. Duplex Residential Units – Multiple Single Family Rental Units on one Property

   a. The general rule is: one owner of the property, one meter. If there are multiple duplexes or single-family units on one property and individual fire service mains are not required to any of the buildings then the one owner – one meter rule applies. The billing shall be at the established monthly rate per unit plus the gallons used over 1,000 gal. per unit billed at the established rate per 1,000 gal.
   b. In the case where each unit is individually owned then each unit shall be individually billed and metered. This specifically intended for duplex and single-family cluster homes only.

4. All Non-Residential Properties with Fire Sprinkler Systems

   a. At all locations where the structures require a separate fire main to the building each building shall have a separate, metered, domestic supply main.

b. One commercial property with multiple overnight lodging units (a motel or hotel) not requiring fire mains shall be metered by one meter assembly and billed on the water use.

c. One commercial property with multiple commercial units without fire mains, with individual tenants, may be metered with one meter, or individually, as mutually determined by the owner and the Public Works Operations Manager or designee.

d. One property with mixed residential long term, overnight rental, and commercial enterprises, may be metered on one meter assembly, or multiple meters, as determined by the Public Works Operations Manager or designee. Billing will be on a water use basis.

e. Where there are multiple buildings on one property that require fire main services, each building's domestic supply will be metered. All meters will be billed to the property owner.

C. Fire Main Connections

1. Fire main connections are required for all sprinkled buildings and structures. The owner/developer shall submit appropriate drawings and computations by a Registered Professional Engineer for approval. The owner/developer shall furnish all valves, fittings, and incidentals required to make the connection and shall employ a city approved contractor to perform the work.

2. Indicating shut-off valves shall be installed at the fire main connection to the water main.

3. Pipe materials for the main between the building and post indicating valve shall be Ductile Iron as shown below in Materials for Waterlines and Appurtenances section A. point 1 subpoint a.

D. City Ordinance 98.41 - Owner Furnished Backflow Preventer Assembly

1. Owner furnished backflow assemblies shall be licensed, furnished, installed, and maintained by the owner at the locations specified in City Code 705.470. Most of these will be for lawn sprinkler systems and the like.
Note: *These units are required in addition to any dual check assembly installed by the city at the meter installation*.

MATERIALS FOR WATERLINES AND APPURTENANCES

A. Water Mains
   1. All mains 6-inches and larger:
      a. Ductile Iron Pipe, AWWA C150 and C151, Class 350
         1) Cement mortar lined per AWWA C104
         2) Joints:
            a) For buried pipe: push-on joints per AWWA C111
            b) For exposed or interior: Flanged joints
      b. PVC, AWWA C900 or C905, DR 14, Class 305
         1) Joints shall be push-on type rubber gasket

B. Water Meter Service Lines and City Service Lines
   1. HDPE AWWA C901, CTS, SDR9, Class 200
   2. Larger than 2-inches to be approved by Public Works Operations Manager

C. Water Service Lines from meter to building (Privately Owned Lines Only)
   1. These lines shall conform to the requirements of the International Plumbing Code.

D. Water Fittings and Adapters Ductile Iron and PVC
   1. 6-inches and Larger:
      a. Fittings:
         1) Ductile iron fittings, cement mortar lined, conforming to AWWA C150 or C151.
         2) All buried or flooded locations shall use grip restraint mechanical joint pipe and fittings, such as Megalug or approved equal.
         3) Flanged fittings shall be provided for flanged pipe (above ground installations only). Faces shall be coated with rust Protective coating.
         4) Cement mortar lined pipe and fittings shall be coated with coal tar epoxy paint with a minimum thickness of 24 mils.
         5) Bolts shall be stainless steel, fluoropolymer coated, or approved equal.

b. Flanged Coupling Adapters:

1) Shall be Ford 193, Smith-Blair 913, Rockwell 913, or approved equal.
2) Bolts shall be Stainless Steel, Type 216.
3) Minimum rated operating pressure to match the line in which installed.

c. Joint Restraints:

1) Bell Joints shall be restrained with all threads or approved equal.
2) Approved concrete thrust blocks required.

2. For pipe 1-1/2-inches to 3-inches:

a. Fittings:

1) For ASTM 2241, SDR 21, Class 200 fittings shall be approved by the Public Works Operations Manager.

3. For PE Pipe – 2-inches or less:

a. Shall be Ford CTS Pack Joint Couplings for PE Pipe rated at the same pressure class as the pipe in which they are to be installed or approved equal.

E. Waterline Valves and Valve Boxes (for Valves 2-inches and larger):

1. Shall be iron body, non-rising stem, resilient wedge, gate valves with stainless steel bolts, and shall be epoxy paint coated.

2. Valves shall be by Mueller, Clow, M&H, or approved equal.

3. Valve Boxes shall be cast iron bonnet, PVC riser, with cast iron top and cover marked “water”.

F. Fire Hydrants

1. Fire hydrants shall be Mueller Super Centurion 250, American-Darling B84 or Clow Medallion with 4-1/2-inch pumper inlet, and two 2-1/2-inch hose connections. Hydrants shall be fully compatible with the requirements of the Osage Beach Fire Protection District.

2. Fire hydrants shall be painted red with epoxy coating as approved by the Public Works Operations Manager or designee.

G. Blow-Off Assembly

1. Post Hydrants shall be non-freezing, self-draining type with a minimum 42-inches of cover to the main. Hydrants shall be furnished with a 2-inch FIP inlet, a NOT-Turning operating rod, and shall open to the left. All working parts shall be Bronze-to-Bronze design. The outlet shall also be Bronze and be 2½-inch NST. Hydrants shall be lockable to prevent unauthorized use.

2. Hydrant shall be as manufactured by Kupferle Foundry Co., St. Louis, MO, or approved equal.

H. Water Meter Assemblies:

1. 5/8-inch and 1-inch Residential Meters:

   a. Tapping saddle shall be Ford Brass Saddles Hinged Series S91 for PVC and Series 202B IP for DIP, Min. 1-inch.
   b. Corporation Stop shall be Ford or Ford Ballcorp F(B)1000 Series, with pack joint for PE pipe.
   c. Meter Setter shall Be Ford 70 Series Coppersetter single yoke, with lockable angle valve, spreader bar, and CTS pack joint. *Do not place dual check assembly on residential service lines.*
   d. Meter Vault shall be ADS N-12 corrugated plastic of appropriate size (min. 24-inch), with Ford Wabash lid cover with Clay & Bailey extension ring. The lid cover must have a hole that accommodates the meter antenna.
   e. If the distance from the angled valve to the top of the lid is greater than 24-inches, the meter pit shall be up sized to 36-inches in diameter.
   f. All additional devices, equipment, and valves shall be down stream of the water meter and not located within the water meter pit.

2. 1-inch, 1-1/2-inch, and 2-inch Meters for Commercial or Multi-family Residential Use:
   a. Tapping saddle shall be Ford Brass Saddles Hinged Series S91 for PVC and Series 202B IP for DIP. It shall be a 2-inch tap with 2-inch service line to the meter., min. 1-inch for 1-inch meters and 2-inch for all larger.
   b. Corporation Stop shall be Ford or Ford Ballcorp F(B)1000 Series, with pack joint for PE pipe.
   c. Meter Setter shall Be Ford 70 Series Coppersetter single yoke, with lockable angle valve, spreader bar, dual check assembly, and CTS pack joint.
   d. Meter Vault shall be ADS N-12 corrugated plastic of

appropriate size (min. 36-inch), with Ford Wabash lid cover with Clay & Bailey extension ring. The lid cover must have a hole that accommodates the meter antenna.

e. All additional devices, equipment, and valves shall be down stream of the water meter and not located within the water meter pit.

3. Meter larger than 2-inches.

a. Tap, valves, fittings, and meter service line shall be not less than 2-inches and shall be equal to or one size larger than the building service line. The meter, pressure reducing valve, and dual check backflow assembly may be one size smaller than the meter service line (i.e., 4-inch tap, 4-inch gate valve, 4-inch meter service line, 3-inch meter, 3-inch PRV, 3-inch dual check assembly, 4-inch stub-out for building service line).
b. Tapping sleeve shall be Ford Style FAST, stainless-steel flange.
c. Gate Valve shall be as specified above.
d. Fittings and flanged coupling adapters as specified above.
e. All additional devices, equipment, and valves shall be located on the customer's side of the water meter and not located within the water meter pit.

WATERLINE AND APPURTENANCE INSTALLATION REQUIREMENTS

A. Waterline Installation

1. The minimum depth of cover is 42-inches above the top of the pipe.

2. The maximum depth of cover for waterlines is 5-feet unless specifically authorized in writing by the Public Works Operations Manager or designee.

3. Blue minimum 4-inch-wide marking tape marked "waterline below" shall be installed 12-inches above all waterlines.

4. Locator wire shall be standard tracer wire, a single No. 12 U.L. approved copper wire of the solid type with insulation for 600 volts. Wire for this service shall be blue in color and provided in standard rolls of not less than 500-foot lengths. Locator wire shall be placed on top of the water main and secured with tape at 8-foot intervals. Locator wire shall extend to al terminus, such as valves, hydrants, and meter pits.
a. Splices shall only be allowed where accessible. Buried splices will not be allowed. If valve box locations are spaced more than 500-feet apart, contractor shall install a vertical piece of 6-inch diameter PVC adjacent to the water main topped with a cast iron bonnet and cover marked "water". The wire shall be run outside

up alongside the valve box, then through a hole in the valve box just below ground level. The splice connector shall be left exposed at the top of the valve box. Wire contact points shall be provided at no more than 500-foot intervals.

b. Prior to final acceptance by the City, the contractor shall demonstrate that the locator wire works to the satisfaction of the City Inspector, Public Works Operations Manager or designee.

5. Bedding shall be installed around the pipe from 6-inches below to 12-inches above the pipe. Bedding shall be crushed rock conforming to MoDOT Type 5 aggregate, Section 1007. Trench backfill material shall not contain any material with a nominal particle size greater than 6-inches.

6. Waterlines shall be separated by a minimum of 18-inches vertically and 10-feet horizontally from sanitary/storm sewer lines or sanitary/storm sewer line appurtenances unless:

   a. At crossings the water or non-potable main has an encasement to a point 10-feet on either side of the sewer/water line crossing as appropriate. No joints shall occur in either the water or sewer line within the 20-foot area. The encasement may be a free draining sleeve of a material that is approved for use as a water main or one of the water or sewer main shall be constructed of mechanical or manufactured restrained joint pipe, fusion welded pipe.
   b. For parallel lines closer than 10-feet, exceptions can be made with prior approval of the Public Works Operations Manager or designee. Either the water main or the non-potable main shall be constructed of mechanical or manufactured restrained joint pipe, fusion welded pipe, or cased in a continuous casing. Casing pipe must be a material that is approved for use as a water main.

7. Primary power lines of 480 volts or higher shall not be placed in the same trench with any other utility. See Section 6 Road Cuts, Utility Trenches, and Excavation.

8. Secondary power may be installed in an offset trench with water lines. See Section 6 Road Cuts, Utility Trenches, and Excavation.

B. Valve Locations

1. When valves must be located within roadways and paved surfaces a cast or ductile iron valve box with valve box cover marked “water”. The box shall be flush with the pavement to ¼-inch below the finished pavement surface. The cover shall be set in a minimum of 6-inch deep by 18-square

inches concrete pad.

2. Post Indicating Valves shall be located a minimum of 5-feet from the building that they are servicing.

C. Water Meter Locations

1. As a general case water meters will be located on the customer's property immediately inside the property line from the city roadway or platted roadway property line.
2. Meters will be set in traffic type boxes only with prior written consent of the Public Works Operations Manager or designee.

D. Installation of Meter Assembly:

1. Residential and commercial hookup – 5/8-inch through 1-inch:
   a. The Owner shall furnish and install the service saddle, corporation stop, curb valve and box, meter service line, meter set, lockable shut-off valve and the single meter setter and the meter vault.
   b. Wet taps are to be performed by a City approved contractor and witnessed by the City.
   c. The City will furnish the water meter and transponder.
   d. The meter installation shall be as detailed in the attached Typical Meter Installation Detail.
   e. The water meter lid shall be easily accessible and visible.
   f. All hard surfaces, including concrete and asphalt, that surround the water lid assembly will need prior approval from the Public Works Operations Manager or designee.
   g. All obstructions within a 5-foot radius that present a clear obstacle to the maintenance of the city water meter shall be removed at the homeowner's expense.

2. Residential and commercial hookup – 1-1/2-inch and 2-inch:

   a. The Owner shall furnish and install the service saddle, corporation stop, curb valve and box, meter service line, meter set, lockable shut-off valve, and the single meter setter and the meter vault.
   b. Wet taps are to be performed by a City approved contractor and witnessed by the City.
   c. The City will furnish the water meter and transponder.
   d. The meter installation shall be in accordance with the attached Typical Meter Installation for 1-1/2-inch and 2-inch Meters.
   e. The water meter lid shall be easily accessible and visible.
   f. All hard surfaces, including concrete and asphalt, that surround the water lid assembly will need prior approval from the Public

Works Operations Manager or designee.

g. All obstructions within a 5-foot radius that present a clear obstacle to the maintenance of the city water meter shall be removed at the homeowner's expense.

3. Domestic Service Connections 2-1/2-inch and larger:

a. These are considered custom installation with the technical requirements varying for each installation. The owner shall provide construction drawings by a Registered Professional Engineer for approval. The owner shall furnish and install all materials and appurtenances for a complete and operable service connection.

b. Any wet tap larger than 2-inches shall be performed by a City approved contractor and witnessed by City Staff.

E. Fire Hydrant Locations

1. Fire hydrants shall be located 5-feet from the edge of pavement or within the City's Right-of-way. Hydrant and auxiliary valve should both be outside the roadway ditch areas.

2. Fire hydrants shall be located such that a clear work area a minimum of 5-feet in diameter exists around the hydrant.

3. All fire hydrant locations must be immediately accessible by fire vehicle.

4. Fire hydrants shall be installed with the 4-1/2-inch pumper outlet toward the street or access point.

5. Fire hydrants shall be installed such that the finish grade is between 3-inches below and level with the hydrant base ring.

WATERLINE INSPECTION AND TESTING FOR ACCEPTANCE

A. Inspections:

1. As a part of the platting and permitting process the developer/owner shall submit full and complete engineering drawings sealed by a Registered Professional Engineer in the State of Missouri; construction of one- and two-family dwellings and their accessory structures are excluded from this requirement, unless the design requires an extension to the City's system. The design and materials specified shall conform to the requirements of the City of Osage Beach Design Guidelines. Such drawings shall be reviewed and approved by the Public Works Operations Manager or designee prior to any onsite construction.

2. During the progress of the work each utility line shall be inspected by the City Inspector prior to trench backfill.

B. Water Main Leakage Tests

1. All water mains constructed by or for the City of Osage Beach shall be tested for leakage to the standards specified herein before they shall be accepted for service. A representative of the City shall be present during all testing.

2. Testing shall be by hydraulic means only. Air or vacuum tests will not be accepted.

3. Testing procedure is as follows:
   a. Upon completion of the water main it shall be clean of all dirt, trash, debris, and deleterious materials removed from the line.
   b. Filled to capacity and all extraneous air removed.
   c. Pressurize to 75 psi above normal working pressure at the test location and hold for a period of not less than 2 hours.
   d. At the end of the testing period the line shall be refilled with water and the amount of water needed to refill the line shall be measured and recorded.
   e. The amount of water needed to refill the line must be less than the maximum allowable leakage. The maximum allowable leakage shall be computed thusly:

$$Q_{Loss} = SDP^{1/2} / 133000$$

Where:

Q_{Loss} = Maximum allowable leakage
S = Length of the section tested in feet
D = Diameter of the pipe in inches
P = Test Pressure, PSI

C. Cleanup, Chlorination, and Bacteriological Testing

1. Prior to final acceptance and after pressure testing of the waterline the contractor/owner shall:

   a. Thoroughly flush all sediment, debris, and deleterious materials out of the line.
   b. Fill the line with chlorinated water, chlorinate to not less than 50 ppm, and let stand for 24 hours.
   c. At the end of 24 hours the line shall be thoroughly flushed and refilled with chlorinated water, chlorinated to 200 ppm and allowed to stand for 3 hours.
   d. The line shall then be thoroughly flushed and bacteriological samples taken in the following manner:

1) Two consecutive sets of samples taken at least 24 hours apart from the new main in accordance with AWWA.
   i. Samples to be taken every 1,200 of new main, plus one set from the end of the line and at least one set from each branch.
   ii. Samples shall be collected in sterile bottles treated with sodium thiosulfate. No hose or fire hydrant shall be used in the collection of samples.
2) Samples shall be tested by a Certified laboratory
3) Upon receipt of passing test results, and with the authorization of the City, the line may be placed in service.

Prior to placing the waterline in service, the City Representative shall be presented with certified pressure test results, certified passing biological test results, and written certification that the waterline and appurtenances have been constructed in accordance with MoDNR and City of Osage Beach standards.

D. Privately Owned Systems

1. Privately owned water mains within subdivisions where the mains are to remain the property of, and be maintained, by the subdivision owner and connected to the City of Osage Beach water system shall be tested as specified herein. Building service lines between the water meter and the building shall be tested in accordance with the International Plumbing Code and as accepted by the Department of Public Works at the time the meter is activated.
2. A written certification of waterline test completion is required.

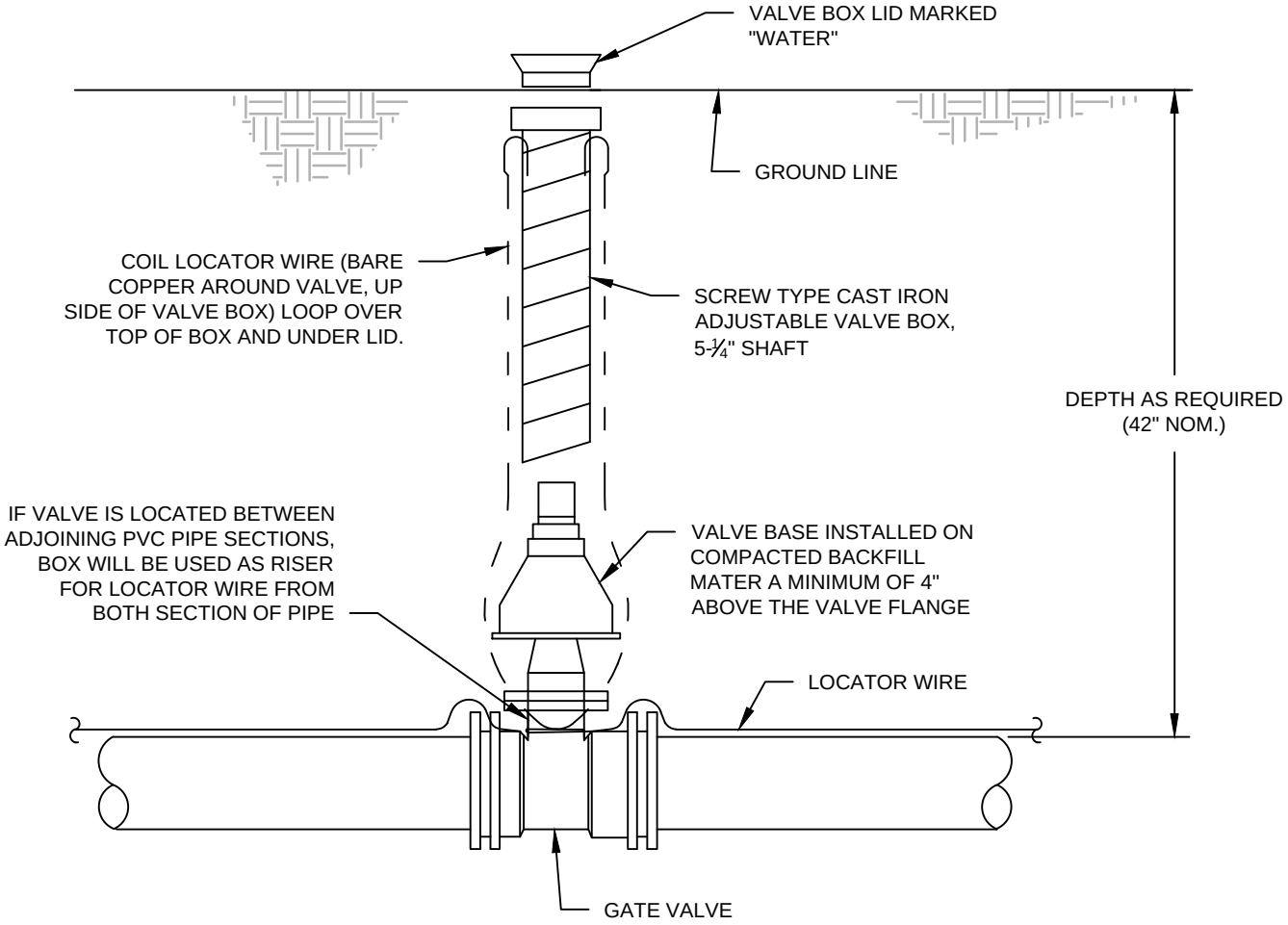
AS CONSTRUCTED DRAWINGS AND MAINTENANCE DOCUMENTS

The Developer/Contractor shall provide the Public Works Department with not less than two full sized "As Constructed" drawings certified as being correct record drawings by a Registered Professional Engineer or Land Surveyor. If fire pumps, specialized standby equipment, etc. are to be turned over the City; two full sets of operational and maintenance data for each pump or system shall be provided to the Public Works Operations Manager.

WATERLINE AND APPURTENANCES CONSTRUCTION DETAIL DRAWINGS

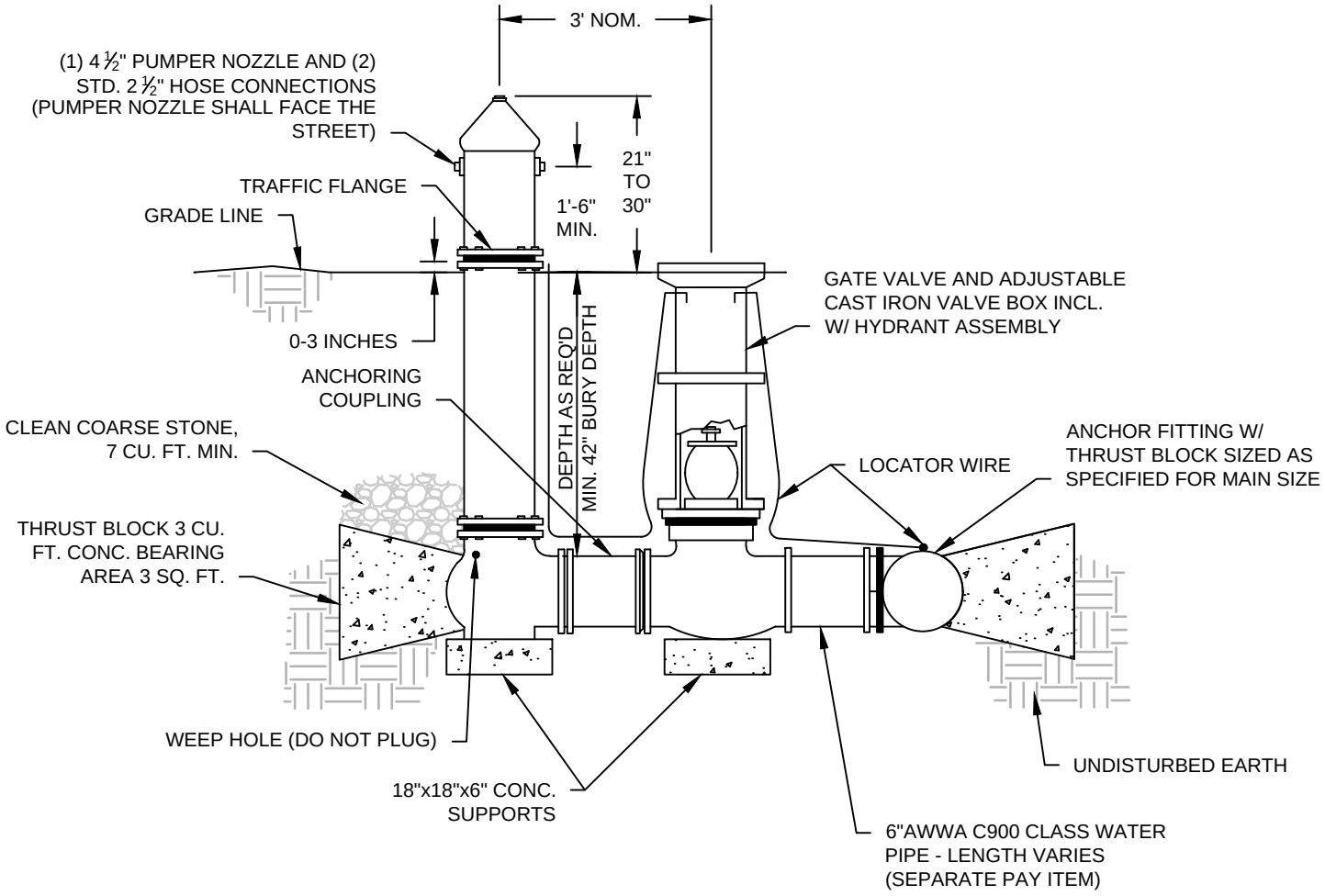
Construction details and sketches are attached.

END



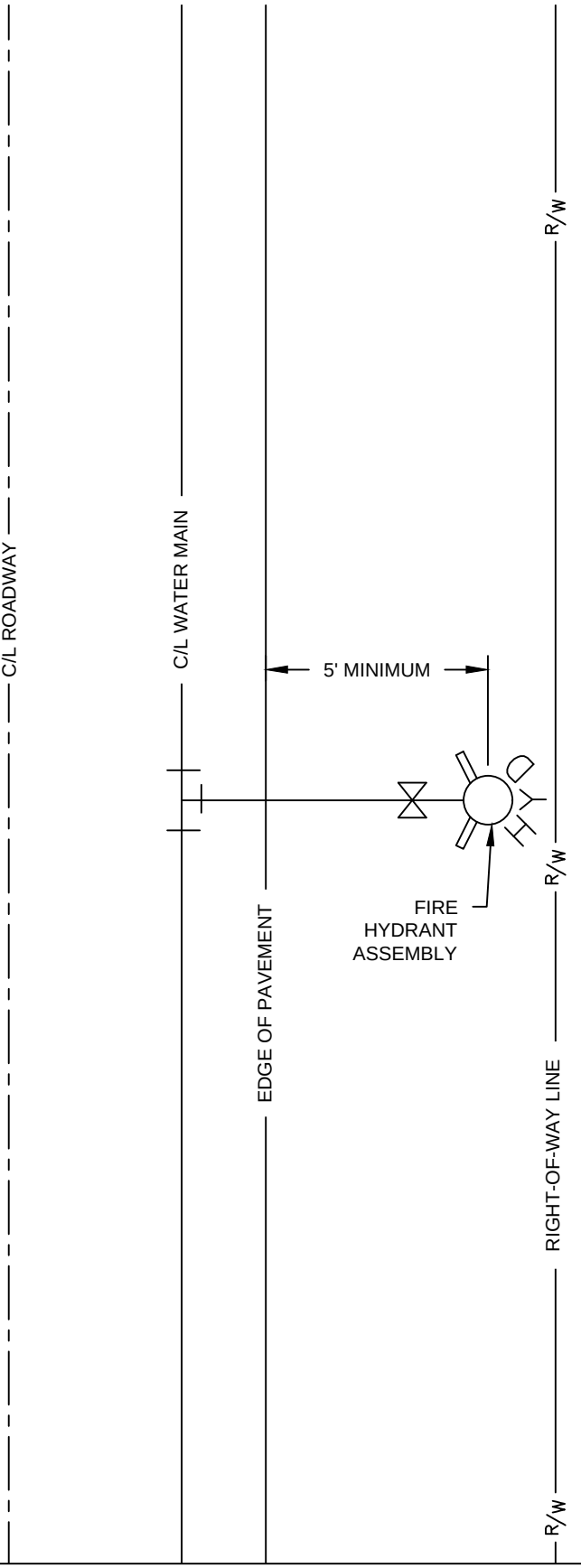
NOTE:
6" PVC PIPE WITH CAST IRON OR ALUMINUM CAP AND LID MAY BE SUBSTITUTED FOR SCREW TYPE CAST IRON VALVE BOX IN OUT OF TRAFFIC AREAS.

Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL GATE VALVE INSTALLATION	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-1



NOTE:
RETAINER GLANDS REQUIRED ON ALL FITTINGS. RESTRAINED JOINTS SHALL BE REQUIRED WHERE INDICATED OR DICTATED BY AVAILABLE SPACE OR UNSUITABLE SOIL CONDITIONS.

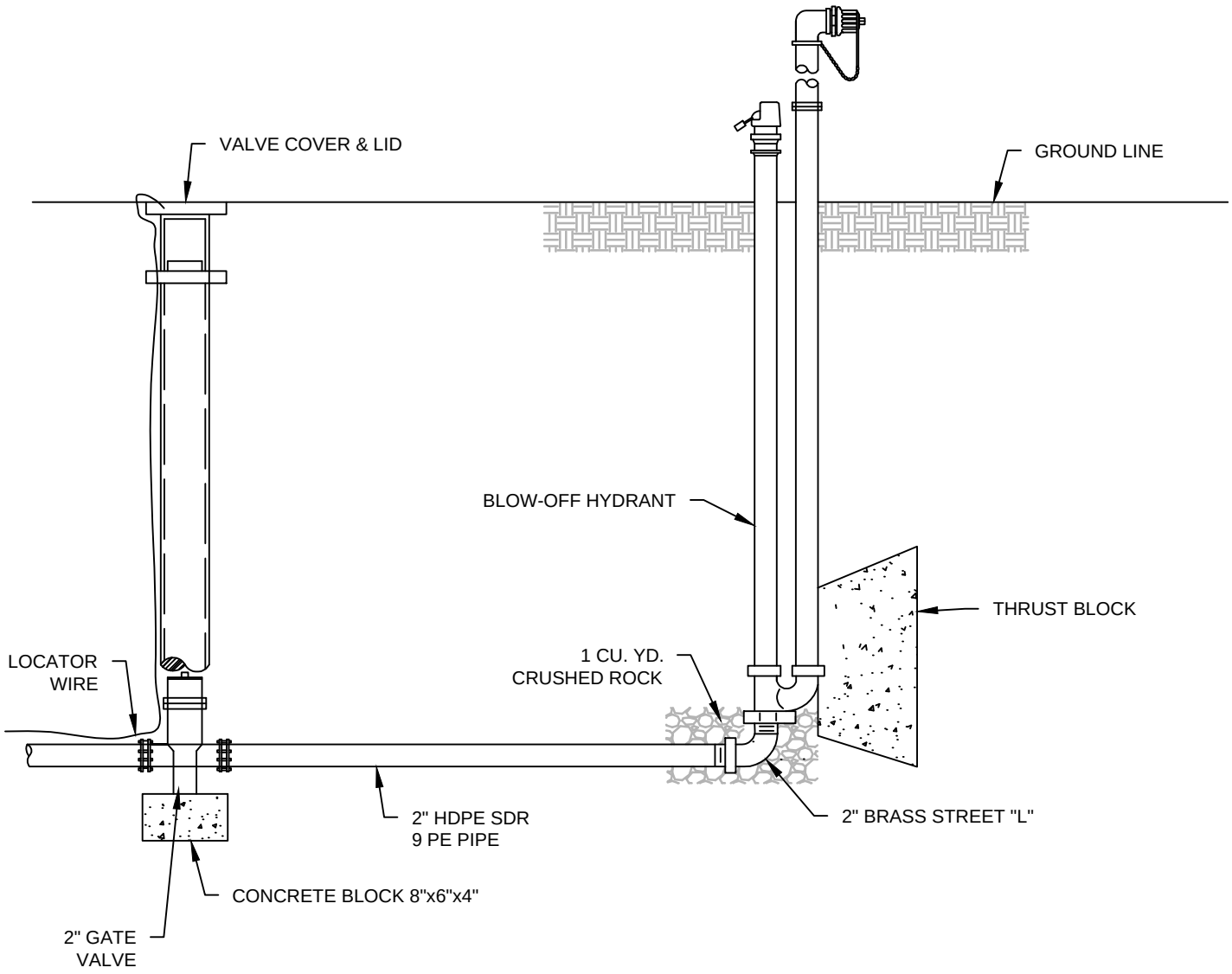
Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL FIRE HYDRANT	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-2



NOTE:
FIRE HYDRANT SHALL BE LOCATED
5' FROM EOP OR WITHIN THE
CITY'S RIGHT-OF-WAY

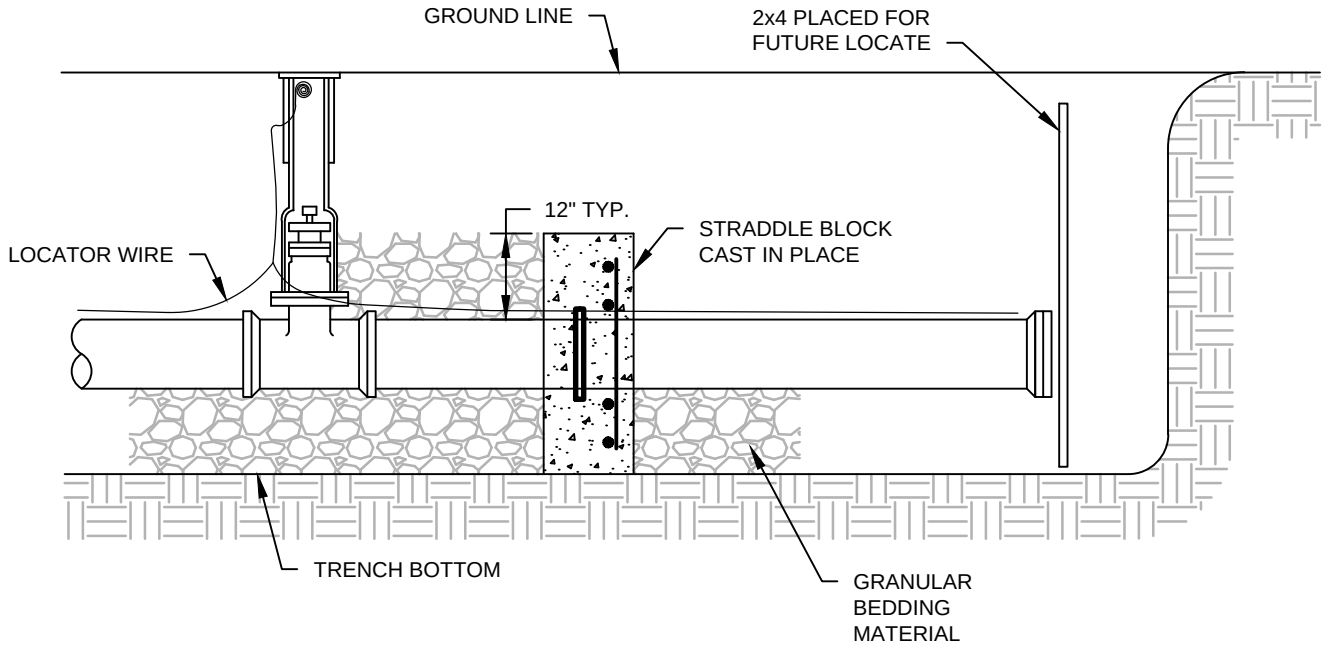
Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL FIRE HYDRANT LOCATION	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-3

NOTE:
CONTRACTOR SHALL FIELD VERIFY WITH
ENGINEER DIRECTION OF BLOW-OFF HYDRANT.

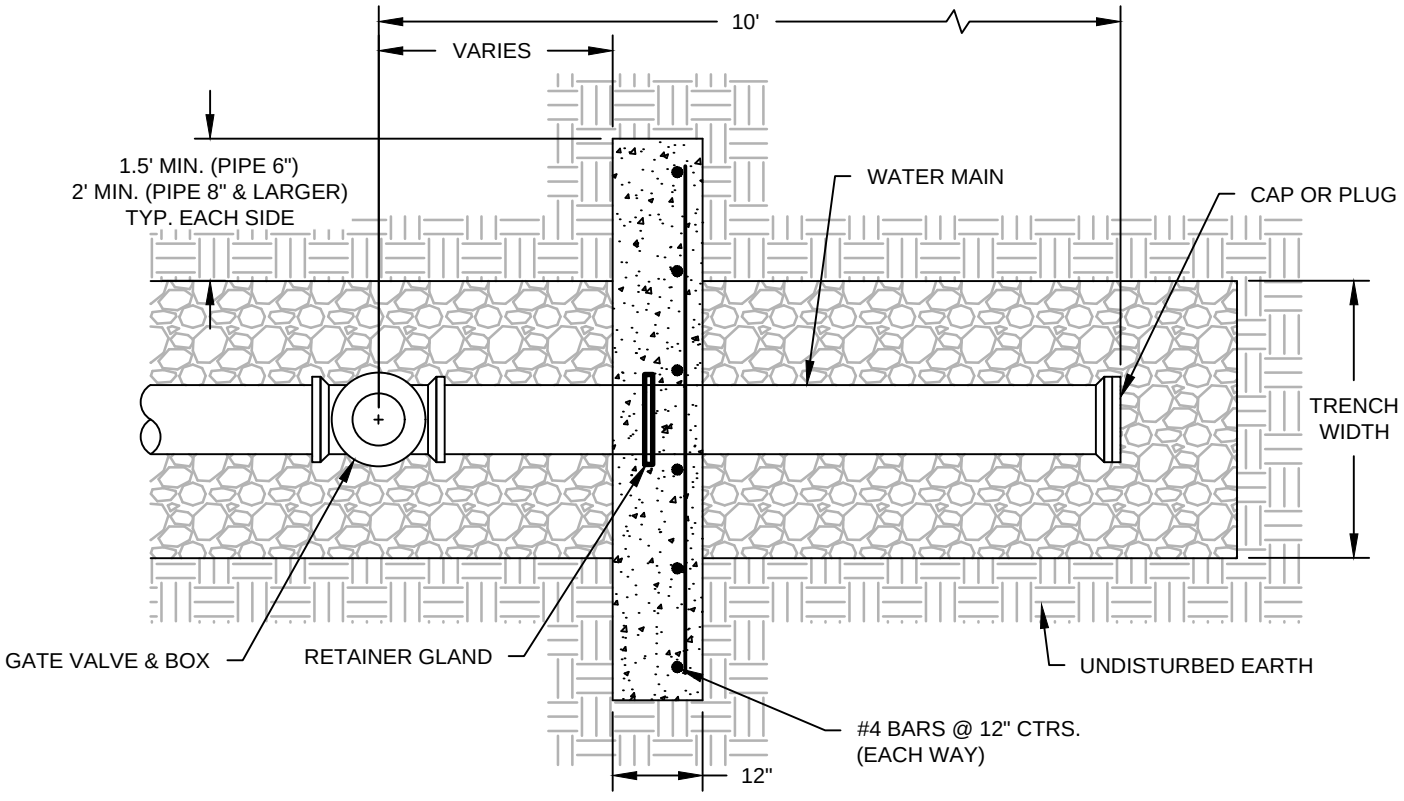


Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL BLOW-OFF ASSEMBLY	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-4

NOTE:
CONTRACTOR TO INCLUDE RETAINER
GLANDS FOR THE GAVE VALVE

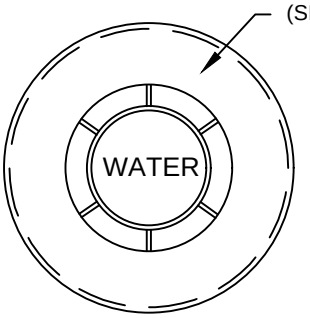


ELEVATION

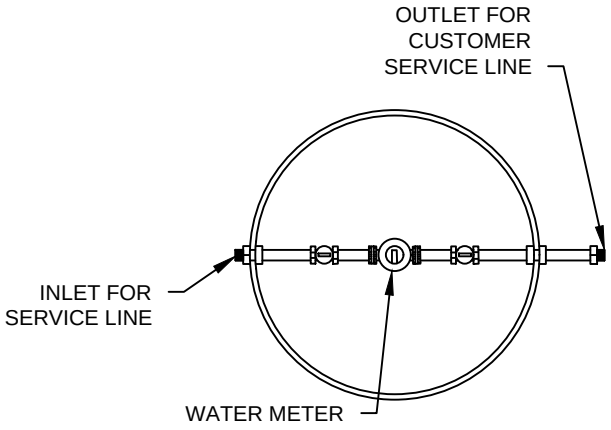


PLAN VIEW

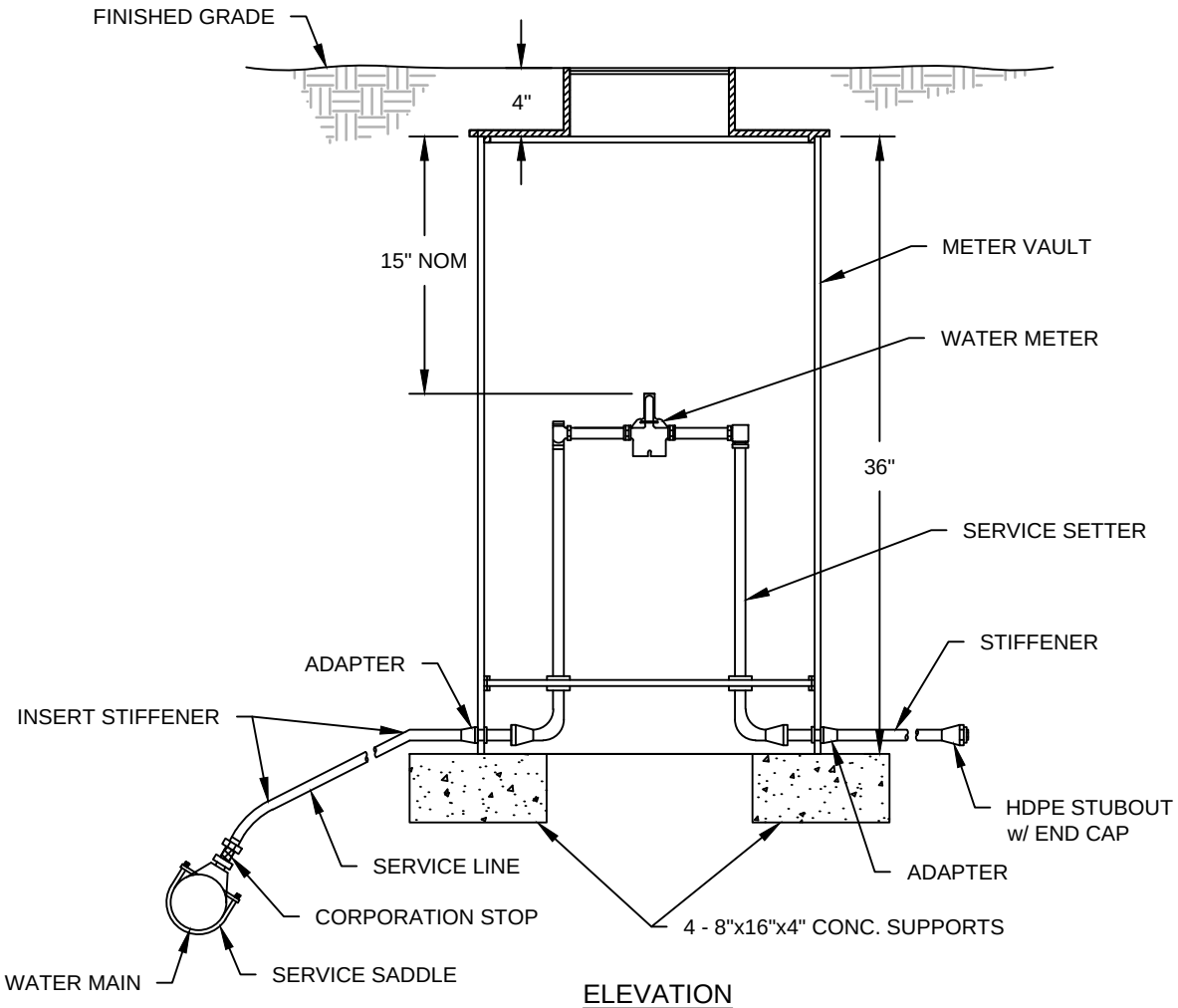
Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL WATER LINE TERMINATION	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-5



TOP

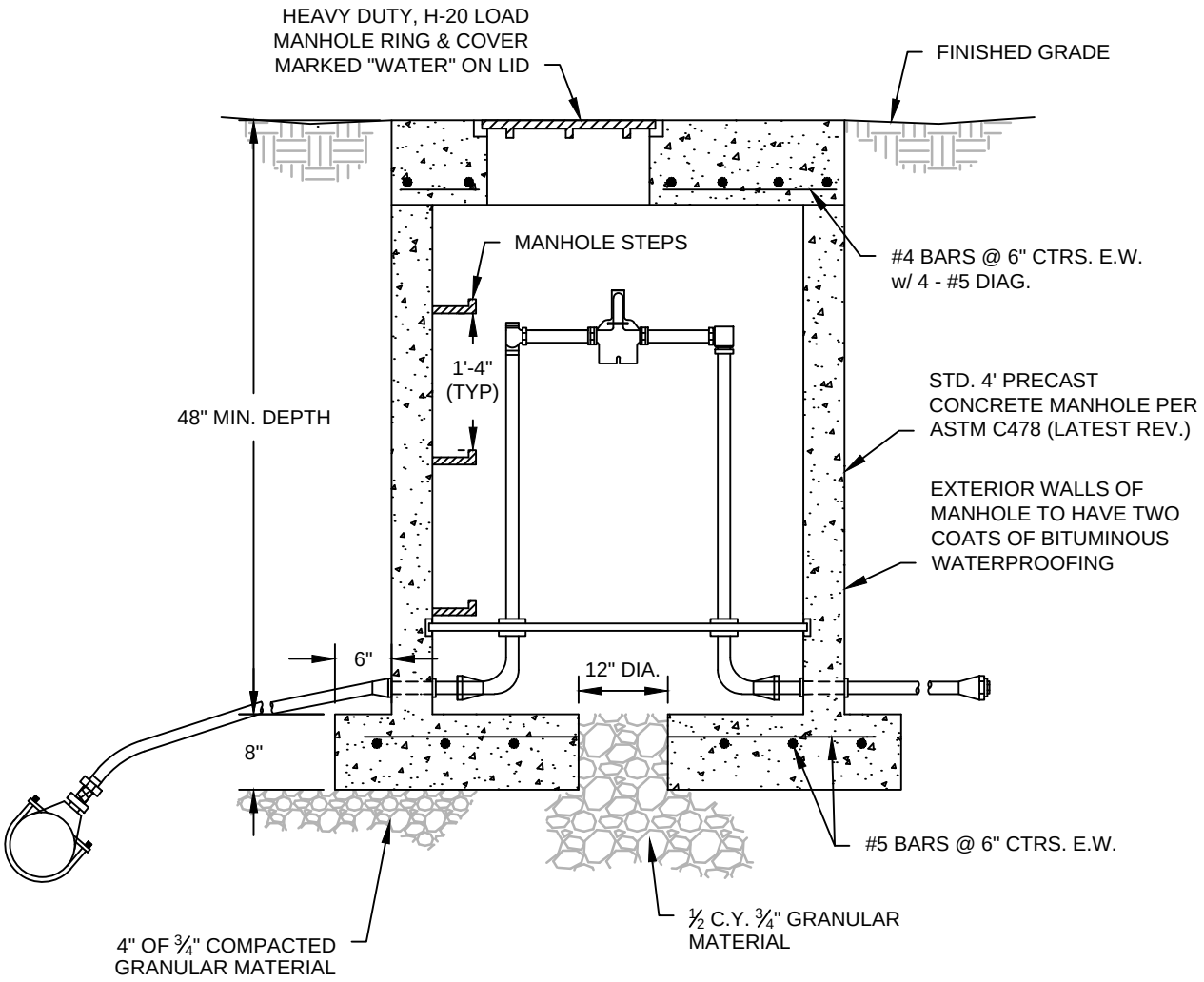


PLAN

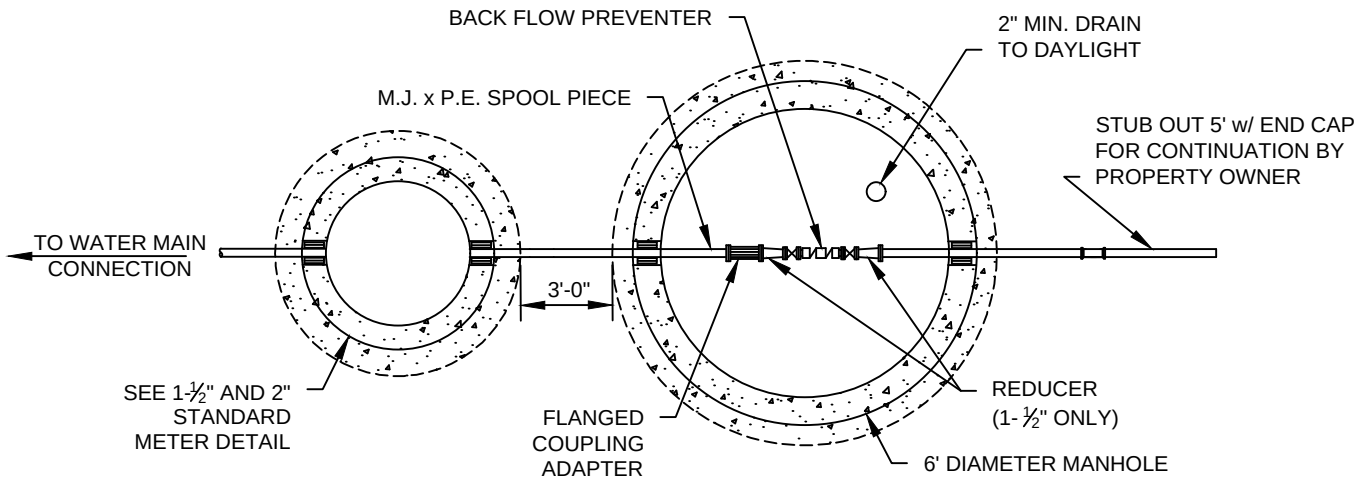


ELEVATION

Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL METER SETTING SIDEWALK OR LAWN ⅝"x¾", 1", 1-½", OR 2" METERS	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-6

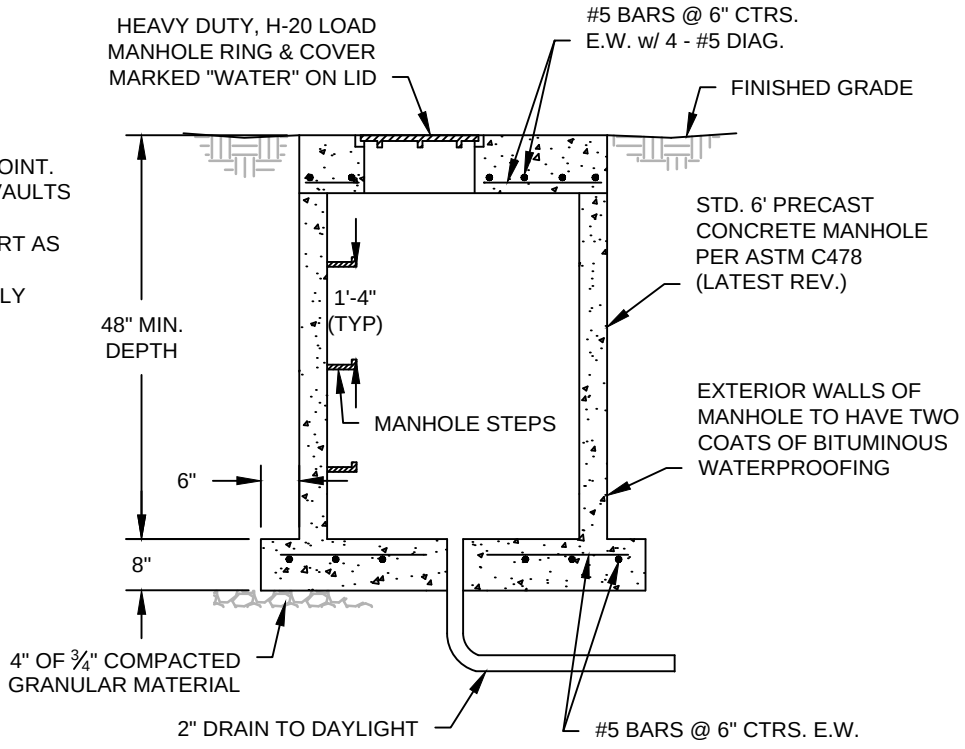


Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL METER VAULT DRIVEWAY OR PARKING AREA	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-7



PLAN VIEW (TOP REMOVED)

NOTES:
1. ALL PIPE AND FITTINGS OUTSIDE VAULTS SHALL BE MECHANICAL JOINT.
2. ALL PIPES AND FITTINGS INSIDE VAULTS SHALL BE FLANGED.
3. PROVIDE ADEQUATE PIPE SUPPORT AS REQUIRED.
4. BACK FLOW PREVENTER ASSEMBLY MIN. OF 12" OFF FLOOR.



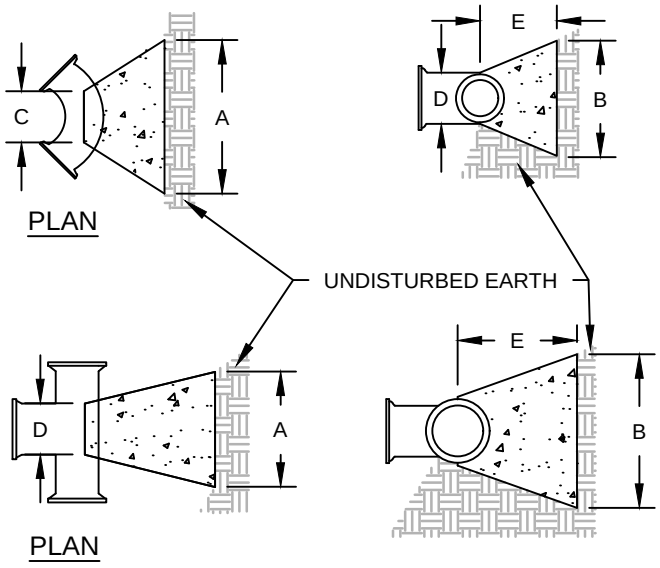
BACKFLOW PREVENTER ELEVATION

Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL 1-½" TO 2" METER WITH BACK FLOW PREVENTER	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-8

PIPE SIZE CHART

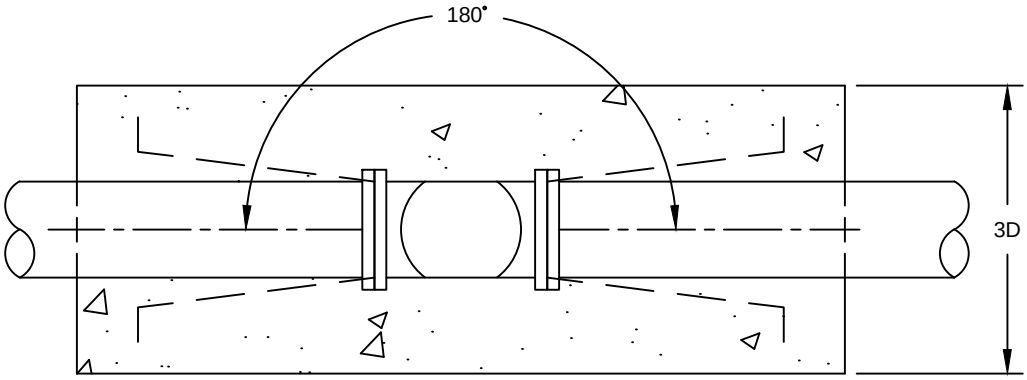
PIPE SIZE	FITTING	DISTANCE IN INCHES				
		A	B	C	D	E
4" AND SMALLER	11.25° & 22.5°	9	9	8	8	6
	45°	18	9	8	8	12
	90°	21	12	8	8	12
	TEE/PLUG	15	12	8	8	12
6"	11.25° & 22.5°	12	12	8	10	12
	45°	27	12	8	10	12
	90°	33	18	8	10	12
	TEE/PLUG	24	18	8	10	12
8"	11.25° & 22.5°	18	15	8	10	12
	45°	33	15	8	10	18
	90°	42	24	8	10	18
	TEE/PLUG	30	24	12	10	18
10" & 12"	11.25° & 22.5°	27	24	12	12	18
	45°	51	24	12	12	24
	90°	63	36	12	12	30
	TEE/PLUG	45	36	12	12	24
14" & 16"	11.25° & 22.5°	33	33	12	16	18
	45°	69	33	12	16	30
	90°	84	48	12	16	36
	TEE/PLUG	60	48	12	16	30

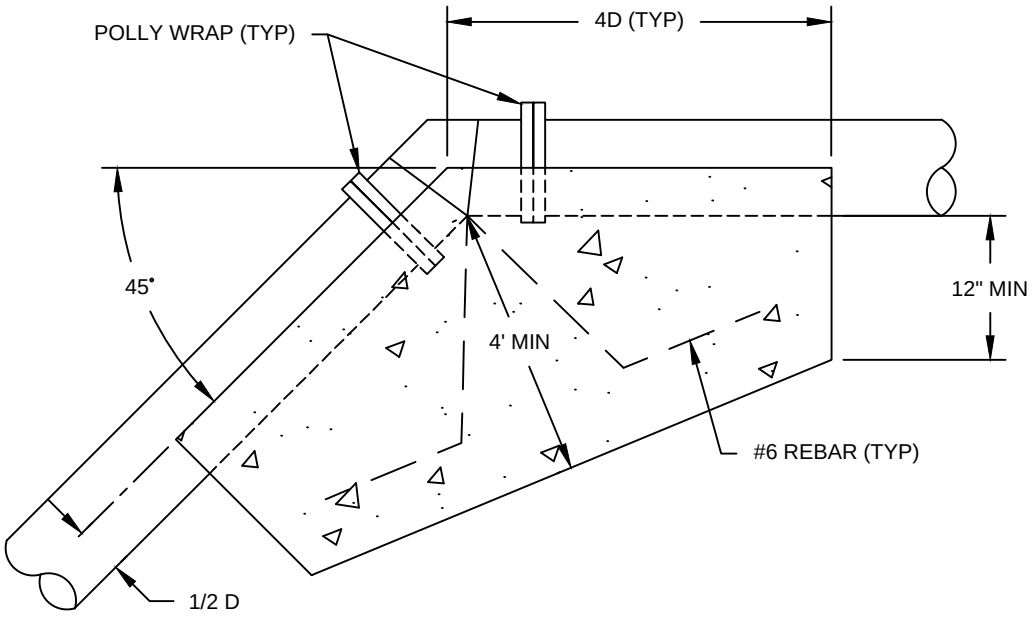
NOTES:
1. THRUST BLOCKS ARE BASED ON A WORKING PRESSURE OF 200 P.S.I. PLUS 0% SURGE & 2000 P.S.F. ALLOWABLE SOIL BEARING PRESSURE.
2. FOR PIPE SIZES NOT SHOWN USE DIMENSIONS FOR NEXT LARGER SIZE.
3. USE 3/8" PLYWOOD SEPARATOR BETWEEN BLOCKS AND PLUGS TO PROVIDE FOR FUTURE REMOVAL.



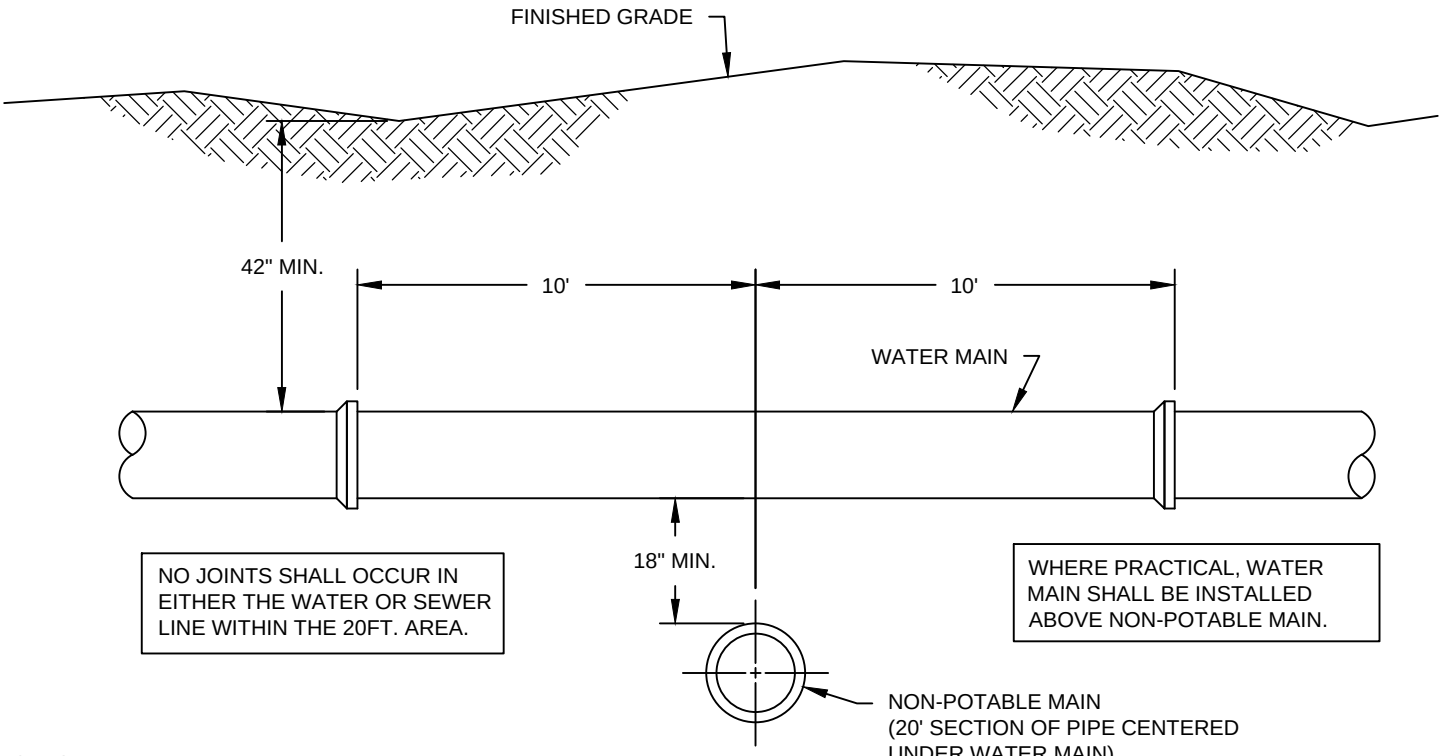
Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL THRUST BLOCK DETAIL	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-9

NOTE:
M.J. FITTING WITH RETAINER GLANDS
REQUIRED FOR ALL VERTICAL BENDS





Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL VERTICAL BEND THRUST BLOCK	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-10



NOTES:

1. IF VERTICAL SEPARATION CANNOT BE MAINTAINED, THE CONTRACTOR SHALL:

   1.1. PROVIDE ENCASEMENT TO A POINT OF TEN FEET ON EITHER SIDE OF THE SEWER/WATER LINE CROSSING AS APPROPRIATE. CASING PIPE MUST BE A MATERIAL THAT IS APPROVED FOR USE AS WATER MAIN.

   OR

   1.2. CONSTRUCT ONE OF THE WATER OR SEWER MAIN WITH MECHANICAL OR MANUFACTURED RESTRAINED JOINT PIPE OR FUSION WELDED PIPE.

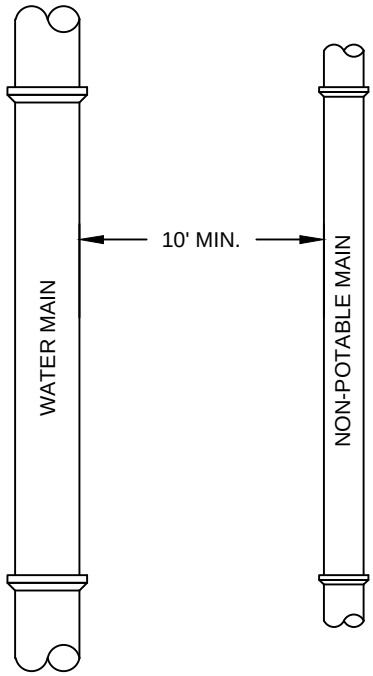
2. IF HORIZONTAL SEPARATION CANNOT BE MAINTAINED, THE CONTRACTOR SHALL:

   2.1. CONSTRUCT ONE OF THE WATER OR SEWER MAIN WITH MECHANICAL OR MANUFACTURED RESTRAINED JOINT PIPE OR FUSION WELDED PIPE.

   OR

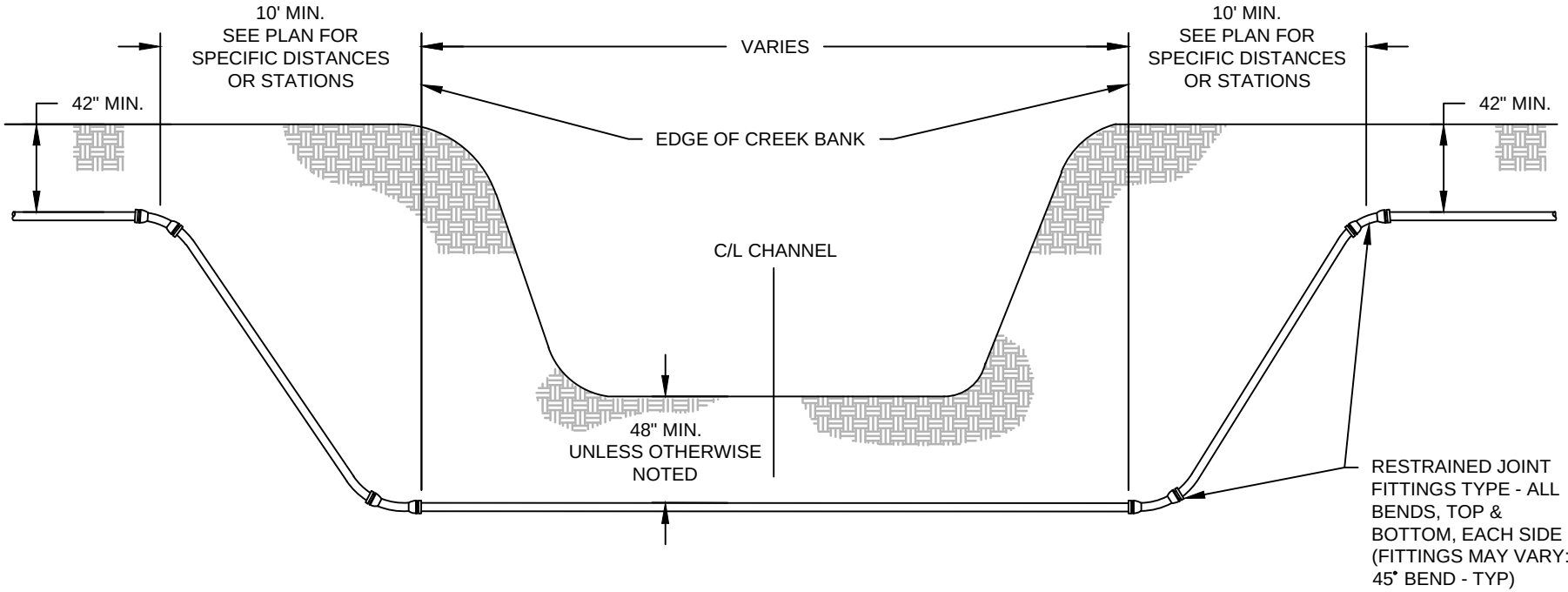
   2.2. PROVIDE A CONTINUOUS CASING. CASING PIPE MUST BE A MATERIAL THAT IS APPROVED FOR USE AS A WATER MAIN

VERTICAL SEPARATION



HORIZONTAL SEPARATION

Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL WATER / NON-POTABLE MAIN CROSSING	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-11



Date Revised: OCTOBER 2004	CITY OF OSAGE BEACH TYPICAL DETAIL CREEK CROSSING	Design Guideline: SECTION 2
By: SH		WATER SYSTEM
Checked By: JB		Drawing No: II-12