

# CITY OF ORANGE

PUBLIC WORKS DEPARTMENT  
WATER DIVISION

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## STANDARD SPECIFICATIONS AND PLANS FOR THE CONSTRUCTION OF WATER SYSTEMS

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WATER DIVISION HEADQUARTERS  
189 S. WATER ST. | ORANGE CA, 92866  
TEL: (714) 288-2475 | EMAIL: [WATERINFO@CITYOFORANGE.ORG](mailto:WATERINFO@CITYOFORANGE.ORG) | WEBSITE: [WWW.CITYOFORANGE.ORG](http://WWW.CITYOFORANGE.ORG)

## INTRODUCTION

These Standard Specifications and Plans are to be used as a guide by Private Engineers and Contractors in the design and installation of additions or modifications to the City of Orange's Public Water System.

It is the intent that this document in coordination with the "Greenbook" Standard Specifications for Public Works Construction will provide uniformity in materials and installation of piping, valves, fire hydrants, service laterals and other appurtenant equipment to be operated and maintained by the City as well as providing for construction methods and controls to be used by Contractors to construct, pressure test, chlorinate and place into service domestic water systems in the City of Orange.

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# PART 1

## GENERAL PROVISIONS

Construction of all water system improvements intended to be dedicated to the City of Orange's Public Water System will be governed by plans and specifications approved by the Orange Water Division. All plans and specifications must be prepared by, or under the supervision of a current registered civil engineer licensed to practice in the State of California. All work shall be subject to fees as provided for in the City Fee Schedule, Rules and Regulations and shall be inspected by the City to ensure conformity to these specifications.

In cases of conflict of information, the following documents will have precedence in the order listed:

1. Permits and licenses from affected agencies for the improvements.
2. Special provisions for the improvements.
3. Construction plans for the improvements.
4. City of Orange Water Division Standard Specifications and Plans for the Construction of Water Systems.
5. Latest edition of Standard Specifications for Public Works Construction (SSPWC), "Green Book" adopted by the City of Orange.
6. Manufacturer's recommendations of product use and installation.

Conflicts and discrepancies noted by the Contractor shall be brought to the attention of the Orange Water Division. The Orange Water Division will review the conflicts or discrepancies and determine the appropriate course of action to follow, if any. Unless otherwise determined by the Engineer, the most stringent/ restricted condition shall govern overall. Contractor/ Developer shall check with zoning code and/ or local ordinances for special requirements and color schemes on all above ground facilities.

Provisions of reference specifications noted in these specifications and plans shall have the same effect as if written herein, unless expressly modified by these specifications. Any reference specification in the absence of designation to the contrary, shall be understood to refer to the latest revision at the time of beginning of work.

## PUBLIC WORKS CONTRACTS

The Orange Water Division Standard Specifications and Plans for the Construction of Water Systems shall be used along with the provisions of the latest edition of the Standard Specifications for Public Works Construction ("Green Book"), and all amendments thereto, adopted by the Joint Cooperative Committee of Southern California Chapter, American Public Works Association and Southern California District, Associated General Contractors of California; hereinafter referred to as the "Standard Specifications". Section 2.34.020 of the Orange Municipal Code establishes the legislative authority of these Standard Plans and Specifications.

The following additions, as revised, to the provisions of the "Standard Specifications" shall be used for all Public Works contracts awarded by the City of Orange. The numbering of sections for the purpose of these provisions refers to corresponding numbering of sections of the "Standard Specifications". The following specifications are intended to delete, replace, amend, or supplement the corresponding section in the "Standard Specifications".



## 1-2 TERMS AND DEFINITIONS

- (a) Applicant: The agent of the developer or the developer himself having legal responsibility for construction of water systems in conjunction with development of property.
- (b) Developer: The person or organization having legal responsibility for construction of water systems in conjunction with development of property.
- (c) Domestic Water (Potable Water): that water which is pure and wholesome, does not endanger the lives or health of human beings, and is treated to levels that meet state and federal standards for consumption.
- (d) Engineer: the agent of the developer or independent design engineer who has responsibility for the design and preparation of the plans for the water system improvements.
- (e) Local Health Agency: Orange County Health Care Agency.
- (f) Or Approved Equal: an equivalent product to that specified in these Standard Plans and Specifications, approved by the City of Orange Water Division before beginning of construction.
- (g) Record Drawings: drawings which show the facilities, including all revisions and field changes to the original plans.
- (h) State Health: California State Water Resources Control Board

### **1-3 ABBREVIATIONS**

ANSI:	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM:	American Society for Testing and Materials
AWWA:	American Water Works Association
NFPA:	National Fire Protection Association
NSF:	National Sanitation Foundation
OWD:	City of Orange Water Division
SCAQMD:	South Coast Air Quality Management District
SSPC:	Steel Structures Painting Council
SWRCB:	State Water Resources Control Board

## **PART 2 CONSTRUCTION MATERIALS**

All materials and equipment installed in the City of Orange’s public water system shall meet all state and federal standards, as well as standards developed by nationally recognized organizations such as AWWA, ANSI and NSF. In order to protect human health, all materials, chemicals, lubricants, and products in contact with drinking water shall be tested and certified as meeting NSF/ANSI Standard 60 (Drinking Water Treatment Chemicals – Health Effects) and ANSI/NSF 61 (Drinking Water System Components – Health Effects).

In addition, all materials coming in contact with potable water shall be lead-free per California Health & Safety Code Section 116875. All materials are required to be certified as lead-free by NSF or other ANSI accredited certifier per SB 1953.

All water system materials furnished for installation by the contractor shall be provided with clear manufacturer’s markings and labeling indicating that the product furnished meets the materials standards requirements of the City of Orange as specified within these Standard Specifications. All products shall be new, not previously used, and of current manufacture and supplied to the jobsite in unopened packaging. In addition to the labeling and packaging requirements, and upon the request of the City Public Works Inspector, all pipe, pipe fittings, valves, pipe appurtenances, and service materials shall be provided with a written manufacturer’s statement indicating: (1) conformance with the specified materials and manufacturing requirements specified in the Water Division Standard Plans and Specifications; and (2) certification that all public water system materials comply with California Health & Safety Code Section 116875.

### **SECTION 209- PRESSURE PIPE**

Unless otherwise specifically authorized by the Water Division, all pipe four-inches (4”) through twelve-inches (12”) in diameter shall be Ductile Iron Pipe. At the sole discretion of the Water Division, polyvinyl chloride (PVC) pipe material may be required in areas of highly corrosive soil.

#### **209-1.1 DUCTILE IRON PIPE (DIP)**

##### **209-1.1.2 Materials**

##### **209-1.1.2.1 Pipe**

Ductile Iron Pipe shall be manufactured in accordance with ANSI/AWWA C151, latest revision. The minimum wall thickness for ductile iron pipe shall be as specified in AWWA C150, latest revision, for the design pressure class for the bell and spigot pipe. Pipe four-inches (4”) through twelve-inches (12”) in diameter shall be push-on type, single-gasket joint, Pressure Class 350 Ductile Iron Pipe. Pipe sixteen-inches (16”) in diameter shall be push-on type, single-gasket joint, Pressure Class 250 Ductile Iron Pipe. All flanged spools shall be thickness Class 53.

Special order pipe sizes, such as ten-inches (10”) and fourteen-inches (14”) are not allowed unless otherwise specifically authorized by the Water Division.

All ductile iron pipe, pipe fittings, restraints, and valves shall be encased with polyethylene protective wrapping in accordance with AWWA C105, latest revision and per Section 212-12.1.2.1.

#### **209-1.1.2.2 Lining and Coating**

The interior of all ductile iron pipe and fittings shall be lined with cement-mortar per ANSI/AWWA C104, latest revision.

Exterior surfaces of buried ductile iron pipe and fittings shall be coated with an asphaltic material in conformance with ANSI/AWWA C110, latest revision, and ANSI/AWWA C151, latest revision. The coating shall be free from blisters and holes and shall adhere to the metal surface at ambient temperatures encountered in the field.

#### **209-1.1.2.3 Joints**

Ductile iron pipe shall be furnished in eighteen-foot (18') nominal laying length and shall have a push-on type, single gasket joint employing a rubber gasket in accordance with AWWA Standard C111, latest revision. Allowable deflection of push-on joints shall not exceed the values shown in the Greenbook Standard Specifications table 306-8.2.2.1 or 80% of the manufacturer's recommendation, whichever is less.

Above ground or exposed pipe joints shall be flanged or as indicated on the construction plans.

Where restrained joints are indicated on the plans or required by the Water Division, the push-on joints shall be restrained in accordance with the requirements specified in 209-1.1.2.5 (Joint Restraints).

#### **209-1.1.2.4 Fittings**

Ductile iron pipe fittings shall be full sized ductile iron fittings manufactured in accordance with ANSI/AWWA C110, latest revision. Ductile iron compact body fittings may be used for fitting sizes four-inches (4") through twelve-inches (12") in diameter and shall be manufactured in accordance with ANSI/AWWA C153, latest revision.

All fittings shall be restrained in accordance with Section 209-1.1.2.6 unless otherwise indicated on the construction drawings and approved by the Water Division. Mechanical joint fittings shall comply with AWWA C111, latest revision, with a pressure rating of 250 psi and ANSI Class 125 and Class 150 bolt patterns.

All fittings with flanged ends shall comply with AWWA C110, latest revision, with a pressure rating of 250 psi and a Class 125 AME/ANSI B-16.1 flange or AWWA C115 Class 125 flange. The contractor shall be careful to confirm the mating flange, especially of valves, to ensure the compatibility of the two flanges.

#### **209-1.1.2.5 Joint Restraints**

All mechanical joint restraints, locking gaskets and/or locking restrained pipe and fittings shall be thrust-blocked and/or anchored in accordance with the Water Division Standard Drawing for Thrust Block Details.

Where indicated on the plans or required by the Water Division, ductile iron pipe and fittings shall be restrained and shall be one of the following types:

- A. Push-On Pipe Bell Restraints For eight-inch (8") Diameter Pipe and Smaller.

Push-on joints shall be restrained with a locking gasket rated for 250 psi operating pressure: "Field Lock" gaskets as manufactured by U.S. Pipe & Foundry Company; "Perma-Lock" Joint as manufactured by Pacific States Cast Iron Pipe Company or approved equal. Any of the

manufactured locking restraint pipe noted below are also acceptable options for restraint of push-on joints in these pipe sizes.

**B. Push-On Pipe Bell Restraints For ten-inch (10") Diameter Pipe and Larger.**

Use a manufactured locking restraint pipe with fittings: "TR-Flex" as manufactured by U.S. Pipe & Foundry Company; "Flex-Ring" as manufactured by American Cast Iron Pipe; "Thrust-Lock" as manufactured by Pacific States Cast Iron Pipe Company; or approved equal. The restrained joint shall be a boltless restrained system and be capable of deflection after assembly. Field welding of ductile iron restrained joint or ductile iron components is not acceptable. Restraint of field cut pipe shall be kept to a minimum.

**C. Mechanical Joints with Mechanical Joint Restraints.**

Mechanical joints restraint shall be incorporated with the design of the follower gland and shall include a restraining mechanism which, when activated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. The joint shall maintain flexibility after burial. Following glands shall be manufactured of ductile iron conforming to ASTM A536. Torque off bolts shall be tightened per manufacturer's recommendation and shall be inspected by the City of Orange Public Works Inspector prior to backfill. The mechanical joint restraint shall be: "MEGALUG Series 1100" as manufactured by EBAA Iron, Inc.; "UNIFLANGE Series 1400" as manufactured by The Ford Meter Box Co.; or approved equal. Tee-head bolts and hexagonal nuts for all mechanical joint restraints shall be Cor-ten steel and finished with TRIPAC 2000 Blue coating system or approved equal.

**D. Push-on joint pipe with restrained harness assembly (for use within steel casing applications only).**

Restraint of the push-on joints shall be of the type utilizing cast lugs, or retainer rings bearing against the pipe shoulders at the bell or fitting. Restraint systems using lugs integral to the pipe shall be cast with the pipe or fitting by the pipe manufacturer. Attachment of angle iron, angle-clips, harness-lugs or tabs by field welding to the ductile iron pipe or fitting is strictly prohibited.

**E. Flanged joints with gasket and bolted connections.**

Allowable deflection for restrained joints and mechanical joints shall not exceed the values shown in the Greenbook Standard Specifications table 306-2.2.2 of the or 80% of the manufacturer's recommendation, whichever is less.

**209-4 PVC PRESSURE PIPE**

**209-4.2 Materials**

**209-4.2.1 Pipe**

PVC pipe shall be manufactured in accordance with AWWA C900, latest revision, and shall be of the size shown on the plans. The standard dimension ratio (SDR) shall be DR 14 (305 psi pressure rating). PVC pipe for pipe sizes larger than twelve-inches (12") in diameter shall not be allowed. All PVC pressure pipe shall be colored blue.

Material used to produce the pipe and couplings shall be made from Class 12454-A or B virgin compounds as defined in ASTM D 1784, with an established hydrostatic design basis rating of 4,000 psi for water at 73.4°F. Laying lengths shall be twenty-feet (20') nominal with the manufacturer's option to supply up to 15% random (minimum of ten-feet (10')). Each pipe length shall be marked showing the date of manufacture, nominal pipe size, and O.D. base, the AWWA pressure class, and the AWWA specification

designation (AWWA C900). Pipe shall be as manufactured by CertainTeed Corporation, IPEX, Inc., Vinyltech Corporation, Diamond Plastics Corporation, or approved equal.

#### **209-4.2.2 Fittings**

Fittings for PVC pressure pipe shall be ductile iron fittings as specified in Section 209-1.1.2.4, except the fittings shall be lined and coated with 8 mils of fusion bonded epoxy. The fusion bonded epoxy shall conform to AWWA C116, latest revision, and C550, latest revision, as manufactured by 3-M or approved equal.

In addition, all coated ductile iron pipe fittings, restraints, and valves shall be encased with polyethylene protective wrapping in accordance with AWWA C105, latest revision and per Section 212-12.1.2.1.

Rubber rings for use in the PVC couplings and fittings shall conform to the requirements of ASTM D 1869. Rubber rings shall be stored and protected in a manner to prevent deterioration. Lubricant for pipe insertion shall be food grade, and biodegradable.

#### **209-4.2.3 Joint Restraints**

All mechanical joint restraints, locking gaskets and/or locking restrained pipe and fittings shall be thrust-blocked and/or anchored in accordance with the Water Division Standard Drawing for Thrust Block Details.

Where indicated on the plans or required by the Water Division, PVC pipe and ductile iron fittings shall be restrained and shall be one of the following types:

##### **A. Restrained Joint Pipe System for PVC (C900)**

PVC (C900) pipe joints shall be restrained using a restrained joint pipe system with bell-end push-on joints or installed with beveled plain ends and restrained couplings.

Approved restrained joint PVC (C900) pipe systems are Certa-Lok® C900/RJ or C900/RJIB system manufactured by NAPCO, Eagle Loc 900 manufactured by JM Eagle, Diamond Lok-21® by Diamond Plastics, or approved equal.

PVC (C900) pipe with beveled plain ends shall be restrained with ductile iron solid sleeves per Section 212-8.1 and mechanical joint restraints for PVC per Section 209-4.2.3, ALPHA™ restrained couplings manufactured by Romac Industries, Flex-Tite restrained couplings manufactured by RCT, or approved equal. A signed materials Certificate of Analysis shall be provided with the delivery of all RCT couplings.

##### **B. Mechanical Joint Restraints for PVC**

Restraints shall have 360-degree contact and support of the PVC pipe wall. The restraint shall be manufactured of ductile iron conforming to ASTM A536 and shall be coated with fusion bonded epoxy or special restraint coating system (MEGA-BOND) as manufactured by EBAA Iron, Inc.

The connecting rods shall be Type 316 stainless steel. The fitting restraint shall be EBAA Iron, Inc. Series 2000PV, The Ford Meter Box Company, Inc. Series 1500 or approved equal. All restraint devices shall have a working pressure rating equivalent to the full rated pressure of the PVC Pipe, with a minimum 2:1 safety factor. Installation of the restraint device shall be per the Manufacturer's Installation instructions.

#### 209-4.2.4 Curved Alignment (Deflections)

Where the pipeline is to be installed in a curved alignment, the radius of curvature and specific alignment shall be as shown on the plans and shall be accomplished by means of deflecting the pipeline at the joints with couplings or angled fittings. The PVC pipe shall not be laid along curves at a radius less than 1146-feet for twenty-foot (20') pipe lengths or 573-feet for ten-foot (10') pipe lengths. Allowable deflection of PVC joints shall not exceed the values shown in the Greenbook Standard Specifications table 306-8.5.2.1 or 80% of the manufacturer's recommendation, whichever is less. Pipe may not be offset to a degree such that the spigot end of the pipe deflects (touches) against the end of the pipe bell. Longitudinal bending is not permitted.

For curves of smaller radius, restrained ductile iron fittings or restrained high deflection couplings shall be used. High deflection couplings may be used for angles 4° or less, ALPHA™ restrained couplings as manufactured by Romac ALPHA, Flex-Tite restrained couplings manufactured by RCT, or approved equal.

### **209-7 PIPELINE IDENTIFICATION**

#### **209-7.2.1 Pipe Warning and Locating**

Warning tape and tracer wire are required on all PVC installations.

Warning/identification shall be installed twelve inches (12") above PVC pipe and tracer wire installations. Tape shall be 6 inches wide, blue in color and marked "Caution Water Line Below".

Tracer wire shall be placed continuously along PVC pipe for the purpose of providing a continuous signal path for electronic pipe locators used to determine the pipe alignment including adjacent service line assemblies after installation. Tracer wire shall be Copperhead Industries Model #10 AWG copper-clad steel (CCS) with minimum 600-pound break load and SnakeBite Locking Connectors, or approved equal.

## **SECTION 212-WATER SYSTEM VALVES AND APPURTENANCES**

### **212-2 FLANGED AND THREADED CONNECTIONS**

#### **212.2.5.1 Buried Ferrous or Plastic Piping Applications**

Tee-head bolts and hexagonal nuts for all mechanical joint restraints shall be high strength, low alloy steel, meeting the current provisions of American National Standard ANSI/AWWA C1111/ A21.11, "Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings", and must be Cor-ten steel as manufactured by NSS Industries, or approved equal and finished with TRIPAC 2000 Blue coating system or approved equal.

All buried nuts and bolts with the exception of valves shall be Type 316 stainless steel conforming to ASTM A193, Grade B8M for bolts, and ASTM A 194, Grade 8M for nuts. Washers shall be provided for each nut. The length of each bolt or stud shall be such that between one quarter-inch (1/4") and one half-inch (1/2") will project through the nut when drawn tight. Nuts shall be finished with TRIPAC 2000 Blue coating system or approved equal.

All stainless-steel nuts and bolts shall be coated with Loctite N-5000 anti-seize/rust preventer lubricant manufactured by the Henkel Corporation or approved equal.

### **212-2.5.2 Above-Ground Ferrous or Plastic Piping Applications**

Unless otherwise specified, bolts, nuts and washers for above ground ferrous or plastic piping applications shall be zinc-plated carbon steel heavy hexagon series conforming to ASTM, A307 Grade B for bolts, and ASTM A563 for nuts. Washers shall be provided for each nut. The length of each bolt or stud shall be such that between 1/4 inch and 1/2 inch will project through the nut when drawn tight.

All stainless-steel nuts and bolts shall be coated with Loctite N-5000 anti-seize/rust preventer lubricant manufactured by the Henkel Corporation or approved equal.

### **212-2.5.3 Applications in Corrosive Environments**

For all construction within areas of corrosive environments, all buried metal surfaces on valves, flanges, bolts, nuts, tie-rods, restraint devices, couplings, and other appurtenances in contact with the earth and backfill materials shall be coated with a minimum of 30 mils of JS160H Mastic manufactured by Protecto Wrap Co., 30 mils of Bituminous Mastic 50-HT by Utility Coating Company, or approved equal.

In addition to the bituminous coating, all metal surfaces shall be encased in polyethylene protective wrapping in accordance with AWWA C105, latest revision and per Section 212-12.1.2.1.

### **212-2.7 Flange Gaskets**

#### **212-2.7.1 General**

Gaskets for flanged fittings shall be one-eighth inch (1/8") thick and be made of Styrene Butadiene Rubber (SBR) or Ethylene Propylene Diene Monomer (EPDM) suitable for a water pressure of 350 psi at a temperature of 180°F in conformance with ANSI B16.21, latest revision.

The gasket surface shall have a serrated finish of approximately 16 serrations per inch, approximately one thirty-second inch (1/32") deep, with serrations in either a concentric or spiral pattern. Full face type gaskets with pre-punched bolt holes shall be used where both flanges are flat face. Ring flange gaskets extending to the inner edge of the bolt circle may be used where a raised-face flange is present.

### **212-4 VALVE ACTUATORS, EXTENSIONS, AND VALVE BOXES**

#### **212-4.2.2 Valve Extension Stems**

Where the depth of the valve is such that its operating nut is more than four-feet (4') below grade, a valve stem extension shall be provided to bring the operating nut to a point between twenty-four to thirty-six-inches (24"-36") below the surface of the valve box cover. Extensions shall be solid Type 316 stainless steel and shall be complete with two-inch (2") square operating nut. Stems shall be provided with three sixteenths inch (3/16") center guide to keep the stem centered. Additional spacer plates shall be provided when the distance to the bottom socket exceeds five (5) feet.

#### **212-4.2.3 Valve Cans and Covers for Buried Valves**

##### **212-4.2.3.2 Materials**

Valve boxes shall be firmly supported and shall be kept centered and plumb over the operating nut of the valves. Valve boxes shall have a concrete body, with an inside diameter of ten and one quarter-inch (10-1/4") and cast-iron top with a triangular cover marked "water".



Approved Valve Box Manufacturers

Eisel Enterprises        #4TT  
Brooks                    #4-TT  
H&C                        4-TT  
Or approved equal.

Valve box riser pipe shall be standard eight-inch (8”) diameter SDR 35 PVC pipe.

**212-5                    VALVES**

All main line valves shall be provided with the applicable design requirements as follows:

Valve markings shall include the name of the manufacturer, year manufactured, and the size of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached corrosion-resistant plate.

Valves for buried applications shall be provided with a direct acting two-inch (2”) square AWWA wrench nut. Valves for above-ground applications shall be provided with a hand-wheel. The hand-wheel shall have an arrow thereon, indicating the direction of the opening. Valve position indicators shall be provided for all above ground valves.

All valves shall open by turning counter-clockwise (commonly stated as “open-left and close-right”).

Actuators on buried valves shall be designed to produce the specified torque with a maximum input of 150 ft-lbs applied to the wrench nut at the maximum rated pressure and a velocity of 15 fps. Actuators equipped with hand-wheels shall be designed to produce the specified torque with a maximum pull of 80 pounds at the hand-wheel rim.

The flanges of the valves may be raised or plain faced. Flanges shall be drilled to a 125-pound American Standard dimension.

**212-5.1                Resilient Wedge Gate Valves**

Gate valves shall be provided for valves twelve inches (12”) in diameter and smaller.

**212-5.1.2            Material**

Gate valves for twelve-inches (12”) in diameter and smaller shall be ductile iron bodied, non-rising stem, resilient-seated, solid wedge, gate valves, manufactured to meet all applicable requirements of AWWA Standard C509, latest revision.

Valve stems and stem nuts shall be of nondezincification (NDZ) bronze. Bonnet and seal plate bolts shall be Type 316 stainless steel. Inside and outside ferrous surfaces shall be coated with a fusion bonded epoxy to a dry film thickness of not less than 8 mils in accordance with AWWA Standard C116, latest revision, and C550, latest revision. The interior coating shall be certified to NSF 61.

Approved Gate Valve Manufacturers

Clow	Model 2639
Kennedy	7000 Series
M&H	Style 7000
Mueller	A-2362
U.S. Pipe	Model A-USP2

**212-5.1.4 Tapping Valves**

Tapping valves shall conform to the requirements of the resilient seated gate valves. Valve ends shall be flanged, and the flange at one end shall have slotted bolt holes to fit standard tapping machines. Seat rings shall be oversized to permit the use of full-size cutters.

**212-5.1.5 Tapping Sleeves**

Tapping sleeves for ductile iron pipe or PVC pipe shall be of the mechanical joint type or the full circle stainless steel type. All tapping sleeves shall withstand a 150 psi minimum working pressure and shall provide a positive seal around the pipe at each end of the sleeve. Gaskets shall be EPDM rubber with a wide cross-section.

Mechanical joint type sleeves shall be made of ductile iron and conform to the requirements of AWWA Standard C110, latest revision, and AWWA Standard C111, latest revision. All interior surfaces of the ductile iron sleeves shall be lined with a fusion bonded epoxy coating.

Approved Mechanical Joint Ductile Iron Tapping Sleeve Manufacturers

Mueller	H-615
Tyler Union	MJ Tapping Sleeve
JCM	Model 414
Or approved equal	

Stainless steel type tapping sleeves shall be made of 18-8 or 316 stainless steel, with a stainless steel flange piece conforming to the requirements of AWWA Standard C207, latest revision. The following manufacturers are approved for use within the City of Orange:

Approved Full Circle Stainless Steel Tapping Sleeve Manufacturers

Mueller	Model H-304 SS
Power Seal	Model 3490 AS
Smith-Blair	Model 663
JCM	Model 432
Ford	Style FAST
Romac	Style SST III
Or approved equal	

**212-5.2 Butterfly Valves**

Butterfly valves shall be provided for valves larger than twelve inches (12”) in diameter.

**212-5.2.2 Materials**

Butterfly valves shall be short body, restrained mechanical joint, or restrained mechanical joint by flange, conforming to AWWA Standard C504, latest revision, Class 150B. The minimum working differential pressure across the valve disc shall be 150 psi. Flange ends shall be 150-lb flanges per Class 125, ASME B-16.1.

Valve body and discs shall be ductile iron, ASTM A536, Grade 65-45-12. The valve shaft shall be stainless steel, Type 304 or Type 316. All exposed body capscrews, bolts and nuts shall be Type 316 stainless steel. The valve seat shall be EPDM rubber per ASTM D-412. O-rings shall be synthetic rubber per ASTM D-2000. The rubber seat shall be made from peroxide-cured EPDM rubber and shall be fastened integrally with the valve body. Rubber seats fastened to the disc by any means shall not be allowed.

The ductile iron interior and exterior shall be factory coated with NSF 61 approved two-part low VOC epoxy-polyamide coating conforming to AWWA Standard C550, latest revision. It shall be applied to a minimum of 15 mils dry-film thickness. Approved manufacturers include: Ameron Amerlock VOC; Tnemec Series L140F Pota Pox; Devoe 233H; Sherwin Williams Macropoxy 646-100PW; or approved equal.

Approved Butterfly Valve Manufacturers

- Pratt                Groundhog
- Dezurik            BAW
- Mueller           Lineal
- Or approved equal

**212-5.2.3 Design Requirements**

Gear actuators shall be provided on all butterfly valves. Butterfly valves less than twenty-four-inch (24”) in diameter shall have gear actuators of the “traveling nut type”. Traveling-nut actuators shall be furnished on all valves in this size range unless torque or pressure conditions dictate a “worm gear type”. Traveling nut type actuators shall be Pratt Series MDT, Dezurik M-Series, Mueller MDT, or approved equal.

Gear actuators for valves twenty-four-inch (24”) in diameter and larger shall be of the “worm gear type”. Worm gear actuators shall be furnished on all valves in this size range. Worm gear actuators shall be Limitorque Model HBC or PT Series, EIM Model WB Series, or Auma GS Series. No substitution is permitted.

All butterfly valves shall be pressure tested in the field. The valves shall be tested bi-directionally after the actuator is installed and the adjustment stops are set. Each side of the valve shall be tested for a duration of at least five minutes at the pressure class rating of the valves with zero loss or leakage. The pressure test shall be witnessed by the City of Orange Public Works Inspector. The field pressure test shall be performed within twenty miles of the City of Orange. The contractor shall provide a minimum of 72-hour notice to the City’s Public Works Inspector in advance of the pressure test.

**212-5.6 Air Release, Air/ Vacuum, and Combination Air valves**

**212-5.6.2 Materials**

Air and vacuum valves shall be combination air release and vacuum relief valves and shall be manufactured in accordance with AWWA Standard C512, latest revision. The valves shall be designed for a working pressure of 150 psi.

Body and cover shall be constructed of cast iron or stainless steel with reinforced nylon. Float shall be constructed of stainless steel, Type 316, or of foamed polypropylene, ASTM-1895-89. The linkage, guide rod, and guide bushings shall be constructed of stainless steel, Type 316. The valve trim and cover bolts shall be constructed of Type 316 stainless steel. The seat shall be EPDM. Interior coating of the cast iron body shall be NSF 61 approved fusion bonded epoxy.

Approved Combination Air Valves

APCO	Series 140C
Crispin	Series UL
Cla-Val	Series 36
A.R.I.	D-040 ST

The air and vacuum valves shall be enclosed inside a removable vented cover. Vented covers shall be manufactured of linear-low-density polyethylene (LLDPE) cover as manufactured by Pipeline Products (Advantage Series – Part No. VCAS-1830-TN), Armorcast Products, or approved equal. The integral color of the vent cover shall be tan. The vent cover shall be eighteen-inches (18”) in diameter and thirty-inches (30”) high.

**212-5.7 Pressure Relief Valves**

**212-5.7.2 Materials**

The elastomers shall be EPDM rubber material. The main valve body and cover shall be ductile iron, ASTM A536, Grade 60-40-18. The main valve trim and seat shall be Type 316 stainless steel. The pilot control system shall be brass with Type 316 stainless steel trim. Bonnet studs, nuts and body plugs shall be Type 316 stainless steel. The interior surfaces of the valve shall be fusion bonded epoxy. The valve shall be angle pattern CLA-VAL Model 50A-01BPKCX D/S with 150 lb flanges and shall be provided with CRL pilot system 20-200 psi and X-101C dry valve position indicator (no substitution is permitted).

**212-5.7.3 Design Requirements**

The pressure relief valve shall be a hydraulically actuated diaphragm type control valve. The pressure sustaining/relief valve shall maintain a constant upstream pressure by relieving excess pressure without causing surges. The pilot control system shall operate such that as excess line pressure is dissipated, the valve shall slowly close. The pilot control shall be direct acting, spring-loaded, diaphragm valve, designed to permit flow when controlling pressure exceeds the spring setting. The pilot control system shall be provided with a strainer, isolation valves, opening speed control (pressure sustaining valves only), and closing speed control.

**212-6 HYDRANTS**

**212-6.1 Fire Hydrants**

**212-6.1.3 Materials**

Fire hydrants shall be “California” wet-barrel type, ductile iron body, conforming to AWWA C503, latest revision.

Fire hydrants shall have a single two and one half-inch (2-1/2”) hose outlet and a single four-inch (4”) pumper outlet. Outlet threads shall conform to ANSI-B26 “National Standard Fire-Hose Coupling Screw Threads”. Outlet caps shall be cast iron and shall include chains and gaskets. Valve stems shall have pentagon operating nuts measuring one and one half inch (1-1/2”) from point to flat and be nondezincification bronze . Base flange drilling shall be 6-hole bolt pattern. Gaskets shall be full flange gaskets, made from 1/8” cloth-inserted rubber sheet.

Hydrant break-off bolts and a hydrant extension with break-off groove shall be installed with all fire hydrants. Bolts shall be the break-off type 5/8” x 3” plated hexagon-head machine bolts. Hydrant extension and hydrant bury shall be ductile iron. Hydrant bury shall be provided with a six-inch (6”) mechanical joint inlet connection.

Interior ferrous surfaces including hydrant, extension, and bury shall be coated with a fusion-bonded epoxy with a dry film thickness of not less than 8 mils in accordance with AWWA Standard C550, latest revision.

Exterior ferrous surfaces shall be painted with a “Safety Orange” color coating, as specified with Section 212-12.3.

Where a hydrant break-off check valve is specified in the construction drawings, the following model is approved for use within the City of Orange: Clow LP 619. No substitution is permitted.

Approved Fire Hydrant Manufacturers

- Clow Model 850
- Jones \*Model J-4048 w/ top to include casting of the Orange “City Seal”  
\*(For use only within the national register historic district)

**212-7 BACKFLOW PREVENTION**

**212-7.1 General**

Water services connected to the public water system may be required to include an approved backflow prevention device of the type designated by the Water Division. The type of devices approved shall be based on the existing or potential degree of hazard which exists, in the opinion of the Water Division. A list of pre-approved backflow prevention assemblies can be found at following website, <https://fccchr.usc.edu/list.html>.

The purpose of these provisions is to protect the public water supply against actual or potential cross-connections by isolating, within the premises, contamination or pollution that may occur because of undiscovered or unauthorized cross-connections on the premises. These provisions are in accordance with the California Administration Code, Title 17 (Public Health), entitled “Regulations Relating to Cross-Connections”. Additional information concerning backflow prevention may be obtained from the “Manual of Cross-Connection Control”, as developed by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, School of Engineering.

Cross-connections of any type that permit a back flow condition from any source or system other than that of the City of Orange's domestic water mains are prohibited.

A connection constituting a potential or actual back flow hazard is not permissible unless a back flow device or air gap, which is approved by the California Department of Public Health and the local health agency and complies with Title 17 of the California Administrative Code, is installed. Such an installation shall at all times be subject to inspection and regulation by the City of Orange Water Division for the purpose of avoiding possibility of back flow.

City of Orange Water Division recognizes that the water purveyor has a responsibility to take all reasonable precautions to protect the integrity of the public water supply. Thus, in the exercise of this responsibility, the City of Orange Water Division may need to conduct a cross-connection control survey of the applicant's plumbing system. City of Orange Water Division will not address internal protection requirements. Water Division recommends that the applicant or his engineer contact the local health agency (Orange County Health Care Agency) to ensure the on-site water system complies with current plumbing codes, and requirements of the local health agency.

City of Orange Water Division will not provide any water service to any premises unless the public domestic water supply is protected as required by State, County and City of Orange regulations.

Back-flow prevention devices shall be approved by the U.S.C. Foundation for Cross-Connection Control and shall be installed by and at the expense of the customer.

The customer shall have the device: tested annually by a tester certified by the Orange County Health Care Agency; service such devices to maintain them in satisfactory operating condition; and shall overhaul or replace such devices if they are found defective. Test results shall be provided before City of Orange will accept service as complete.

Records of such annual tests, repairs, and overhauling shall be kept by the customer and copies forwarded to City of Orange Water Division and the local health agency within ten (10) working days after testing.

Backflow prevention assemblies shall conform to the latest edition of AWWA Standard C510 or C511 and the "Manual of Cross-Connection Control", Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, School of Engineering. The assemblies shall be on the latest edition of "List of Approved Backflow Prevention Assemblies".

All assemblies shall meet the requirements of the California Health and Safety Code Section 116875, which requires that the maximum allowable lead content in pipes, pipe or plumbing fittings, fixtures, solder or flux intended to convey or dispense water for human consumption be limited to 0.25 percent lead.

Additional reference for guidelines to when, why, and what types of back-flow and cross-connection control devices are approved may be found in:

- A. "Regulations Relating to Cross-Connections", California Administrative Code - Title 17 - Public Health.
- B. "Manual of Cross-Connection Control", published by Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, School of Engineering.
- C. EPA Cross-Connection Control Manual.

### **212-7.1.1 Backflow Device Locations**

All fire suppression services requiring a backflow assembly as specified in Section 212-7.4 (Fire Suppression Service Requirements) must be installed in accordance with City of Orange Water Division Standard Plans and Specifications. The required backflow assemblies shall be located as close as possible to the water meter and in a manner where it is readily accessible for testing and maintenance as approved by the City of Orange Water Division.

When an existing backflow prevention device that is located in public right-of-way needs to be replaced, the property owner shall be required to install the new device above ground on private property. Unless otherwise approved by the Water Division, the entire section of piping between the water main and the new device shall be replaced with new pipe. In addition, design plans for the new device, and accompanying plan check and inspection fees shall be submitted to the Water Division for review and approval.

### **212-7.4 Fire Suppression Service Requirements**

All fire suppression service connections will require, at a minimum, an approved backflow assembly.

All fire suppression services for multi-family residential, industrial and commercial services shall be stand-alone (no combination fire and domestic service will be permitted).

When approved by the Water Division and the Fire Department, single family residential services will have a combination fire and domestic residential service per OWD Standard Drawing 304 and the below specifications.

All single-family residential fire service connections, required by NFPA 13D, two inches (2”) in diameter and smaller will be required to have a Reduced Pressure Principle (RPPD) backflow device unless the fire suppression system is connected to a toilet at its end to ensure frequent flushing of water through the entire system and none of the below conditions are part of the fire suppression system:

- Chemical flame-retardants and/or foaming agents
- On-site pumps
- Storage reservoirs or tanks
- Sprinkler heads and/or the building height of 3 stories or greater
- Corrosion inhibiting fluids

For combination fire and domestic residential services, the required backflow device shall be located adjacent to the building but upstream of the residential building valve, and shall be testable, and accessible for maintenance and repairs. The owner shall have the backflow device tested by a certified tester at least annually and immediately after installation, relocation or repair. No new service shall be deemed acceptable until tested and certified after installation.

All single-family residential fire sprinkler systems shall be designed, fabricated, and installed in accordance with 2016 NFPA 13D and amendments as adopted by the City and local fire authority. All valves shall have permanently affixed signs that designate their function. The water flow switch shall be connected to the service panel on an uninterruptible house circuit. Underground mains and lead-in connections shall be flushed before connection is made to the sprinkler piping. All new systems and additions or modifications to existing piping shall be hydrostatically tested in accordance with NFPA 13D. All FDC, wall PIVs, and exposed exterior riser valves shall be painted OSHA safety red. Other fire sprinkler or supply pipe exposed or susceptible to wet

conditions shall be painted (any color) or otherwise coated to inhibit corrosion. Stainless steel assemblies and piping may be left unpainted provided that any hose connections, valves, or other components operated by the fire department are painted red.

## **212-8 COUPLINGS**

### **212-8.1 Bolted –Sleeve-Type Couplings**

Sleeve type couplings shall provide a flexible watertight connection between two plain ends as described when shown in the construction plans. For ductile iron and PVC pipe, all couplings shall have center sleeves of ASTM A126 Class B ductile iron with a minimum yield strength of 30,000 psi. Follower rings shall be ductile iron ASTM A-536. Minimum center sleeve length shall be seven-inches (7”) for pipe sizes up to six-inches (6”) in diameter and shall be a minimum of ten-inches (10”) for larger than six-inch (6”) diameter pipe. Sleeve bolts shall be Type 316 stainless steel with a minimum yield strength of 45,000 psi and shall conform to ASTM a-193 and AWWA C111.

#### Approved Sleeve Type Couplings Manufacturers

Clow	Mechanical Joint Solid Long Sleeves
Tyler	Long Solid Sleeves
Baker	Series 228
Dresser	Style 153
Ford	Style FCI
Romac	Style 501

Or approved equal.

### **212-8.4 Grooved and Shouldered Couplings and Joints**

Grooved pipe and fittings shall be used for above grade or in vault applications only. Wall thickness beneath the groove shall be equal to or greater than the minimum specified thickness and shall be sufficient to meet the maximum pressure. Grooved-end fittings shall conform to AWWA C606, rigid radius-cut groove. Grooved end couplings shall be ductile iron, ASTM A-536, Grade 65-45-12. Gaskets shall be EPDM and shall conform to ASTM D-2000.

#### Approved Grooved-Type Couplings Manufacturers

Victualic	Style 77
Gustin-Bacon	Grinnel

Or approved equal.

## **212-10 SERVICE LATERALS, METERS, AND METER BOXES**

All valves and fittings for use in the buried service line from the main to the meter shall conform to the requirements of AWWA C800 “Underground Service Line Valves and Fittings” and meet the California Health & Safety Code Section 116875 as defined in AB 1953. Materials in contact with potable water shall not contain more than 0.25% lead content by average weight.

All items specified to be manufactured of brass shall conform to AWWA Standard C800, latest revision and meet the lead-free requirements as defined in AB1953. Short threaded nipples and brass pipe shall conform to ASTM B43, regular wall thickness, except that nipples and pipe of sizes one inch (1”) and smaller shall be extra strong. Threads shall conform to ANSI B1.20.1.



### **212-10.1 Copper Tubing**

Copper tubing shall be seamless copper water tubing conforming to ASTM B88. All three-quarter inch (3/4"), one-inch (1"), one and one half-inch (1 1/2"), and two-inch (2") service laterals shall be installed using Type "K" soft copper. All service lateral piping shall be encased with polyethylene protective wrapping in accordance with AWWA C105, latest revision.

Copper tubing shall be as manufactured by Cambridge-Lee Industries, Inc., Cerro Copper Products Company, Halstead Industries, Inc., IUSA/Reading, Mueller Manufacturing Entities c/o Mueller Industries, Inc, Anaconda, Phelps-Dodge, Revere, or approved equal.

All copper connection services shall be made with Mueller 110 compression couplings or approved equal.

Soldered copper couplings may be used for the one and one half-inch (1-1/2") and two-inch (2") service laterals and shall be made with copper tube fittings in accordance with ASME B16.22.

The diametral clearance between the tube and the fitting shall be 0.004 to 0.10 inches. Solder shall be 5% silver solder, Harris Co., Stay Brite, or approved equal. Solder and flux used in joints of potable water lines shall contain no more than 0.2% lead.

### **212-10.3 Service Materials**

#### **212-10.3.1 Corporation Stops**

Corporation stops shall be manufactured of brass with an AWWA "CC" threaded connection inlet and compression connection outlet.

#### Approved Corporation Stop Manufacturers

3/4" Corporation Stop: Jones J-3401-SQ, Ford F1000Q, or Mueller H15008

1" Corporation Stop: Jones J-3401-SQ, Ford F1000Q, or Mueller B25008

1-1/2" Corporation Stop: Jones J-1937-SQ, Ford FB1000Q, or Mueller B25008

2" Corporation Stop: Jones J-1937-SQ, Ford FB1000Q, or Mueller B25008

#### **212-10.3.2 Angle Meter Valves and Curb Stops**

Angle meter valves shall be manufactured of brass with a compression connection inlet and meter flange w/ meter flanged gasket or meter coupling outlet.

#### Approved Angle Stop Manufacturers

3/4" Angle Meter Stop: Jones J-4201-SQ, Ford KV43-332WQ, or Mueller B-24258N

1" Angle Meter Stop: Jones J-4201-SQ, Ford KV43-444WQ, or Mueller B-24258N

1-1/2" Angle Meter Stop: Jones J-4205-SQ, Ford FV43-666WQ, or Mueller H-14277

2" Angle Meter Stop: Jones J-4205-SQ, Ford FV43-777WQ, or Mueller H-14277

Curb stops (courtesy valve) shall be manufactured of brass with a lever-type turn handle and meter flange or a meter coupling inlet and female iron pipe threaded outlet. The following manufacturers are approved: Jones, Ford, and Mueller (no substitution is permitted).

**212-10.3.3 Service Saddles**

All service taps two inches (2”) and smaller shall be installed with a service saddle.

Service saddles shall be double strap type for all sizes of ductile iron pipe. Saddles shall be tapped with a an AWWA “CC” threaded outlet (to receive a corporation stop thread). The seal with the outer wall of the pipe shall be affected with either a rubber gasket or an O-ring. The straps (or bails) shall be flat and shall be manufactured of Everdur or Silnic bronze or stainless steel. Service saddles shall be as manufactured by Ford, Jones, Mueller, or approved equal.

Service saddles shall be stainless steel band type for all sizes of AWWA C900 PVC Pipe. Service saddle bodies shall be manufactured of brass. The strong, extra wide fabricated stainless-steel band will conform to the PVC pipe surface resulting in nearly 360 degrees. Each saddle shall accurately fit the contour of the pipe O.D. without causing distortion of the pipe. The saddle shall be securely held in place with Type 316 stainless steel hex-head screws or bolts. The brass service saddle shall be as manufactured by Ford Style 202BS, Smith-Blair Series 325, AY McDonald Model 3845, or approved equal.

For outlets larger than two-inches (2”) in diameter, ductile iron tees with mechanical joints shall be used.

**212-10.4 Meters**

Meters two-inch (2”) or smaller in size are classified as small meters and shall conform to AWWA C700, standard specifications for “Cold Water Meters – Displacement Type, Bronze Main Case”. Mach 10 Ultrasonic Meters manufactured by Neptune Technology Group are approved for use within the City of Orange: no substitution is permitted.

**212-10.6 Meter Boxes**

**212-10.6.1 General**

Water meter boxes shall be manufactured by Armormcast or approved equal. Meter boxes shall be straight wall polymer concrete. Covers shall be AMR/AMI top mount.

<u>Meter Size</u>	<u>Meter Box Size</u>	<u>20K AMR/AMI Cover Part #</u>
5/8” x 3/4”	12” x 20” x 12”	A6000484-TH*
1”	13” x 24” x 12”	A6001969-TH*
1-1/2”	17” x 30” x 12”	A6001947-TH*
2”	17” x 30” x 12”	A6001947-TH*

Where required, meter boxes shall have traffic load rating covers with specific approval from the Water Division.

**212-10.6.3 Precast Concrete Vaults**

For the four-inch (4”) service installation (with three-inch (3”) meters), six-inch (6”) service installation, and the eight-inch (8”) service installation, precast concrete vaults shall be provided. The precast concrete vault shall be manufactured in a plant especially designed for that purpose and shall conform to the size, shape and dimensions indicated on the detailed plans. Vaults shall be Olson Precast, Christy Concrete, Eisel Enterprises, Inc., J&R Concrete Products, Inc., Jensen Precast, or approved equal.

Design loads shall consist of dead load, live load, impact, and in addition, loads due to water table and any other loads which may be imposed upon the vault. Live loads shall be based on H-20 loading per AASHTO Standard Specifications for highway bridges. Design wheel load shall be 16 kips. The live load shall be that which produces the maximum shear and bending moments in the vault.

Concrete shall be Class 560-C-3250 per the Standard Specifications.

The joint sealing compound shall be permanently adhesive flexible plastic material complying in every detail to Federal Specification SS-S-00210 (GSA-FSS). Joint sealing compound shall be Quickseal by Associated Concrete Products, or approved equal.

Grout for pipe penetrations and between precast sections shall be composed of one part Portland cement to two parts of clean well-graded sand of such size that all pass a No. 8 sieve.

Vault covers shall be of aluminum or steel construction and shall be rated for occasional traffic loading. Hinges, hardware and all threaded pieces and connectors shall be Type 316 stainless steel. Aluminum or steel access hatches shall be double leaf doors and shall be sized for full access to the vault. The hatches shall be equipped with spring operators for easy operation, an automatic hold open arm with release handle, and a snap lock with removable handle. Hardware shall be 316 stainless steel and shall include but not be limited to hinges, hold-open arms, springs, and spring covers.

Hatches shall be equipped with extruded aluminum or steel channel trough frames with one and one half-inch (1 1/2") drain coupling, flush aluminum or steel drop handles which do not protrude above the cover, a recessed padlock box and a stainless-steel staple sized for a No. 6 padlock. The vault cover shall be as manufactured by BILCO, USF Fabrication, Inc., INRYCO, or approved equal.

## **212-12 PAINTING, INTERIOR LINING, AND EXTERIOR COATING**

### **212-12.1.1 General**

All above ground installations shall be painted in accordance with Section 212-12 of the Greenbook Standard Specifications and the following:

Remove all dirt, oil, grease, rust, bituminous coating, and other contaminants from the surfaces to be painted by sandblasting, pickling, or wire brushing as required. Clean all surfaces with a SCAQMD compliant, biodegradable surface cleaner as may be necessary. Allow surfaces to dry completely then apply primer to all surfaces to be painted. Allow the primer to dry, then apply the intermediate coat to all surfaces, allow intermediate coat to dry, and then apply the finish coat.

The underlined generic terms in the above paragraph shall be considered together as a painting system and shall be supplied by a single manufacturer selected from the list of Approved Painting Systems contained in this section.

The above specified work shall be accomplished per the appropriate sections of the Steel Structures Painting Manual, Volumes 1 and 2, as published by the SSPC of Pittsburgh, Pennsylvania and strict adherence to the manufacturer's recommendations.

**212-12.1.2 Materials**

**212-12.1.2.1 Polyethylene Encasement**

All ductile iron pipe, pipe fittings, and valves shall be encased with polyethylene protective wrapping in accordance with ANSI/AWWA C105, latest revision. Polyethylene material shall be clear 8-mil thick polyethylene flat tubing with dimensions appropriate for the size of pipe installed.

Tubing shall be installed in accordance with AWWA C600 and taped and secured with general purpose polyethylene tape, 2 inches wide and 10-mil thick (Scotchrap 50, Protecto Wrap 200, Polyken 900, or approved equal).

**212-12.2 Color Scheme**

The following are approved finish coat colors for above ground pipe and appurtenances up to and including backflow prevention devices.

CITY DEVICE	COLOR
Fire Hydrants	Safety Orange
Private Fire Hydrants	(Contact the City Fire Prevention Bureau for color coding requirements related to private fire hydrants).
All Other Above Ground Pipe and Fittings (Four-inch (4”) diameter or larger)	Medium or Pastel Green (unless otherwise approved by the Water Division)
Guard Posts	Safety Yellow
Air and Vacuum/PRV Enclosures	Tan

Unless noted otherwise, brass, bronze, copper, stainless steel, galvanized, aluminum, vaults, name plates, grease fittings shall not be painted and shall be fully protected when adjacent areas are painted.

All other surfaces not intended to be painted shall be fully protected when adjacent areas are painted.

**212-12.3 Fire Hydrant Painting**

Painting system for public fire hydrants: water-based low VOC acrylic coating. Thinners, cleaners, driers, and other additives shall be as recommended by the paint manufacturer. A total dry film consisting of the combined thickness of both a prime coat and finish coat is described herein. The total dry-film thickness of this system shall be 5 mils.

Surface Preparation: Remove oil, grease, and chalking. Abrade existing paint and visible rust areas. Do not sandblast or prepare more surface area than can be coated in one day. Surface preparation shall conform to SSPC specifications: SP-1 Solvent Tool Cleaning; SP-2 Hand Tool Cleaning; and SP-3 Power Tool Cleaning.

Prime Coat: Apply to a dry-film thickness of 2 to 3 mils. Primer shall be synthetic. Approved manufacturers for previously painted surfaces include Ellis Maximus 7900 Series; Carboline Carbocrylic 120; Sherwin Williams Zero VOC Acrylic; Tnemec Series 1028 Enduratone; International/Devoe Devflex 4216 HP; or approved equal.

Approved manufacturers for bare metal surfaces include Ellis Maximus 7900 Series; Carboline Carbocrylic 120; Sherwin Williams Pro Industrial Pro-Cryl Universal Primer; Tnemec Series 94-H20 Hydro-zinc; International/Devoe Devflex 4216 HP; or approved equal.

Finish Coat: Apply to a dry-film thickness of 3 to 4 mils to achieve the total dry-film thickness. Approved manufacturers for finish coats include Ellis Maximus 7900 Series; Carboline Carbocrylic 3359 MC; Sherwin Williams Zero VOC Acrylic; Tnemec Series 1028 Enduratone; International/Devoe Devflex 4216 HP; or approved equal.

#### **212-12.4 Exposed Metal with Atmospheric Weathering Environment**

Painting system for exposed metal with atmospheric weathering environment: a low VOC aliphatic polyurethane with low VOC epoxy-polyamide or amido-amine epoxy primer. A total dry film consisting of the combined thickness of both a prime coat and finish coat is described herein. The total dry-film thickness of this system shall be 8 mils.

Surface Preparation: Surface preparation shall be SSPC SP-6 for steel surfaces. Surface preparation shall be NAPF 500-03-05 Clean No. 2 for ductile iron or cast-iron surfaces. Surface preparation shall be SSPC SP-1 for galvanized surfaces and shall be brush blasted or acid etched surface prior to application of the prime coat.

Prime Coat: Apply one or two coats to a dry-film thickness of 5 mils. For ductile iron surfaces, the ductile iron shall have an asphaltic free surface with a factory applied prime coat the same as the finish coat. Approved manufacturers include Ellis Decade DX-8500 Series; Ameron Amerlock VOC; Tnemec Series 135 Chembuild with low VOC thinner or L69 Epoxyline; International/Devoe BarRust 231; Sherwin Williams Macropoxy 646-100; Carboline Carboguard 890 VOC; or approved equal.

Finish Coat: Apply one coat to a dry-film thickness of 3 mils to achieve the total dry-film thickness. Approved manufacturers include Ellis Decade DX-8500 Series; Ameron Amerlock VOC; Tnemec Series 1080 Endura-shield; International/Devoe Devthane 379; Sherwin Williams Hi-Solids Polyurethane 100; Carboline Carbothane 134 MC; or approved equal.

## **PART 3**

### **CONSTRUCTION METHODS**

#### **SECTION 306 - OPEN TRENCH CONDUIT CONSTRUCTION**

##### **306-1 GENERAL**

All water system improvements intended to be dedicated to the City of Orange shall be installed in a professional manner by a contractor holding a valid Class “A” or “C-34” Specialty License from the State of California. The contractor shall have a current City of Orange Business License.

##### **306-1.1 Inspection**

The construction of any water system improvements for dedication to the City of Orange and use by the City for public water service shall be subject to inspection by the City of Orange Public Works and Water Division. A brief outline of the Public Works Inspection requirements is included in Section 6-1.4 of the City of Orange Public Works Standard Specifications as modified in these Standard Specifications. City of Orange Public Works Inspectors shall have access to the work and shall be furnished with every reasonable facility for ascertaining full knowledge of the progress, material, and methods used to complete the work. The City Public Works Inspector shall be notified a minimum of 24 hours prior to any work. All material shall be inspected prior to placement and all workmanship shall be visually inspected prior to backfilling. Reasonable aid shall be given to ascertain the exact location of all work. The inspection of the work shall not relieve the contractor of any obligation to complete the work as prescribed by these Standard Specifications. Defective work shall be made good, and unsuitable materials may be rejected notwithstanding the fact that such defective work and unsuitable materials may have been previously accepted by the City.

On fire suppression services, the pipeline from a detector check to the building shall be inspected by the Fire Department. Coordinate with the Fire Department at (714) 288-2541.

##### **306-1.2 Permits**

An encroachment permit is required for any excavation within public right-of-way. The permit shall be obtained from the City of Orange Public Works Department at 300 E. Chapman Avenue, Orange. The contractor is responsible for obtaining all construction permits and licenses as may be required by all agencies having jurisdiction over the work area.

##### **306-1.3 Construction Sequencing**

Water mains shall be installed after construction of the curbs and gutters, unless a special waiver of this requirement is approved by the City Water Manager.

##### **306-1.4 Well Destruction**

Destruction of any well within the City of Orange shall comply with the California Department of Water Resources Bulletin No. 74-81 and 74-90, or the latest revision thereto, and the Water Division’s Standard Drawing for Well Destruction.

A permit is required to be obtained from the City of Orange Water Division at 189 S. Water Street prior to performing the well destruction. (Phone number: (714) 288-2475).

**306-3 TRENCH EXCAVATION**

**306-3.1 General**

The pipeline, fittings, and appurtenances shall be installed at a minimum depth of three and one-half feet (3.5') of cover relative to finished grade (not subgrade) unless otherwise indicated on the approved construction plans. Service laterals shall be installed perpendicular to the alignment of the main line, and at a minimum depth of thirty-inches (30") of cover relative to finished grade (not subgrade).

Water, if encountered during trench excavation, shall be removed from excavations as soon as it accumulates. The contractor shall have on-site sufficient pumping capacity to keep the trench dewatered. The contractor shall provide and maintain adequate operating pumping capacity plus additional standby pumping capabilities to cope with emergencies. The contractor shall demonstrate to the City Public Works Inspector that he has sufficient pumping capacity on-site prior to continuing pipeline excavation activities.

All water discharged from the dewatering of the trench excavation shall be disposed of in accordance with the appropriate NPDES or local sewer permit requirements. If discharged to a sewer facility, the contractor shall obtain written permission from the owner of the sewer facility prior to disposing of the water. The contractor will need to coordinate this disposal with the sewer agency in order to schedule the disposal as well as to confirm that the sewer system has adequate capacity to handle the dewatering rate. Contractor shall obtain a permit to discharge to the sewer, if required, and meet all permit requirements.

**306-6 BEDDING**

**306-6.1 General**

For all water piping (ductile iron pipe, PVC pipe and copper tubing), backfill within the pipe zone, which is six-inches (6") below the pipe to twelve-inches (12") above the pipe, shall be sand or other select material, as determined by the City Public Works Inspector. Sand is material graded from fine to coarse, containing less than 10 percent by weight of loam and clay, that passes a three-quarter inch (3/4") sieve with no more than 5% by weight remaining on a No. 4 sieve.

Rocky or unsuitable bedding and backfill material shall be replaced with approved material. Gravel or crushed stone are approved material within the pipe zone for ductile iron pipe for rocky or unstable bedding conditions. Gravel is a reasonably uniform combination of stone, containing none larger than two inches (2") and not containing excessive amounts of clay and loam. Crushed stone is limestone or dolomite ledge-rock material that all passes a one half-inch (1/2") sieve with no more than 25 percent passing a No. 100 sieve.

Compaction of the bedding shall be completed to the satisfaction of the City Public Works Inspector, and no case shall be less than 90% to relative density.

**306-8 PREFABRICATED PRESSURE PIPE**

**306-8.1 General**

All pipe shall be transported, handled, and installed in strict accordance with the pipe manufacturer's recommendations.

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe laying crew cannot place the pipe into the trench without getting soil into it, the City Public Works Inspector may require that before lowering the pipe into the trench, a temporary plug be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing, or other materials shall be left in the pipe. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by watertight plug or other means approved by the City Public Works Inspector. This provision shall apply during the lunch hour breaks as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

Pipes shall be laid uphill with the bell or collared joints on the uphill end of each pipe length, whenever the grade exceeds 5%. At the location of each joint, dig bell holes in the bottom of the trench and at the sides to permit visual inspection of the entire joint and to prevent the pipe from being supported by the bell end or fitting.

**306-8.2 Ductile Iron Pipe**

**306-8.2.2.1 Push-On Joint Installation**

Ductile iron pipe and ductile iron fittings shall be installed in accordance with the applicable sections of AWWA Standard C600 (Installation of Ductile-Iron Water Mains and their Appurtenances), latest revision, and the City of Orange Water Division Standard Plans and Specifications.

The allowable joint deflection for ductile iron pipe and fittings shall not exceed 50% of the manufacturer's recommended maximum deflection.

**306-8.2.2.3 Installation of Polyethylene (PE) Film Wrap on Iron Fittings**

**306-8.5 PVC Pressure Pipe**

**306-8.5.2.1 Push-On Joint Installation**

PVC Pressure Pipe and fittings shall be installed in accordance with AWWA Standard C900, latest revision, and the applicable sections of AWWA Standard C605 (Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water), latest revision, the pipe manufacturer's installation manual and the City of Orange Water Division Standard Plans and Specifications.

The Uni-Bell Handbook of PVC Pipe-Design and Construction shall be used for details of pipe installation practice except as follows: longitudinal bending of pipe sections is prohibited; and any directional change shall be accomplished through approved deflection as specified in Section 209-4.2.4 (Curved Alignment) of these Standard Specifications.

**306-8.5.2.4 Tracer Wire Installation**

Tracer wire shall be tied to the pipe at ten-foot (10') intervals with plastic adhesive tape. Wire connectors shall be spaced at not more than thirteen feet (13') apart. All wire connectors and splices shall be wrapped with PVC tape.

At service lines and air and vacuum valve assemblies, the wires shall extend up into the meter box or cover enclosure. The wire shall be brought to the surface at valve locations and shall be accessible by removing the valve can cover. At blow-off assemblies, the wire shall extend up into the blow-off valve cover.



The contractor shall provide the City of Orange Water Division with the results of an electrical continuity test. The contractor shall perform the initial electrical continuity test, and all subsequent testing required due to failure of the tracer wire to be electrically continuous, at the expense of the contractor.

**306-8.8 Valves, Hydrants, and Appurtenances**

**306-8.8.3 Thrust Blocks**

All changes in pipe direction or grade shall be adequately supported with a thrust block per the Water Division Standard Plans. All fittings shall be installed with thrust blocks and all ductile iron pipe fittings shall be installed with thrust blocks and mechanical joint restraints.

**306-8.8.4 Service connections**

All hot taps required on existing City water mains to provide water service to any lot, parcel or subdivision shall be performed by City crews at the developer's expense in accordance with the fee schedule established by Resolution of the City Council. Hot taps equal to or greater than four inches (4") in diameter are to be performed by City crews after the excavation is completed by the Contractor. Contractor is responsible for excavation and backfill, maintaining the temporary AC patch, compaction of the backfill material, raising of the valve box to finished grade, and permanent pavement surround the valve box.

Two (2) inch and smaller service taps on non-active water mains newly installed by the developer may be installed by the developer under City Public Works Inspection per the Water Division approved plans and in accordance with these Standard Specifications.

Service taps shall be performed at an angle of forty-five (45) degrees relative to the horizontal plane.

All service taps on Class 350 ductile iron pipe shall be installed with a service saddle

**306-8.8.5 Tapping of Pipe**

- A. Main line taps: All hot taps required on existing City water mains to provide water service to any lot, parcel or subdivision shall be performed by City crews at the developer's expense in accordance with the fee schedule established by Resolution of the City Council. Hot taps equal to or greater than four inches (4") in diameter are to be performed by City crews after the excavation is completed by the Contractor. Contractor is responsible for excavation and backfill, maintaining the temporary AC patch, compaction of the backfill material, raising of the valve box to finished grade, and permanent pavement surround the valve box.
- B. Two (2) inch and smaller service taps on non-active water mains newly installed by the developer may be installed by the developer under City Public Works Inspection per the Water Division approved plans and in accordance with these Standard Specifications.
- C. All service taps 2-inches and smaller shall be installed with a service saddle. Service taps shall be performed at an angle of forty-five (45) degrees relative to the horizontal plane.

**306-8.8.6 Installation of Services and Appurtenances**

Polyethylene wrap: Polyethylene tubing shall be installed over all ductile iron pipe, copper tubing, valves, and appurtenances per AWWA Standard C105, latest revision.

All City dedicated fire hydrants shall be painted after installation with approved Safety Orange coating in accordance with section 212-12.

Water valves shall be set plumb and shall be stabilized and supported separately from the pipeline. Backfill within twenty-four-inches (24”) of the valve shall be clean washed sand.

All valve boxes shall be plumb, centered over the valve nut, and supported separately from the valve body. Valve boxes shall be lowered to below paving grade level prior to street paving, and after final grade has been established. In any event, the contractor shall ensure that all valve boxes will provide access for operation of the valve by the Water Division. Valve boxes shall be flagged or barricaded during construction to divert traffic around their location.

Accurate locations of all angle meter stops shall be furnished to the City Public Works Inspector, and all angle meter stops shall be exposed and in proper alignment and location prior to setting of meters and meter boxes by the City.

No more than one splice will be allowed per service and only with City Water Division approval.

Service laterals installed after the main line has been pressure tested shall be tapped into a charged pipeline under normal system operating pressure. All corporation and angle meter stops shall be left exposed to facilitate proper inspection and detection of leaks.

Service laterals installed on dry main prior to the mainline pressure test shall be pressure tested with the water mains. All corporation and angle meter stops shall be left exposed to facilitate proper inspection and detection of leaks.

Jumpers (meter spacers) shall be per the Water Division Standard Plan for Jumper Installation. Jumper shall be supplied and installed by the developer only after obtaining the proper permit from the Water Division, located at 189 S. Water Street, Orange.

Meter couplings shall be supplied to the developer with the issuance of the permit. Jumper installation will not be permitted without meter couplings.

In industrial, commercial, apartment and condominium developments where meter is installed in a landscaped area, a concrete collar six (6) inches in width and four (4) inches in depth shall be constructed around each concrete meter box, except as noted on the Water Division Standard Drawing for Meter Box Installation in Landscaped Areas.

Approved Backflow Assemblies, and Backflow Prevention Devices shall be supplied and installed by the developer and his contractor per the Water Division Corresponding Standard Plans, the City Municipal Code – Chapter 13.36, and the California State Department of Health Services pursuant to the State of California Code of Regulations, Title 17 (Regulations Relating to Cross-Connections), Sections 7583 through 7622 and Safety Code Section 116875.

### **306-8.8.7 Connecting to Existing Water Mains**

Connections to existing City water mains and/or tapping valves shall be made only after successful pressure test and disinfection has been completed. All connections shall be made under inspection of the City Public Works Inspector. The City Public Works Inspector will consider the means of chlorinating those sections of the connecting pipe, fittings, or valves used to connect to the existing water system.

The connection joints between existing pipe and existing valves are typically unknown. The contractor shall expose all joints to confirm the existing pipe joints prior to tie-in or abandonment. The contractor shall exercise due caution during tie-ins and abandonment work, including any temporary bracing until the contractor has installed the permanent thrust restraint for all joints.

The City will make a concerted effort to isolate the existing water system as planned with the contractor. However, the contractor shall be prepared to employ pumping equipment if a watertight seal cannot be achieved. City will not be responsible for any delays due to system shutdown and isolation.

All water mains, fire lines and water services shall be maintained in active uninterrupted service during the course of the construction of the facilities except where extensive main shutdown is required for a proposed connection. When extensive main shutdown is required for a proposed connection, the Water Division will determine what temporary service connection may be required. The contractor shall furnish all necessary hose, piping, valves, water trucks and associated labor required to provide such temporary service. All piping, hoses and associated equipment used in temporary service connections shall be flushed and disinfected in accordance with Section 306-8.9.4 (Disinfection).

Special scheduling outside of normal working hours may be required for temporary service interruptions and a minimum of three (3) working day advance notice by the developer's contractor to the City Public Works Inspector is required for system shutdowns.

The contractor is responsible for all work pertaining to re-establishing lateral connections and temporary tie-overs as may be required as determined by the Water Division. The contractor is responsible for obtaining and satisfying the requirements from the Fire Department, Water Division, Property Owners and Tenants affected by temporary service interruptions.

### **306-8.8.8      Valve Boxes**

It shall be the responsibility of the developer and/or contractor to secure accurate locations of all valves affected by the project. All on-site, off-site, and tapping valves shall be tied and raised to grade by the contractor in accordance with these Standard Plans and Specifications. Water valve covers on all construction projects that are covered over before, during, and after construction operations shall be tied out with exact measurements by the contractor's surveyors. A copy of these survey measurements shall be given to the City's Public Works Inspector prior to covering over the water valves.

All water valve covers and cans shall be adjusted to grade within ten (10) working days after being paved over. Notwithstanding, the contractor shall raise all valves within the vicinity of and before placing or replacing traffic detector loops. The contractor shall be responsible for cleaning all water valve can neck clear of debris before, during, and after construction, and marking all ties clearly in the field for the City's use during construction operations.

The contractor shall verify, in writing, to the City's Public Works Inspector prior to covering over water valves that:

1. Water valve can neck are cleaned, tied out and the ties are transmitted herewith.
2. Water valve ties are marked clearly in the field and the contractor has field reviewed the ties with the City Public Works Inspector.
3. The contractor shall provide the valve ties to the City Public Works Inspector for review and acceptance for all newly installed valves prior to completion of the project.

### **306-8.8.9 Abandonment of Services**

All unused service laterals are to be cut and capped at the water main with the meter boxes removed and disposed of by the contractor per the City Public Works Inspector's approval.

All unused service laterals four (4) inches and larger shall be permanently abandoned by removing the connection to the main completely and replacing it with a new pipe and solid sleeve(s) per the Water Division Standard Plans unless otherwise approved by the Water Division.

All meters, detector checks, valves, valve boxes and covers, and fire hydrants impacted by the demolition work shall be returned to the Water Division.

### **306-8.9 Pipeline Pressure Testing, Disinfection, and Commissioning**

#### **306-8.9.2 Hydrostatic Pressure Test**

The entire water system, including pipeline, connections, fittings, and appurtenant equipment shall be subject to a hydrostatic pressure test of not less than 225 pounds per square inch (psi) for a minimum of two (2) hours. The water necessary to maintain this pressure shall be measured through a meter or other means satisfactory to the City Public Works Inspector. The amount of water entering the pipe during the test shall be considered as the leakage.

Leakage shall not exceed the rate of fifteen (15) gallons per inch diameter per twenty-four (24) hours per mile of pipe tested. Any noticeable leak shall be stopped and any defective pipe shall be repaired or replaced with new sections and the test repeated. All water, temporary bulkheads, testing equipment or materials necessary for the test shall be furnished by the contractor.

#### **306-8.9.4 Disinfection**

Subsequent to the pressure test and prior to the acceptance of the work, the entire water system, including pipeline, all fittings, services and other appurtenant equipment, shall be disinfected by the contractor in accordance with AWWA Standard C651 (Standard for Disinfecting Water Mains), latest revision.

Treated water with 25 ppm of free chlorine shall be retained in the entire water system for at least twenty-four (24) hours and a free chlorine residual of not less than 10 parts per million (PPM) shall be produced in all parts of the system after the twenty-four (24) hour period has elapsed.

After chlorination, the water shall be flushed from the entire water system, until the replacement water test is equal chemically and bacteriologically to that of the permanent source of supply. It shall be the responsibility of the contractor to dispose of all chlorinated water in a safe, environmentally acceptable manner.

The entire water system shall be tested by a state certified drinking water laboratory using the Multiple-tube Fermentation technique per Standard Method 9221 B/E. Two (2) consecutive negative samples are required for the water system to be deemed acceptable. At a minimum, all Fire Hydrants and Blow-offs locations are required to be tested. Service laterals will also be tested if installed prior to water quality testing.

The new pipe, fittings, and valves required for the final connection to existing mains shall be disinfected in accordance with AWWA Standard C651 and shall be tested by a state certified drinking water laboratory

using the Enzyme Substrate Coliform Test per Standard Method 9223. A single passing sample is required prior to completing additional lateral connections to the existing mains.

The contractor shall select a state certified laboratory from an approved list provided by the City or submit their own state certified laboratory for approval at the pre-construction meeting. The contractor shall contact and arrange for this state certified laboratory to collect and analyze the required water samples. The test results shall be sent directly to the Water Division for approval. All cost associated with water quality testing shall be the responsibility of the contractor.

**306-8.9.5 Pipeline Commissioning**

Final inspection shall be made after complete installation of water system and appurtenances, disinfection, raising to grade of on-site, off-site and tapping valves, meter boxes, and installation of meter box and fire hydrant concrete collars. Final inspection of water services shall be made with the final inspection of the main line.

The City shall provide final approval to connect the new water main into the existing water system only after successful pressure test, disinfection and sampling has been completed. When water mains and services, or any portion of them, have been pressure tested, disinfected and otherwise completed to the extent they are operable, the City may, at its sole discretion assume operation of the pipeline facilities and place them into service to provide water for fire protection and other uses. This may occur prior to the final inspection and final acceptance of all work.

The City shall provide the developer with notification when it shall commence operation of new on-site facilities. Following such notification, all water valves and other appurtenances shall be operated by the **CITY PERSONNEL ONLY**.

This action by the City shall not be interpreted to relieve the developer and/or his contractor of the full responsibility for completing the work in its entirety, for correcting defective work, and for protecting the work from damage.

**306-12 BACKFILL**

**306-12.1 General**

Backfill material shall have a minimum sand equivalent of 15 when tested in accordance with ASTM D-2419. Project excavation may be used as backfill only when it meets this requirement.

All trench backfill and bedding shall be compacted to the satisfaction of the City Public Works Inspector, and no case shall be less than 90% to relative density.

Backfill shall be done in accordance with the laying condition specified. All backfill shall be free from glass, cinders, ashes, refuse, vegetable or organic material, boulders, rocks or stone, frozen soil, or other unsuitable material. If excavated material is indicated on the plans or specified for backfill and there is a deficiency as a result of rejection of a part of this material, the required amount of sand, gravel, or other approved material must be provided.

**Compaction testing shall be the responsibility of the Contractor.**

## **SECTION 307 - JACKING AND TUNNELING**

### **307-1 JACKING OPERATIONS**

#### **307-1.1 General**

For each bore exceeding thirty-inches (30”) in diameter, the contractor shall obtain from the Division of Industrial Safety a classification for the bore. The boring and jacking work shall be done in conformance with the State of California’s requirements. It shall be the contractor’s responsibility to call the required safety meeting with representatives from the State Division of Industrial Safety prior to beginning the construction of each bore.

If the pipeline is not installed within the casing as a continuous operation following completion of the jacking of the casing, the casing portals shall be bulk-headed and the approach trenches backfilled and later reopened for pipe installation.

#### **307-1.3 Jacking Steel Casing**

The steel casing shall be ASTM A-283, Grade C, ASTM A-570 Grade 30, or 33, or ASTM A-36. The minimum inside diameter and wall thickness of the casing shall be as shown on the Water Division Standard Plan (Steel Casing Pipe) or as shown on the construction plans. Greater thickness and diameter may be used as convenient for the method of work and loadings involved, as suitable for the size and as limited by possible interferences.

The contractor shall choose a size of casing at or above the minimum specified, in order that the jacking may be done with a sufficient degree of accuracy to permit installation of the carrier pipe to the grades shown on the plans and to properly accommodate the largest dimension of the carrier pipe. All pipe joints of the carrier pipe shall be restrained.

Casing sections shall be joined by full circumference welding. Field welds shall be full-penetration bevel welds in accordance with the standard of quality as set forth in the specifications of the American Welding Society. All welding shall be performed by skilled welders qualified under the provisions of ANSI/AWS D1.1. Prepare ends of casings for proper bevel weld by providing 45-degree bevel on the end of one of the two casing pieces being joined.

##### **307-1.3.1 Annular Space**

Use air-blown sand to fill the annular space between the casing and the carrier pipe, unless otherwise required by the agency having jurisdiction over the road or railroad crossing. Contractor shall furnish the necessary sand, air compressor, hoses, pressure gauges, valves, and fittings for the filling operation. Place a bulkhead for retaining the sand in the annular space between the casing and the carrier pipe at each end of the jacked casing. At the start of the sand filling operations, extend the sand discharge pipe from the placing equipment, through the inside of the casing, and to the bulkhead at the remote end of the casing. The method used to place the sand shall be such to ensure complete filling of the annular space. During placement, position the sand discharge pipe so that its discharge end shall be kept well buried in the sand at all times after the sand has been built up over the crown of the carrier pipe at the remote end of the section being filled. Install a riser pipe suitable for a vent in the casing adjacent to the bulkhead at the near end of the casing. Plug the vent pipe with grout upon completion of sand filling.

### **306-1.3.2 Casing Seals**

Casing seals shall be one-eighth inch (1/8") thick synthetic, rubber, designed to fit snugly around the pipe and casing. Casing seals may be one piece with no field seams or the wrap-around style to facilitate installation after the casing and carrier pipe are already installed. Bands and hardware for attachment to pipe and casing OD shall be Type 316 stainless steel.

### **306-1.3.3 Grout Connections**

For casing pipes thirty-inches (30") in diameter and larger, the contractor shall provide one-inch (1") diameter threaded steel half-couplings on the inside of the casing pipe to allow for external grouting of voids. Grout connections on the casing pipe shall be provided near the top of the casing and space on each side at equal spacing. Longitudinal spacing between grout connections along the axis of the casing pipe shall be 60 inches. This spacing may be decreased to provide more frequent grouting, if required.

Grout shall consist of one part Portland cement, four (4) parts sand, 2% bentonite by weight of the cement, and sufficient water to produce a workable mixture. Sand shall be of such fineness that 100% will pass a standard No. 8 sieve and at least 45%, by weight, will pass a standard No. 40 sieve. Bentonite shall be a commercially processed powdered bentonite, Wyoming type, Black Hills, or approved equal.

Immediately after completion of the jacking or boring operations, grout shall be injection through the grout connections of casing thirty-inches (30") in diameter and larger in such a manner as to completely fill all voids outside the casing pipe resulting from the jacking or boring operation. Where loss of ground outside of the casing is suspected, additional grout connections shall be welded to the casing.

Grout pressure shall be controlled so as to avoid deformation of the casing and/or avoid movement of the surrounding ground. After completion of grouting, the grout connections shall be closed with extra heavy black steel threaded plugs.

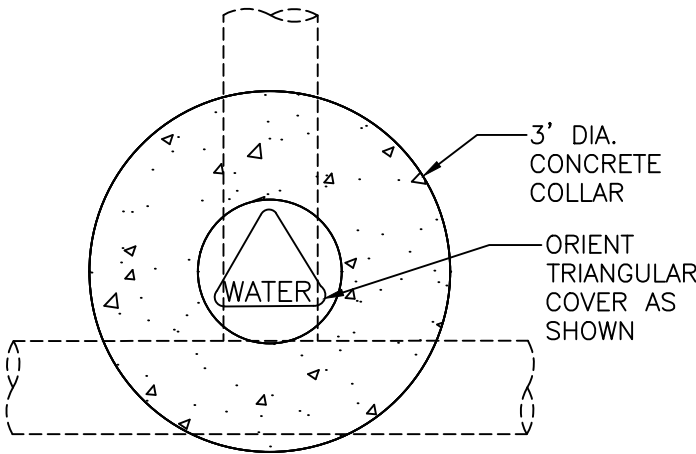
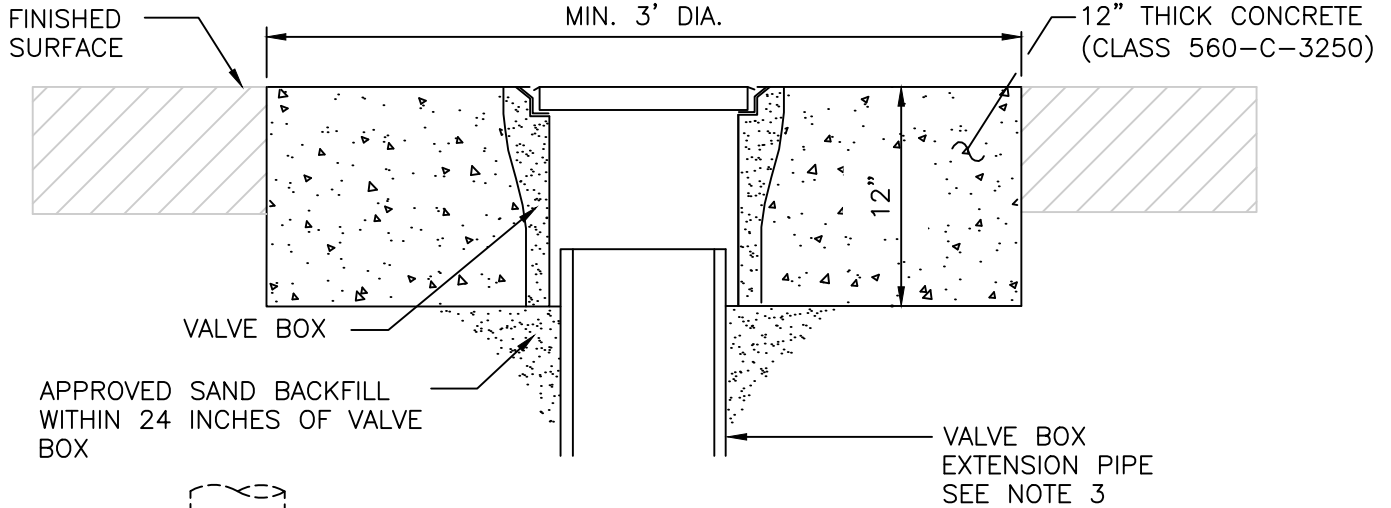
### **306-1.3.4 Casing Skids**

Skids and blocking shall be manufactured stainless steel casing spacers with composite runner skids, "PSI" Spacers Model C8G-2 or approved equal.

CITY OF ORANGE WATER DIVISION

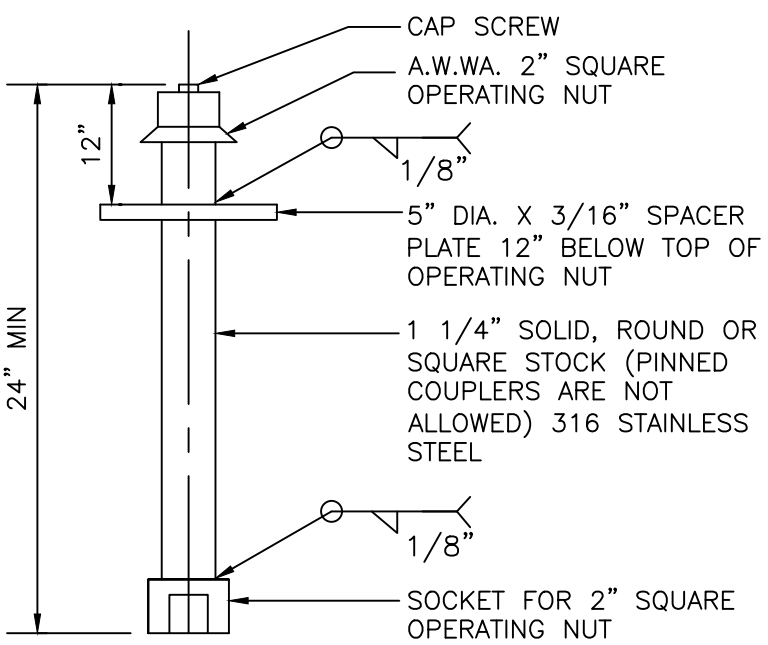
STANDARD PLANS





**NOTES:**

1. CITY INSPECTOR SHALL BE NOTIFIED 24 HRS PRIOR TO RAISING VALVE BOX AT 714-744-5526.
2. VALVE BOX (BROOKS #4-TT, EISEL #4TT, OR EQUAL)
3. EXTENSION PIPE SHALL BE 8" SDR 35 P.V.C.
4. SAND BACKFILL SHALL BE REQUIRED AROUND VALVE, VALVE BOX, AND EXTENSION.
5. THE CONTRACTOR SHALL PROVIDE VALVE TIES TO THE CITY INSPECTOR FOR REVIEW AND ACCEPTANCE PER SECTION 306-8.8.8 OF WATER DIVISION STANDARD SPECIFICATIONS.
6. PROVIDE VALVE STEM EXTENSION WHEN DEPTH TO OPERATING NUT EXCEEDS 48" (FABRICATE EXTENSION TO FIELD MEASUREMENT - SEE NOTE 7)
7. NO VALVE STEM EXTENSION SHALL BE LESS THAN 2 FEET IN LENGTH. TERMINATE EXTENSION 24" TO 36" FROM FINISHED GRADE.
8. PROVIDE ADDITIONAL SPACER PLATE WHEN DISTANCE TO BOTTOM SOCKET EXCEEDS 5 FEET.



*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

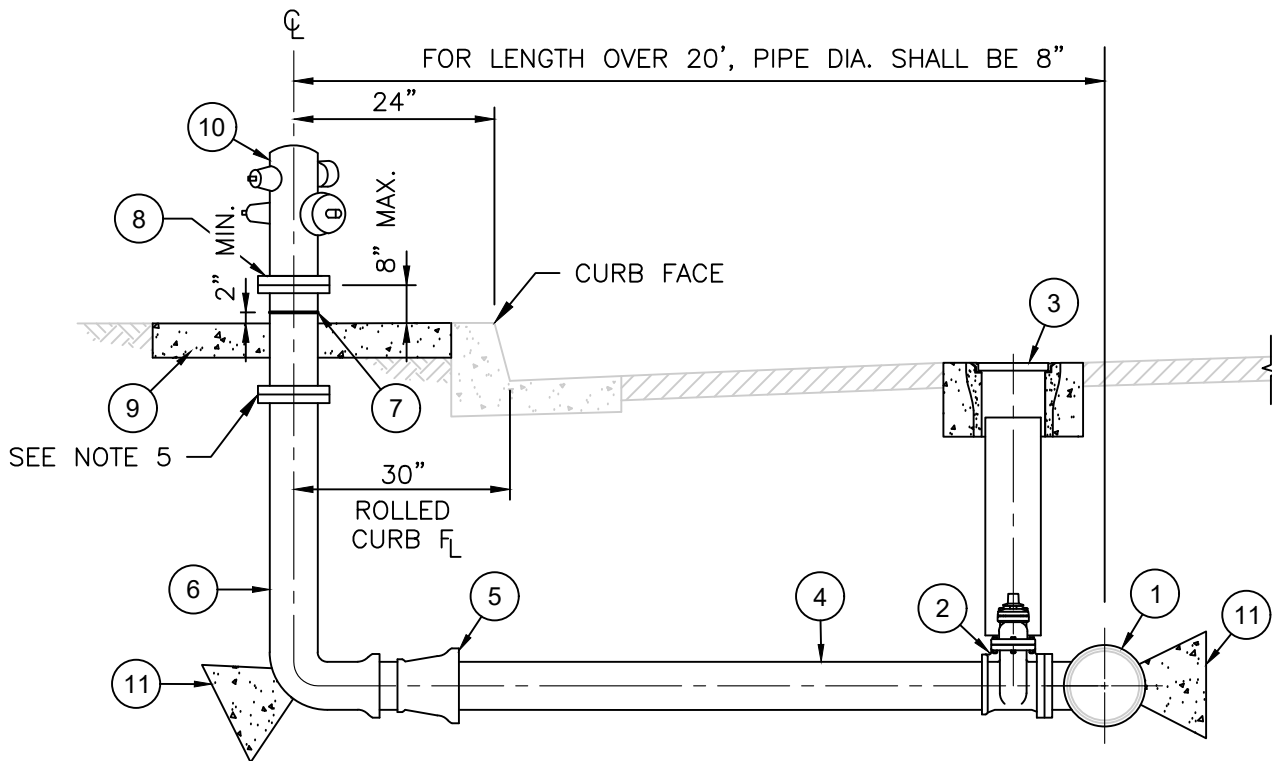
**CITY OF ORANGE WATER DIVISION STANDARDS**

**VALVE BOX INSTALLATION**

OWD STD. DWG.

**OWD-101**

SHEET 1 OF 1



ITEM	MATERIALS	QTY.
①	DI TEE, MAIN SIZE X 6" OR 8" FLG. OUTLET.	1 EA
②	6" OR 8" RW GATE VALVE, FLG. X MJ.	1 EA
③	VALVE BOX PER STD. OWD-101.	1 EA
④	DIP OR C-900 PVC WHERE REQUIRED.	VARIABLES
⑤	DI REDUCER, 6" x 8", MJ X MJ ON LONG SIDE OF STREET (WHERE REQUIRED)	1 EA
⑥	FIRE HYDRANT BURY.	1 EA
⑦	HYDRANT EXTENSION W/ BREAKAWAY GROOVE (GROVE ABOVE PAD).	1 EA
⑧	BREAK-AWAY BOLTS AT HYDRANT FLANGE.	VARIABLES
⑨	CONCRETE COLLAR PER STD. OWD-103.	1 EA
⑩	WET BARREL FIRE HYDRANT, (1) 2-1/2" & (1) 4" OUTLET.	1 EA
⑪	THRUST BLOCK PER STD. OWD-109.	VARIABLES

**NOTES:**

- TUNNEL BENEATH EXISTING CURB & GUTTER AND BACKFILL W/ SAND OR SLURRY.
- ORIENT HYDRANT OUTLETS TO FACE STREET.
- FIRE HYDRANTS SHALL BE PAINTED 'SAFETY ORANGE' PER SPECS. SECTION 212-12.
- PROVIDE "BREAKAWAY" CHECK VALVE WHERE REQUIRED AS DIRECTED BY OWD.
- SEE OWD SPEC. SECTION 212-6 FOR APPROVED HYDRANT TYPES AND ADDITIONAL REQUIREMENTS.
- ALL MECHANICAL JOINTS SHALL BE THRUST BLOCKED AND RESTRAINED WITH MECHANICAL JOINT RESTRAINTS.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

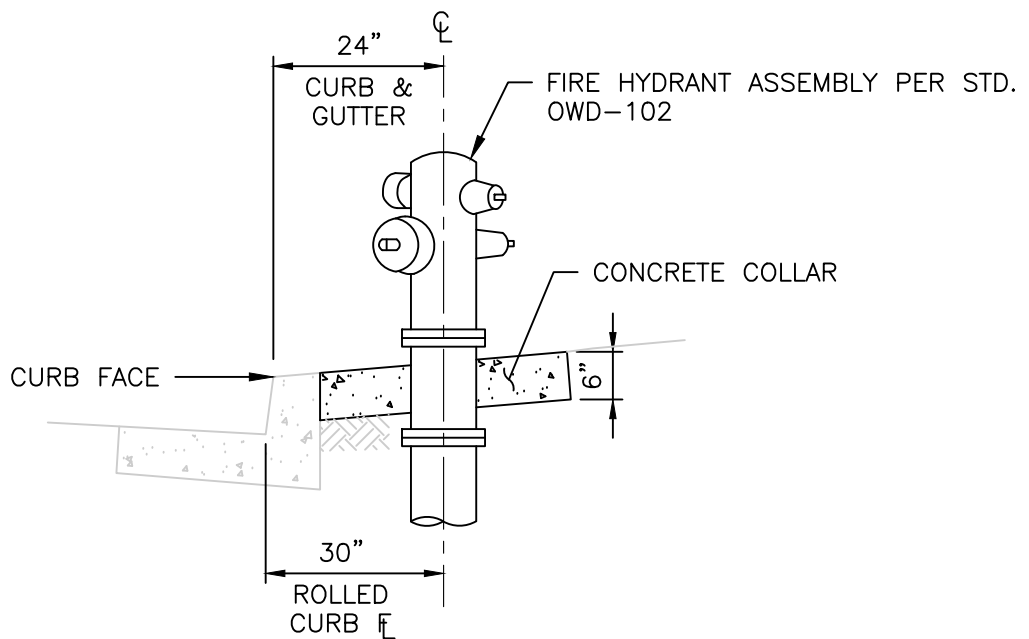
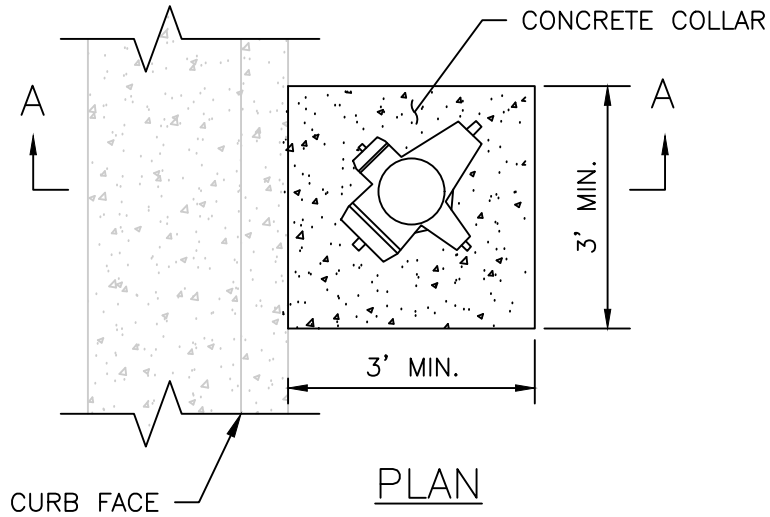
**CITY OF ORANGE WATER DIVISION STANDARDS**

**FIRE HYDRANT ASSEMBLY**

OWD STD. DWG.

**OWD-102**

SHEET 1 OF 1



SECTION A - A

NOTES:

1. CONCRETE COLLAR SHALL MEET CURB AT SAME ELEVATION AS TOP OF CURB.
2. CONCRETE SHALL BE CLASS 420-C-2000 CONTAINING NOT LESS THAN FIVE SACKS PER CUBIC YARD.
3. GUARD POSTS SHALL BE INSTALLED PER STD. OWD-104 WHEN THERE IS NO CURB.

*David D. Dief* 1/31/2023  
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*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
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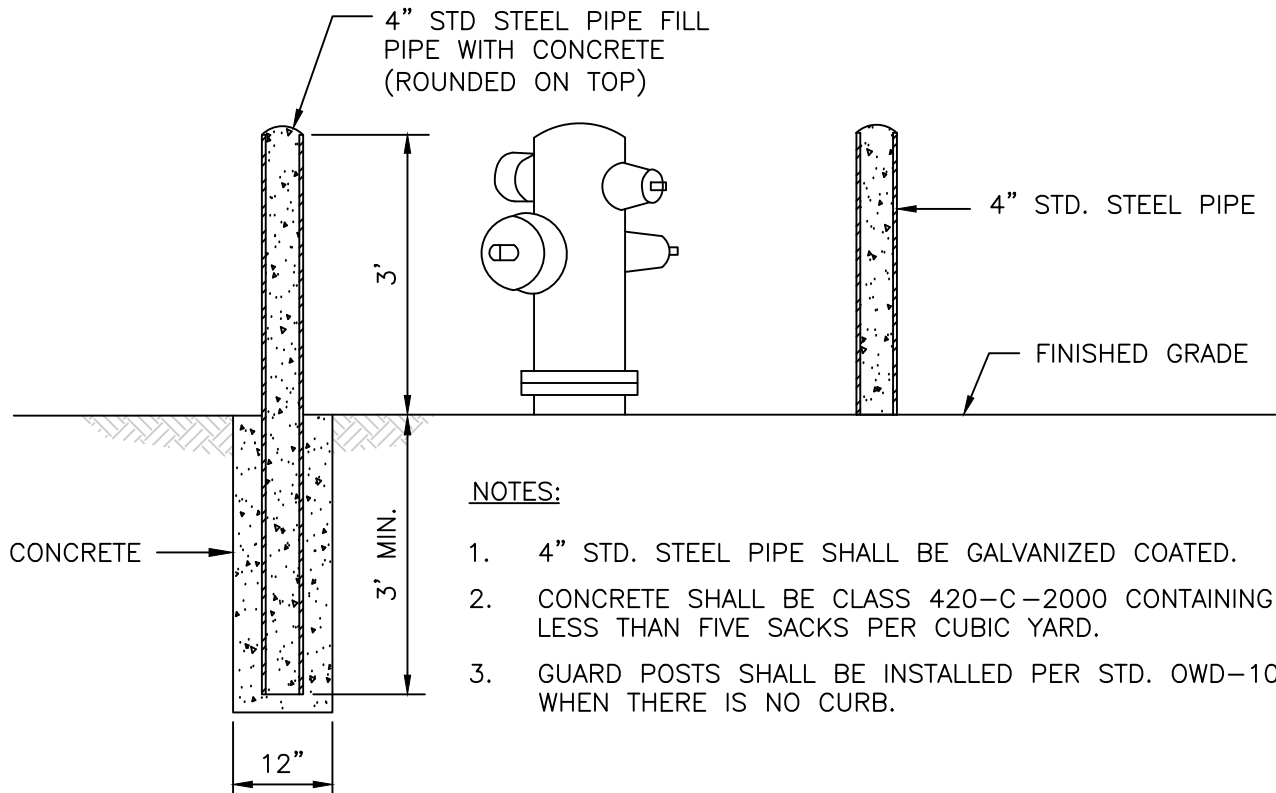
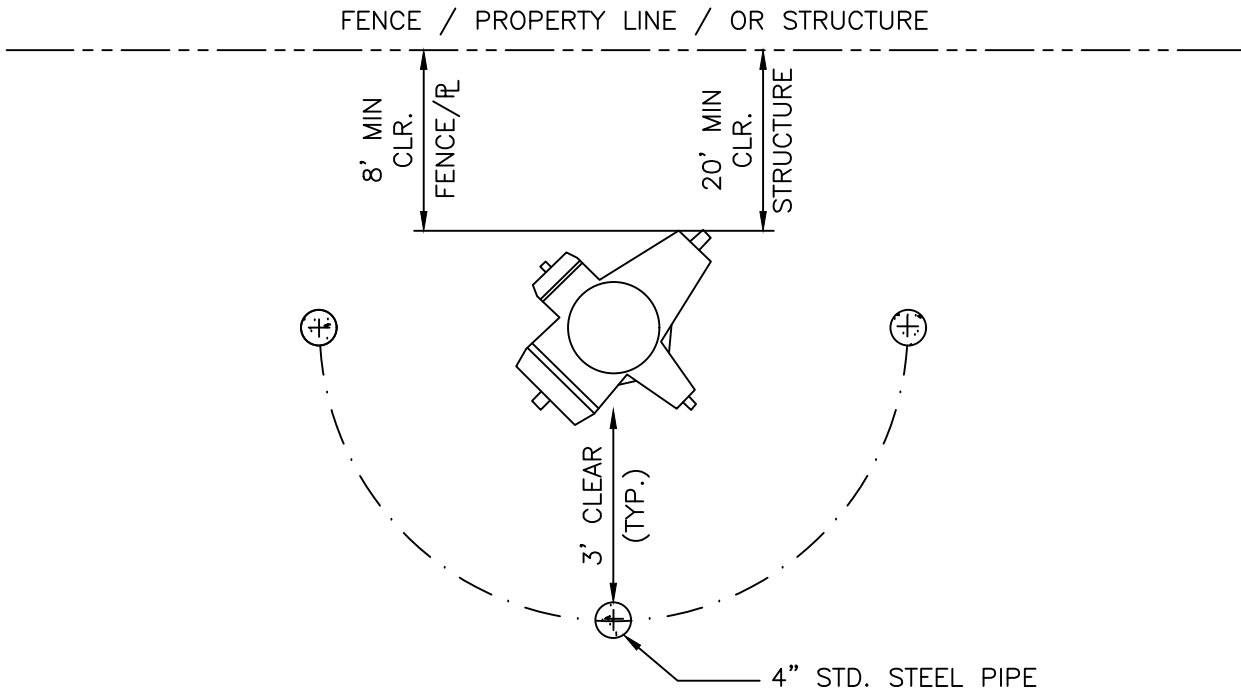
CITY OF ORANGE WATER DIVISION STANDARDS

FIRE HYDRANT CONCRETE COLLAR INSTALLATION

OWD STD. DWG.

**OWD-103**

SHEET 1 OF 1



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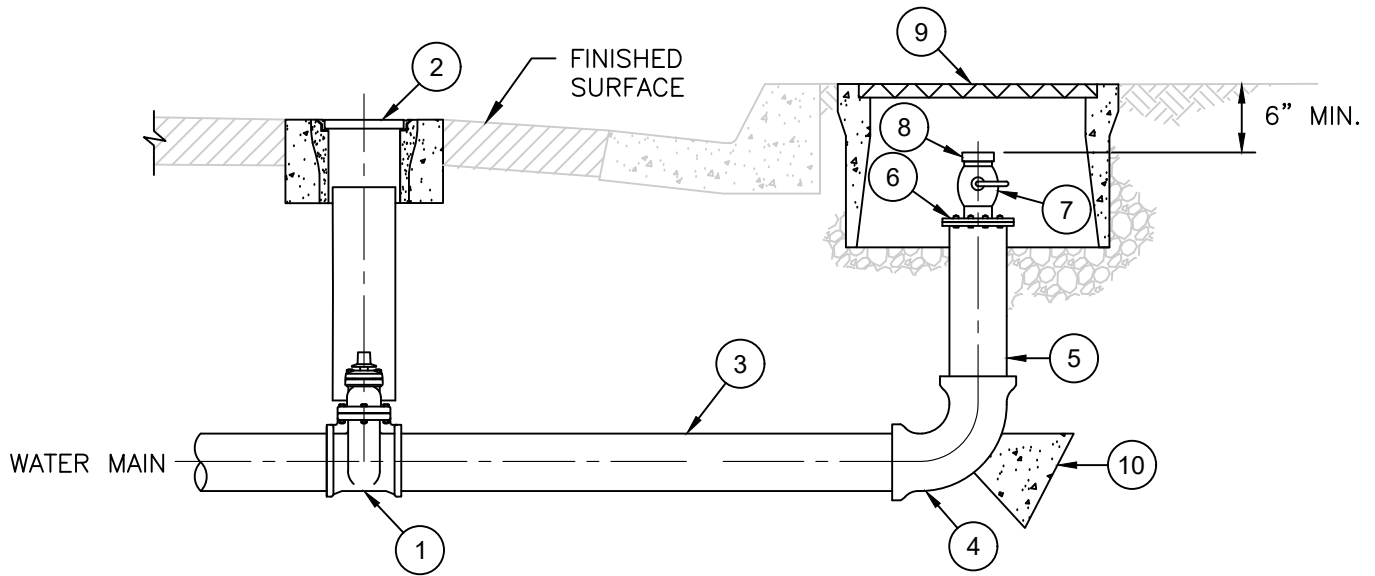
CITY OF ORANGE WATER DIVISION STANDARDS

FIRE HYDRANT GUARD POST INSTALLATION

OWD STD. DWG.

**OWD-104**

SHEET 1 OF 1



ITEM	MATERIALS	QTY.
①	4" RW GATE VALVE, MJ X MJ.	1 EA
②	VALVE BOX PER STD. OWD-101.	1 EA
③	DIP OR C-900 PVC WHERE REQUIRED.	VARIES
④	4" DI 90° ELL, MJ X MJ.	1 EA
⑤	4" DI PIPE SPOOL, FLG. x PE.	VARIES
⑥	4" BLIND FLANGE W/ 2-1/2" TAP.	1 EA
⑦	2 1/2" BRASS NIPPLE AND 2-1/2" BALL VALVE W/ LEVER.	1 EA
⑧	2 1/2" BRASS NIPPLE, IP THREAD X FH THREAD W/ PROTECTIVE CAP.	1 EA
⑨	METER BOX FOR 2" SERVICE AND COVER W/ "BLOW-OFF" MARKING.	1 EA
⑩	THRUST BLOCK PER STD. OWD-109.	VARIES

NOTES:

- ALL MECHANICAL JOINTS SHALL BE THRUST BLOCKED AND RESTRAINED WITH MECHANICAL JOINT RESTRAINTS.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
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CITY OF ORANGE WATER DIVISION STANDARDS

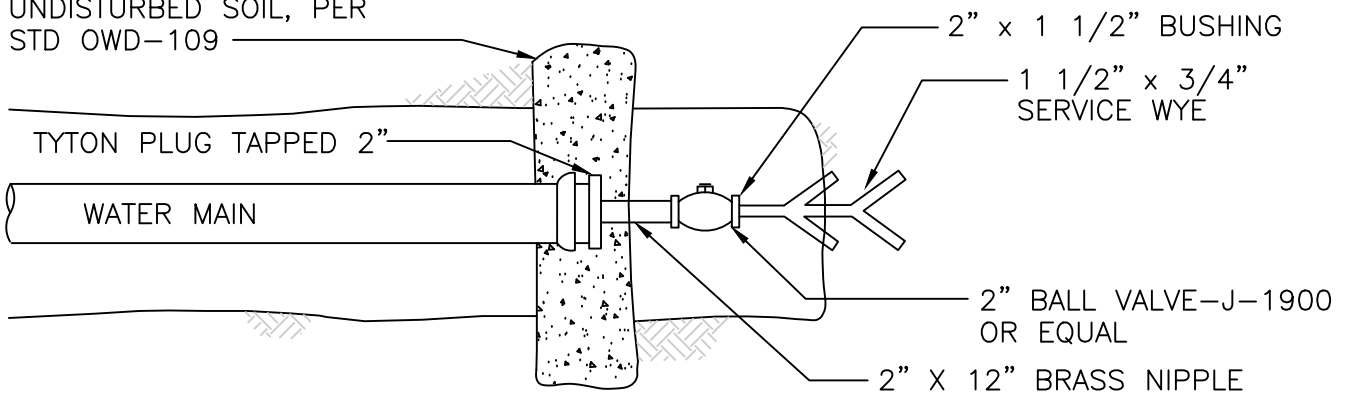
4" BLOWOFF ASSEMBLY

OWD STD. DWG.

**OWD-105**

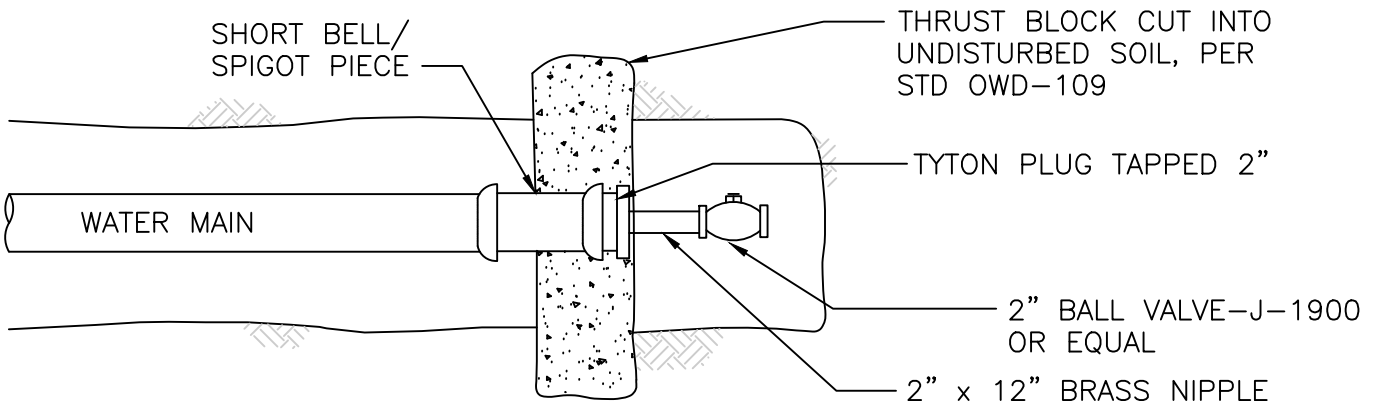
SHEET 1 OF 1

THRUST BLOCK CUT INTO  
UNDISTURBED SOIL, PER  
STD OWD-109

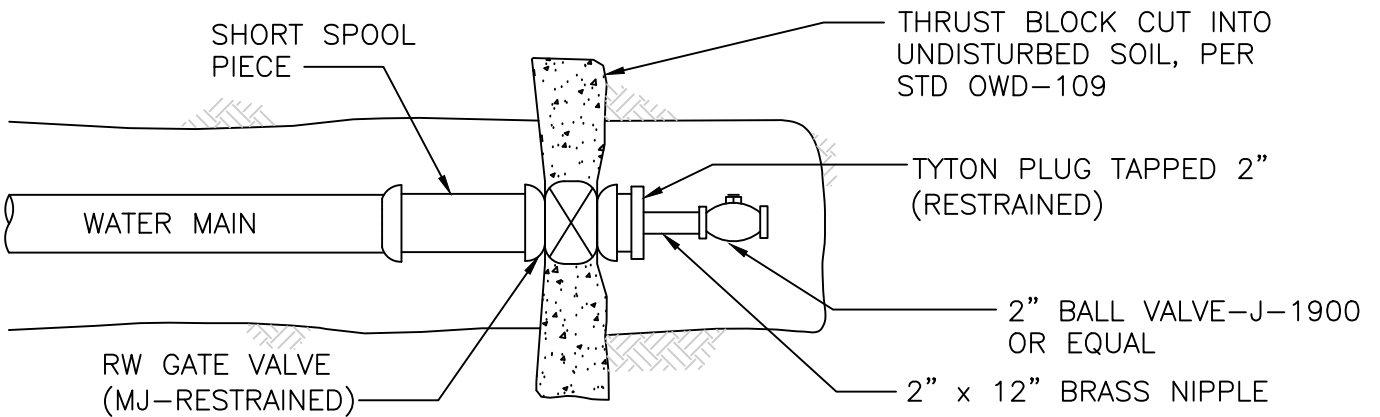


TYPICAL DEAD END MAIN

NOTE: ALL TEMPORARY FLUSHING  
EQUIPMENT BEYOND BALL VALVES  
SHALL BE SUPPLIED BY THE CONTRACTOR



TYPICAL TEMPORARY PLUG



TYPICAL FUTURE TAKEOFF

*David Dief* 1/31/2023  
CITY WATER MANAGER  
*James E.* 1/31/2023  
CITY ENGINEER  
*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

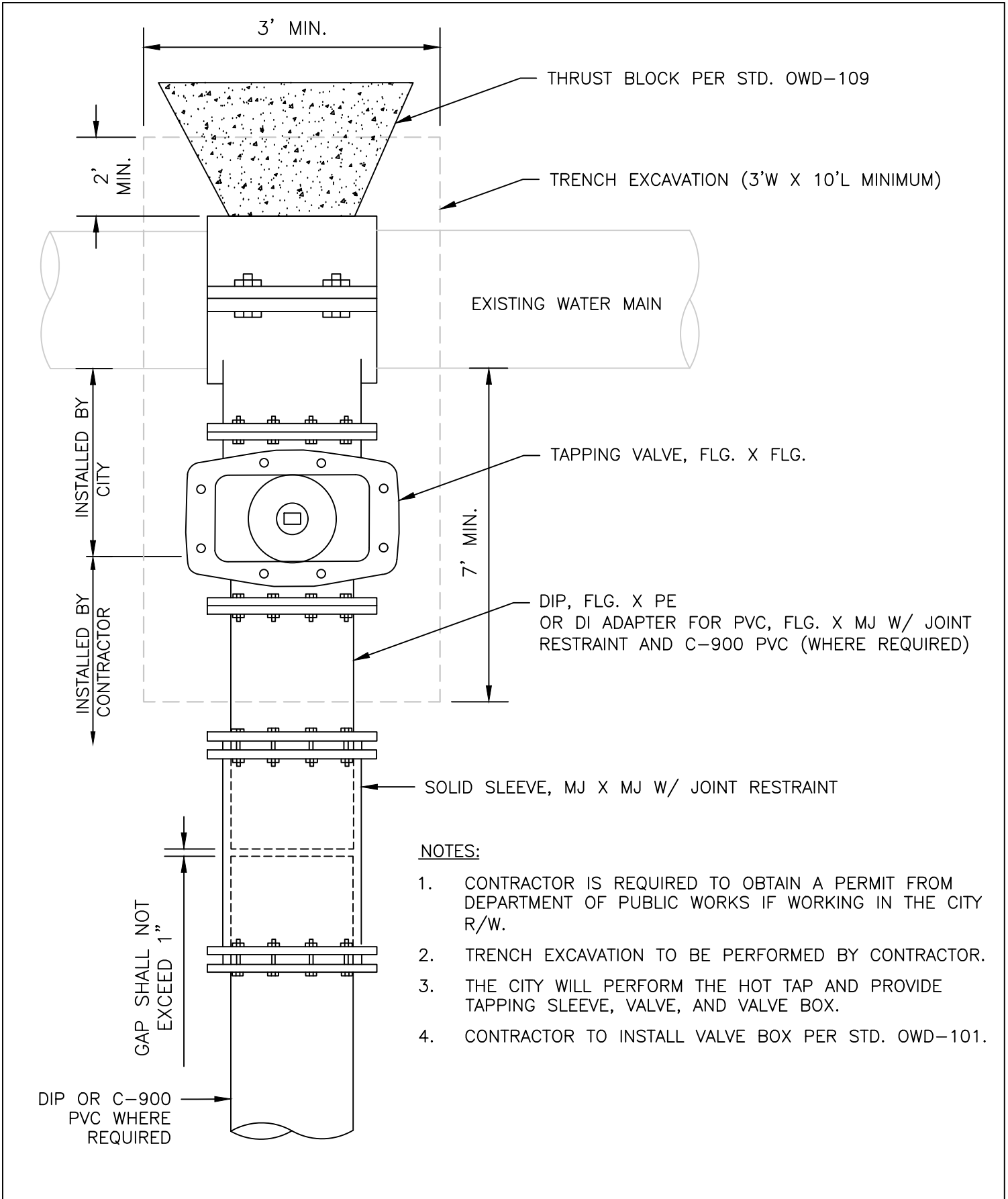
CITY OF ORANGE WATER DIVISION STANDARDS

PLUG INSTALLATION

OWD STD. DWG.

**OWD-106**

SHEET 1 OF 1



**NOTES:**

1. CONTRACTOR IS REQUIRED TO OBTAIN A PERMIT FROM DEPARTMENT OF PUBLIC WORKS IF WORKING IN THE CITY R/W.
2. TRENCH EXCAVATION TO BE PERFORMED BY CONTRACTOR.
3. THE CITY WILL PERFORM THE HOT TAP AND PROVIDE TAPPING SLEEVE, VALVE, AND VALVE BOX.
4. CONTRACTOR TO INSTALL VALVE BOX PER STD. OWD-101.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*[Signature]* 1/31/2023  
CITY ENGINEER

*[Signature]* 1/31/2023  
PUBLIC WORKS DIRECTOR

**CITY OF ORANGE WATER DIVISION STANDARDS**

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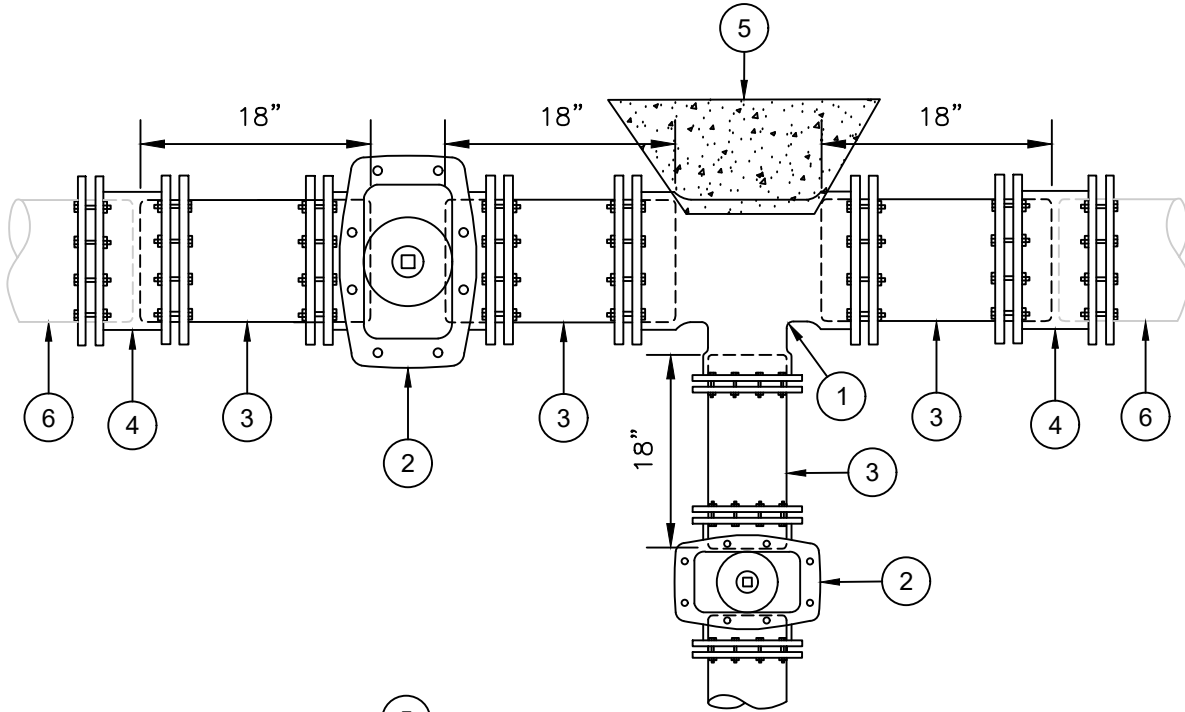
**HOT TAP AND/OR SOLID SLEEVE INSTALLATION**

OWD STD. DWG.

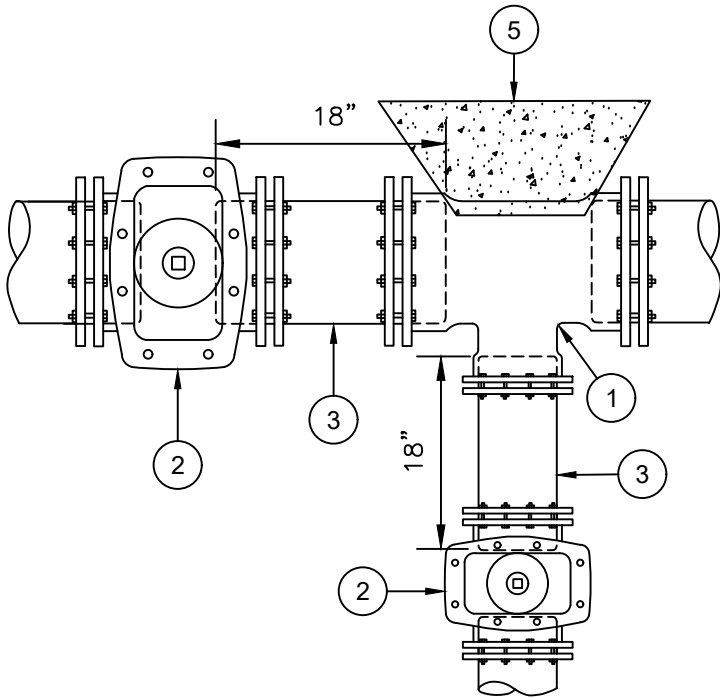
**OWD-107**

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SHEET 1 OF 1



CUT-IN TEE



VALVE INSTALLATION

- | ITEM | MATERIALS                               |
|------|---|
| ①    | DI TEE, MJ W/ JOINT RESTRAINT.          |
| ②    | RW GATE VALVE, MJ W/ JOINT RESTRAINT.   |
| ③    | DIP OR C-900 PVC WHERE REQUIRED.        |
| ④    | DI SOLID SLEEVE, MJ W/ JOINT RESTRAINT. |
| ⑤    | THRUST BLOCK PER STD. OWD-109.          |
| ⑥    | EXISTING PIPE                           |

*David D. Dief* 1/31/2023  
 CITY WATER MANAGER  
*James B.* 1/31/2023  
 CITY ENGINEER  
*John A.* 1/31/2023  
 PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

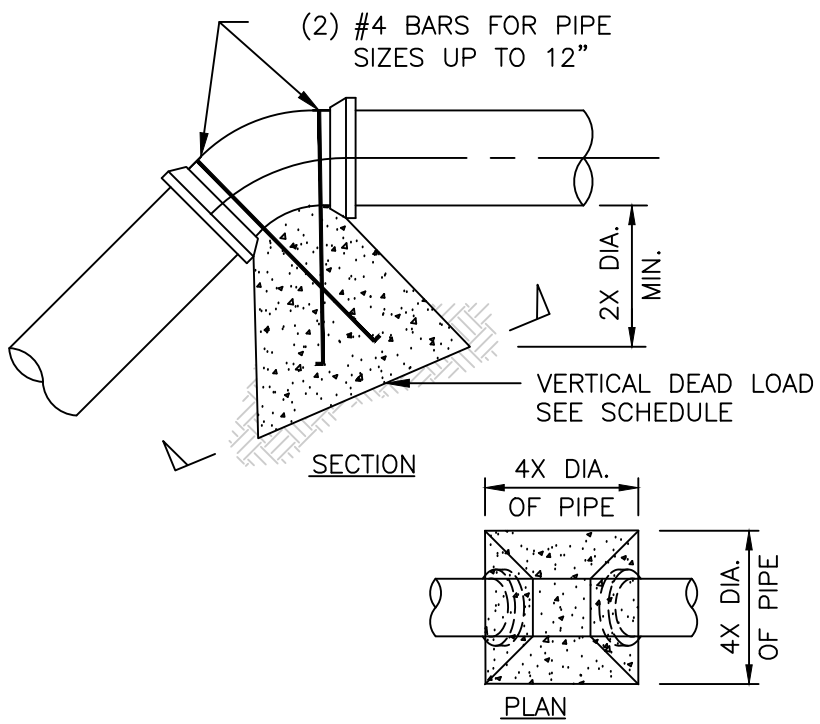
CUT-IN TEE AND VALVE  
INSTALLATION

OWD STD. DWG.

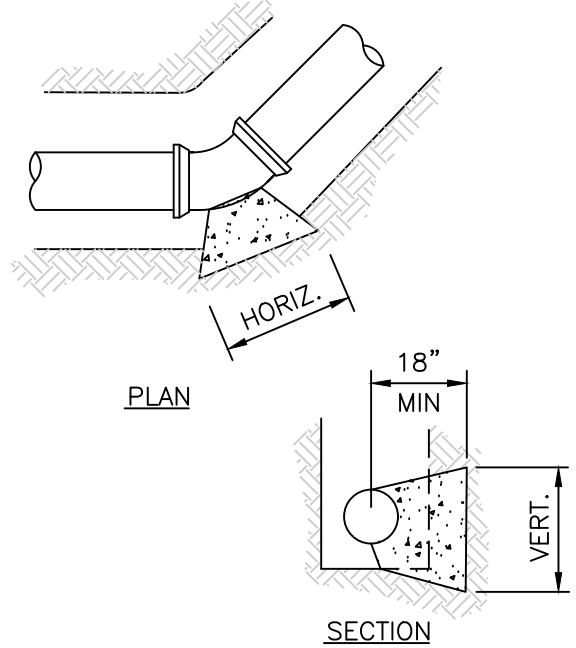
**OWD-108**

SHEET 1 OF 1

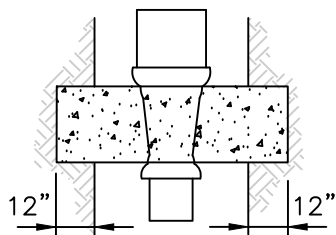




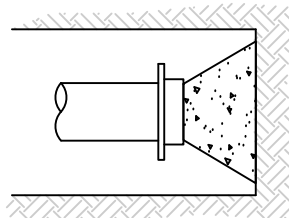
VERTICAL BEND ANCHOR



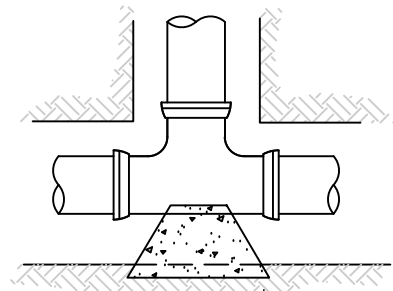
HORIZONTAL BEND



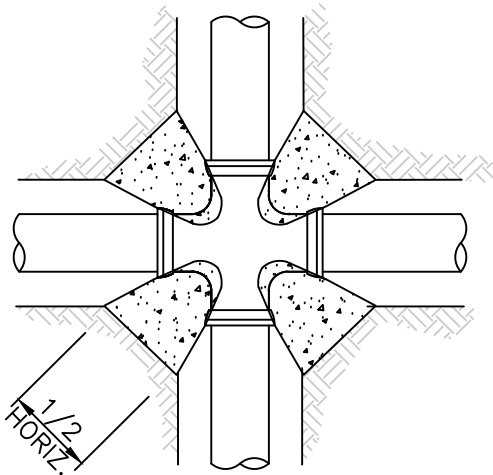
REDUCER



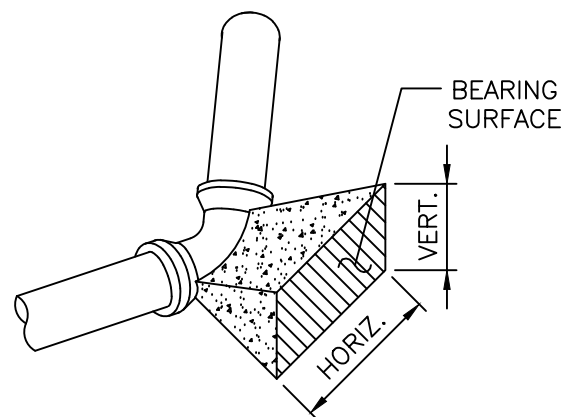
END CAP



TEE OR VALVE



CROSS



TYPICAL BEARING SURFACE

*David Siof* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

THRUST BLOCK DETAILS

OWD STD. DWG.

**OWD-109**

SHEET 1 OF 2

**NOTES:**

1. THRUST BLOCK BEARING AREA BASED ON ALLOWABLE SOIL BEARING VALUE OF 1500 PSF PRESSURE AND 225 PSI LINE PRESSURE WITH 3'-0" COVER MINIMUM.  
 FOR BEARING = 1000 PSF, 1.5 X AREA SHOWN  
 FOR BEARING = 500 PSF, 3.0 X AREA SHOWN
2. ALL THRUST BLOCKS SHALL BE CLASS 560-C-3250 CONCRETE (CONTAINING NOT LESS THAN FIVE SACKS PER CUBIC YARD) AND PLACED AGAINST UNDISTURBED SOIL.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A15 AND A305 INTERMEDIATE GRADE.
4. CONCRETE SHALL NOT EXTEND ONTO FLANGE OR ADJOINING PIPE. PIPE AND FITTING JOINTS SHALL BE ACCESSIBLE FOR REPAIR.
5. IN ADDITION TO THRUST BLOCKS, ALL DUCTILE IRON PIPE MECHANICAL JOINT FITTINGS SHALL BE RESTRAINED PER SECTION 209-1.1.2.5 OR 209-4.2.3 OF THE STANDARD SPECS.

MINIMUM SIZE OF THRUST BLOCK BEARING SURFACE

PIPE	11 1/4° BEND		22 1/2° BEND		45° BEND		90° BEND		TEE		END CAP	
SIZE	HORIZ.	VERT.	HORIZ.	VERT.	HORIZ.	VERT.	HORIZ.	VERT.	HORIZ.	VERT.	HORIZ.	VERT.
4"	1'-6"	0'-9"	1'-8"	0'-9"	2'-4"	1'-0"	3'-3"	1'-4"	2'-8"	1'-3"	2'-8"	1'-3"
6"	1'-9"	1'-0"	2'-6"	1'-3"	3'-6"	1'-6"	4'-8"	2'-3"	4'-0"	2'-0"	4'-0"	2'-0"
8"	2'-4"	1'-0"	3'-4"	1'-6"	4'-8"	2'-0"	6'-4"	3'-0"	5'-4"	2'-4"	5'-4"	2'-4"
10"	3'-0"	1'-4"	4'-3"	1'-9"	5'-9"	2'-6"	7'-10"	3'-6"	6'-8"	3'-0"	6'-8"	3'-0"
12"	3'-6"	2'-0"	5'-0"	2'-3"	6'-10"	3'-0"	9'-6"	4'-3"	7'-10"	3'-6"	7'-10"	3'-6"

VERTICAL DEAD LOAD (MIN. CUBIC YARDS)

PIPE SIZE	11 1/4° BEND	22 1/2° BEND	45° BEND
4"	0.3	0.5	0.9
6"	0.5	1.0	2.0
8"	0.9	1.8	3.5
10"	1.4	2.8	5.5
12"	2.0	4.0	7.8

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

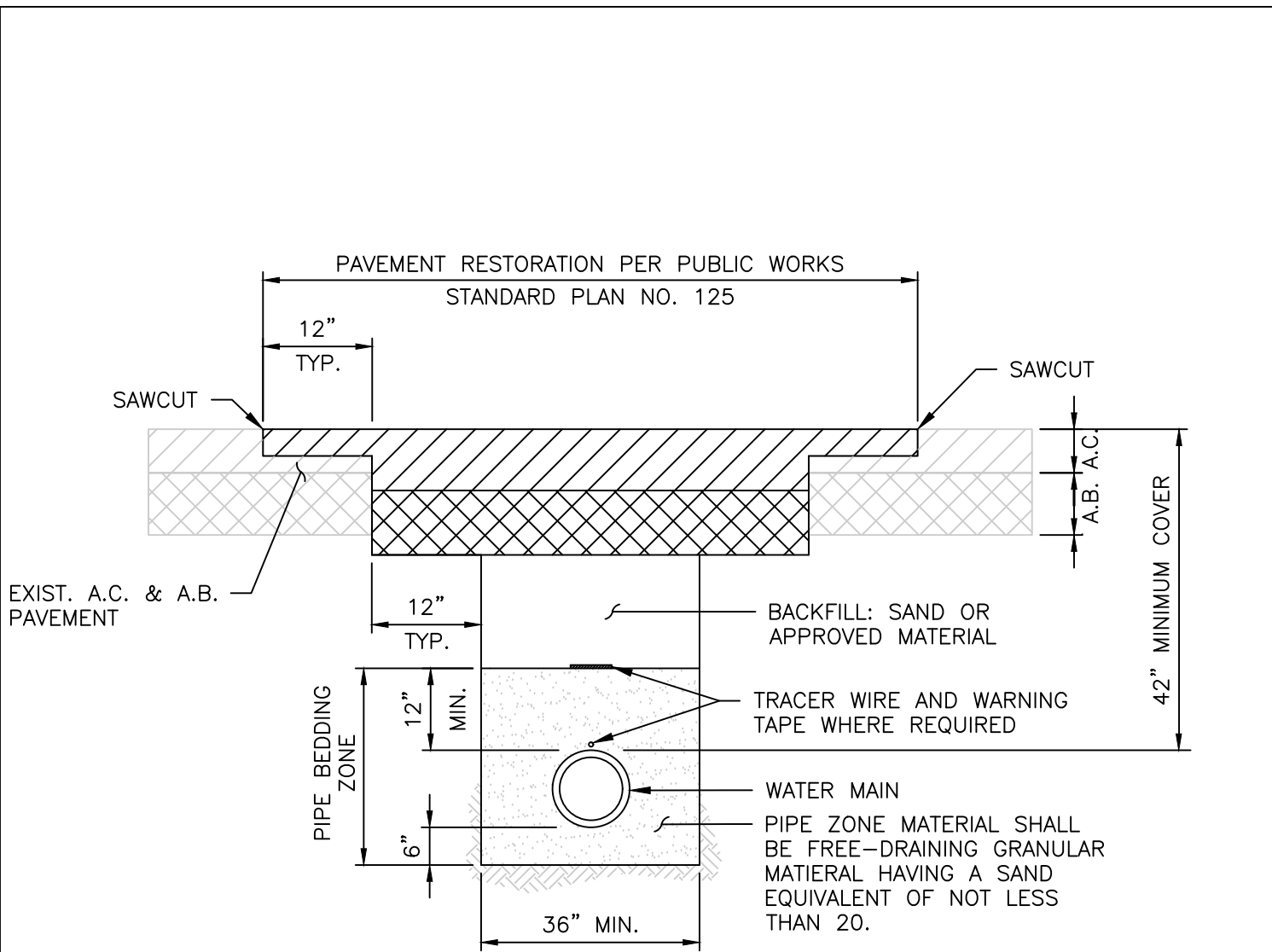
**CITY OF ORANGE WATER DIVISION STANDARDS**

**THRUST BLOCK DETAILS**

OWD STD. DWG.

**OWD-109**

SHEET 2 OF 2



EXIST. A.C. & A.B. PAVEMENT

**NOTES:**

1. TRANSVERSE TRENCHES SHALL BE BACKFILLED WITH 150-E-100 CONCRETE SLURRY PER PUBLIC WORKS STANDARD PLAN NO. 125, EXCEPT WITHIN PIPE ZONE.
2. PIPELINE WARNING AND LOCATION FOR PVC INSTALLATIONS SHALL BE PER SPEC. SECTION 209-7.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

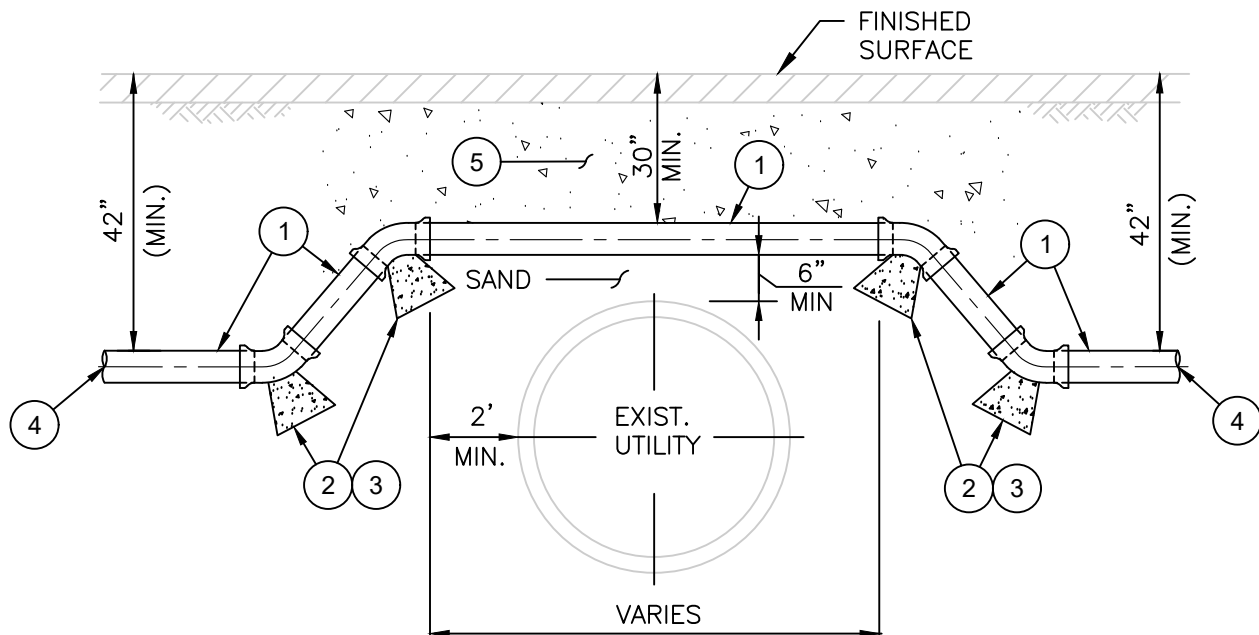
**CITY OF ORANGE WATER DIVISION STANDARDS**

**TYPICAL TRENCH SECTION**

OWD STD. DWG.

**OWD-110**

SHEET 1 OF 1



**ITEM MATERIALS**

- ① DIP OR C-900 WHERE REQUIRED.
- ② (1) DI OFFSET OR (2) 45° BENDS, MJ X MJ.  
FOR PVC WATER MAIN CONSTRUCTION, (2) 22.5° BENDS SHALL BE USED, MJ X MJ.
- ③ THRUST BLOCK FITTINGS PER STD. OWD-109 (VERTICAL DEAD LOAD).
- ④ PROVIDE PIPE JOINT RESTRAINTS 2 JOINTS BACK (TYP.).
- ⑤ BACKFILL WITH 1-1/2 SACK SLURRY OVER SAND BED IF DEPTH OF COVER IS LESS THAN 30".

**NOTES:**

- 1. CONTRACTOR TO POT HOLE AND VERIFY ALL UTILITY CONFLICTS IN THE FIELD.
- 2. AIR-VAC ASSEMBLY SHALL BE INSTALLED PER STD. OWD-302 AS DETERMINED AND APPROVED BY ORANGE WATER DIVISION AND AS SPECIFICALLY CALLED FOR ON THE PROJECT PLANS.
- 3. NO UNRESTRAINED PIPE JOINTS BETWEEN OFFSET FITTINGS.
- 4. SEE SPEC. SECTION 209-1.1.2.5 OR 209-4.2.3 FOR ACCEPTABLE PIPE JOINT RESTRAINTS WHERE REQUIRED.
- 5. ALL MECHANICAL JOINTS SHALL BE THRUST BLOCKED AND RESTRAINED WITH MECHANICAL JOINT RESTRAINTS.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

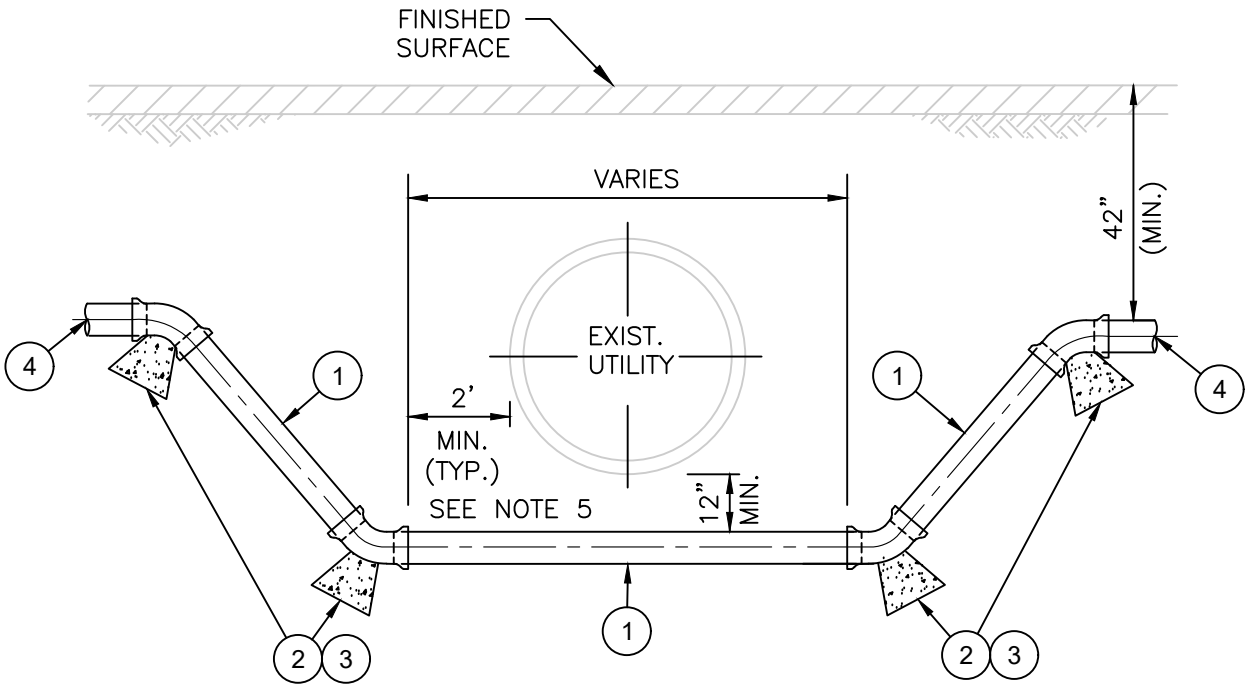
**CITY OF ORANGE WATER DIVISION STANDARDS**

**OFFSET JOINT DETAIL**  
**(TYPICAL INVERTED SIPHON)**

OWD STD. DWG.

**OWD-111**

SHEET 1 OF 2



**ITEM MATERIALS**

- ① DIP OR C-900 WHERE REQUIRED.
- ② (1) DI OFFSET OR (2) 45° BENDS, MJ X MJ.  
FOR PVC WATER MAIN CONSTRUCTION, (2) 22.5° BENDS SHALL BE USED, MJ X MJ.
- ③ THRUST BLOCK FITTINGS PER STD. OWD-109 (VERTICAL DEAD LOAD).
- ④ PROVIDE PIPE JOINT RESTRAINTS 2 JOINTS BACK (TYP.).

**NOTES:**

1. CONTRACTOR TO POTHOLE AND VERIFY ALL UTILITY CONFLICTS IN THE FIELD.
2. AIR-VAC ASSEMBLY SHALL BE INSTALLED PER STD. OWD-302 AS DETERMINED AND APPROVED BY ORANGE WATER DIVISION AND AS SPECIFICALLY CALLED FOR ON THE PROJECT PLANS.
3. NO UNRESTRAINED PIPE JOINTS BETWEEN OFFSET FITTINGS.
4. SEE SPEC. SECTION 209-1.1.2.5 OR 209-4.2.3 FOR ACCEPTABLE PIPE JOINT RESTRAINTS WHERE REQUIRED.
5. FOR STORM DRAINS, NO JOINTS IN THE WATER MAIN FOR A MINIMUM OF 8 FEET FROM THE O.D.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

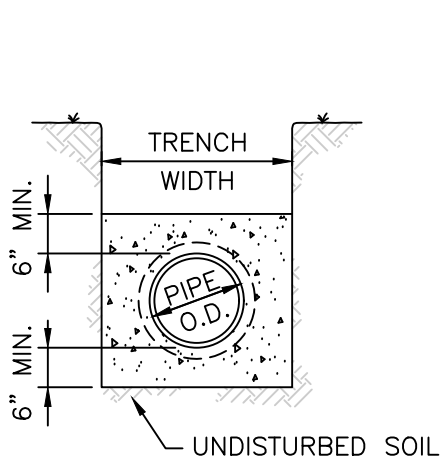
**CITY OF ORANGE WATER DIVISION STANDARDS**

**OFFSET JOINT DETAIL  
(TYPICAL SIPHON)**

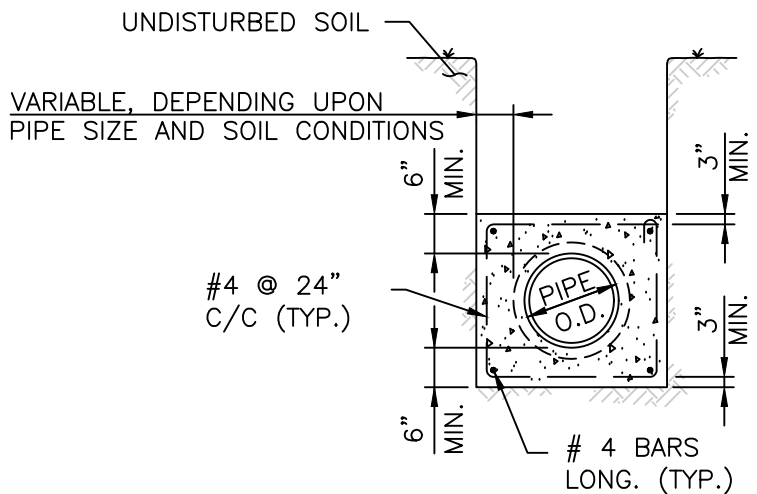
OWD STD. DWG.

**OWD-111**

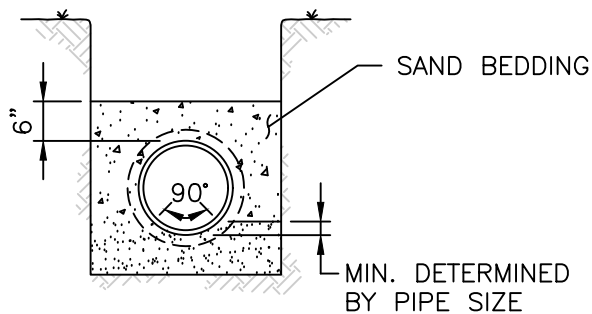
SHEET 2 OF 2



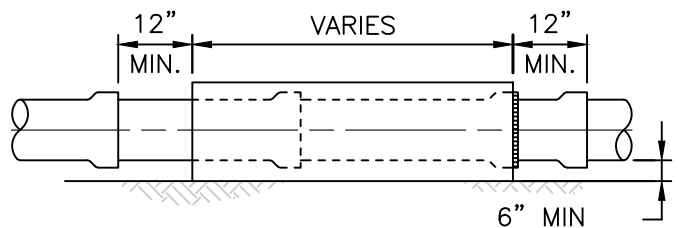
TYPE "A"



TYPE "B"



TYPE "C"



SECTION

NOTES:

1. ENCASEMENT TO BE PLACED AGAINST UNDISTURBED NATURAL GROUND OR FILL COMPACTED TO 90% RELATIVE COMPACTION.
2. NO. 4 STEEL REINFORCING BARS SHALL BE USED AS SPECIFIED.
3. TYPE OF CONCRETE ENCASEMENT TO BE USED WILL BE SHOWN ON PLANS OR AS SPECIFIED BY INSPECTOR TO MEET UNFORSEEN FIELD CONDITIONS.
4. WHERE SLOPE TRENCHES ARE USED, WALLS WILL NOT BEGIN TO SLOPE CLOSER THAN 12" FROM THE TOP OF THE PIPE.
5. ENCASEMENT CONCRETE TO BE CLASS 560-C-3250.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

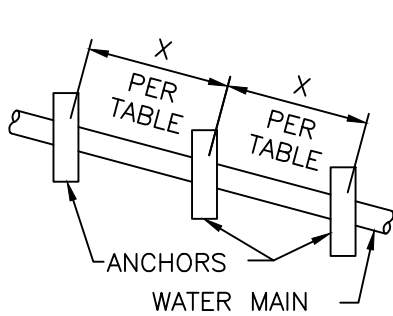
CITY OF ORANGE WATER DIVISION STANDARDS

CONCRETE ENCASEMENT AND SLOPE ANCHORS

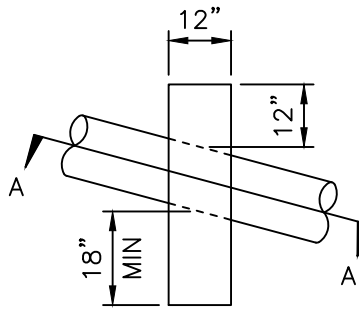
OWD STD. DWG.

OWD-112

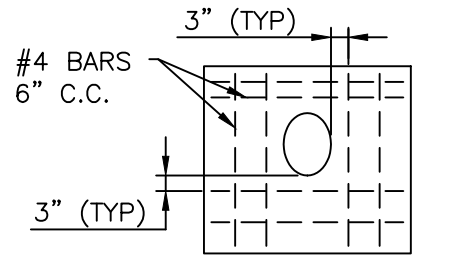
SHEET 1 OF 2



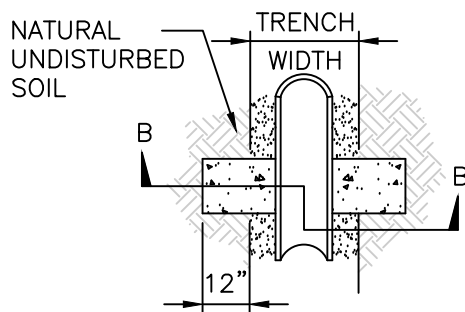
ELEVATION



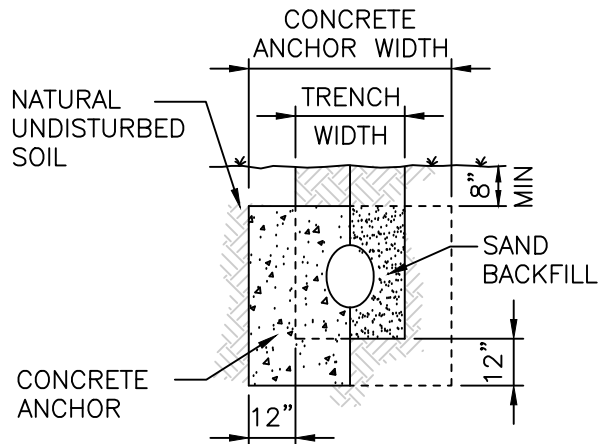
ANCHOR DETAIL



REINFORCING STEEL PATTERN



SECTION A-A



SECTION B-B

TABLE

PIPE SLOPE	X DISTANCE
20% TO 35%	36'
35% TO 50%	24'
> 50%	16'

NOTES:

1. PIPE ANCHORS REQUIRED ON ALL SLOPES OF 20% OR GREATER.
2. ANCHOR SHALL EXTEND 12" INTO NATURAL UNDISTURBED SOIL.
3. CONCRETE SHALL BE CLASS 560-C-3250.
4. ANCHORS FOR TRAPEZOIDAL TRENCH SECTIONS WILL CONFORM TO TRENCH CROSS SECTION AND EXTEND 12" INTO UNDISTURBED SOIL.
5. DO NOT EXTEND D.I.P. POLY BAG THRU ANCHORS - SEAL BAG TO PIPE ON EACH SIDE OF EACH ANCHOR.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

CONCRETE ENCASEMENT AND SLOPE ANCHORS

OWD STD. DWG.

**OWD-112**

SHEET 2 OF 2

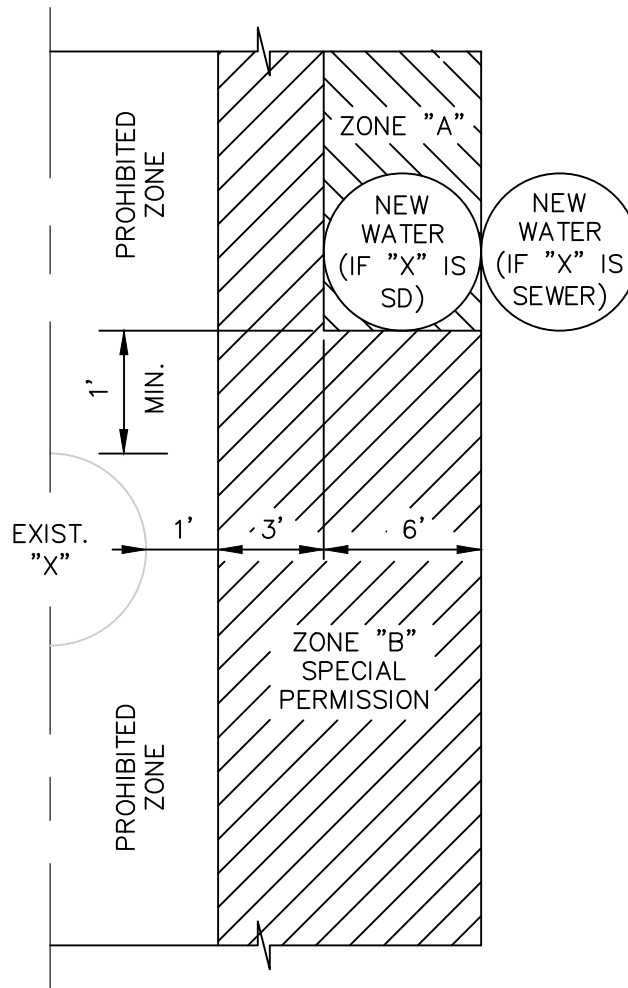


FIGURE 1 – PARALLEL CONSTRUCTION

NOTES:

1. ZONES IDENTICAL ON EITHER SIDE OF CENTER LINES.
2. ZONE "A" CONSTRUCTION IS ALLOWED ONLY FOR THE INDICATED CONVEYANCE; OTHERWISE SPECIAL PERMISSION. NO PIPES SHALL BE INSTALLED WITHIN THE PROHIBITED ZONE.
3. SPECIAL PERMISSION WILL BE REQUIRED TO CONSTRUCT WITHIN THE ZONE "B". WITH STATE DEPARTMENT OF PUBLIC HEALTH APPROVAL, NEWLY INSTALLED MAINS MAY BE EXEMPTED FROM THE SEPARATION DISTANCES IF THE WATER MAIN CAN BE ADEQUATELY PROTECTED AS SET FORTH IN CALIFORNIA ADMINISTRATIVE CODE (CAC), TITLE 22, SECTION 64572, SUB-SECTION (H). PROPOSED PROTECTIVE MEASURE(S) SHALL BE SUBMITTED TO DISTRICT FOR CONSIDERATION BEFORE REQUESTING APPROVAL FROM THE STATE HEALTH DEPARTMENT.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

SEPARATION OF WATERMANS, SANITARY SEWERS  
AND STORM DRAINS

OWD STD. DWG.

**OWD-113**

SHEET 1 OF 3



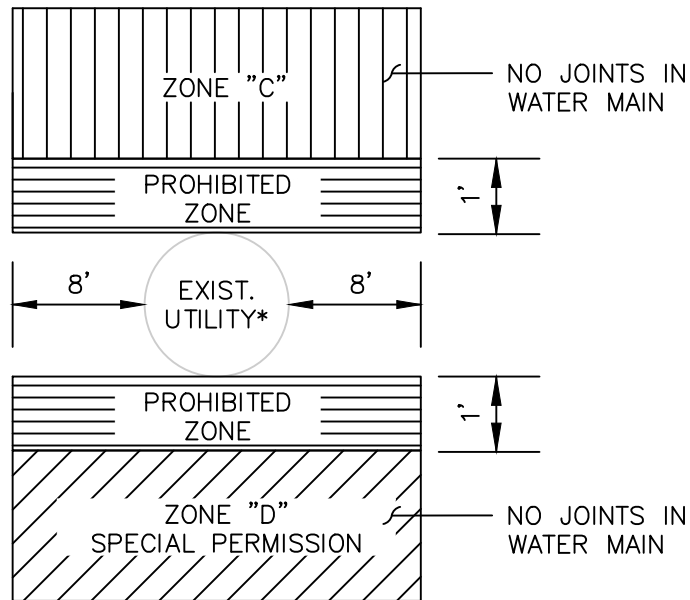


FIGURE 2 – CROSSINGS

\*FLUID CONVEYANCE LISTED PER CAC, TITLE 22, SECTION 64572, SUB-SECTION (A) AND (B)

1. ZONE "C" CONSTRUCTION SHALL HAVE NO JOINTS. CROSSINGS SHALL BE MADE AT AN ANGLE NO LESS THAN 45° TO EXISTING PIPELINE. NO PIPES SHALL BE INSTALLED WITHIN THE PROHIBITED ZONE.
2. SPECIAL PERMISSION WILL BE REQUIRED TO CONSTRUCT WITHIN THE ZONE "D". WITH STATE DEPARTMENT OF PUBLIC HEALTH APPROVAL, NEWLY INSTALLED MAINS MAY BE EXEMPTED FROM THE SEPARATION DISTANCES IF THE WATER MAIN CAN BE ADEQUATELY PROTECTED AS SET FORTH IN CALIFORNIA ADMINISTRATIVE CODE (CAC), TITLE 22, SECTION 64572, SUB-SECTION (H). PROPOSED PROTECTIVE MEASURE(S) SHALL BE SUBMITTED TO DISTRICT FOR CONSIDERATION BEFORE REQUESTING APPROVAL FROM THE STATE HEALTH DEPARTMENT.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

SEPARATION OF WATERMAINS, SANITARY SEWERS  
AND STORM DRAINS

OWD STD. DWG.

**OWD-113**

SHEET 2 OF 3

NOTES:

1. ALL NEW DOMESTIC WATER MAINS SHALL BE INSTALLED PER THE LATEST CALIFORNIA PUBLIC HEALTH LAWS FOR DRINKING WATER SAFETY.
2. CALIFORNIA ADMINISTRATIVE CODE, TITLE 22, SECTION 64572 (LATEST REVISION) STATES:
  - (A) NEW WATER MAINS AND NEW SUPPLY LINES SHALL NOT BE INSTALLED IN THE SAME TRENCH AS, AND SHALL BE AT LEAST 10 FEET HORIZONTALLY FROM AND ONE FOOT VERTICALLY ABOVE, ANY PARALLEL PIPELINE CONVEYING:
    - 1) UNTREATED SEWAGE,
    - 2) PRIMARY OR SECONDARY TREATED SEWAGE,
    - 3) DISINFECTED SECONDARY-2.2 RECYCLED WATER (DEFINED IN SECTION 60301.220),
    - 4) DISINFECTED SECONDARY-23 RECYCLED WATER (DEFINED IN SECTION 60301.225), AND
    - 5) HAZARDOUS FLUIDS SUCH AS FUELS, INDUSTRIAL WASTES, AND WASTEWATER SLUDGE.
  - (B) NEW WATER MAINS AND NEW SUPPLY LINES SHALL BE INSTALLED AT LEAST 6 FEET HORIZONTALLY FROM, AND ONE FOOT VERTICALLY ABOVE, ANY PARALLEL PIPELINE CONVEYING:
    - 1) DISINFECTED TERTIARY RECYCLED WATER (DEFINED IN SECTION 60301.230), AND
    - 2) STORM DRAINAGE.
  - (C) NEW SUPPLY LINES CONVEYING RAW WATER TO BE TREATED FOR DRINKING PURPOSES SHALL BE INSTALLED AT LEAST 6 FEET HORIZONTALLY FROM, AND ONE FOOT VERTICALLY BELOW, ANY WATER MAIN.
  - (D) IF CROSSING A PIPELINE CONVEYING A FLUID LISTED IN SUBSECTION (A) OR (B), A NEW WATER MAIN SHALL BE CONSTRUCTED NO LESS THAN 45-DEGREES TO AND AT LEAST ONE FOOT ABOVE THAT PIPELINE. NO CONNECTION JOINTS SHALL BE MADE IN THE WATER MAIN WITHIN EIGHT HORIZONTAL FEET OF THE FLUID PIPELINE.
  - (E) THE VERTICAL SEPARATION SPECIFIED IN SUBSECTIONS (A), (B), AND (C) IS REQUIRED ONLY WHEN THE HORIZONTAL DISTANCE BETWEEN A WATER MAIN AND PIPELINE IS LESS THAN TEN FEET.
  - (F) NEW WATER MAINS SHALL NOT BE INSTALLED WITHIN 100 HORIZONTAL FEET OF THE NEAREST EDGE OF ANY SANITARY LANDFILL, WASTEWATER DISPOSAL POND, OR HAZARDOUS WASTE DISPOSAL SITE, OR WITHIN 25 HORIZONTAL FEET OF THE NEAREST EDGE OF ANY CESSPOOL, SEPTIC TANK, SEWAGE LEACH FIELD, SEEPAGE PIT, UNDERGROUND HAZARDOUS MATERIAL STORAGE TANK, OR GROUNDWATER RECHARGE PROJECT SITE.
  - (G) THE MINIMUM SEPARATION DISTANCES SET FORTH IN THIS SECTION SHALL BE MEASURED FROM THE NEAREST OUTSIDE EDGE OF EACH PIPE BARREL.
  - (H) WITH DEPARTMENT APPROVAL, NEWLY INSTALLED WATER MAINS MAY BE EXEMPT FROM THE SEPARATION DISTANCES IN THIS SECTION, EXCEPT SUBSECTION (F), IF THE NEWLY INSTALLED MAIN IS:
    - 1) LESS THAN 1320 LINEAR FEET,
    - 2) REPLACING AN EXISTING MAIN, INSTALLED IN THE SAME LOCATION, AND HAS A DIAMETER NO GREATER THAN SIX INCHES MORE THAN THE DIAMETER OF THE MAIN IT IS REPLACING, AND
    - 3) INSTALLED IN A MANNER THAT MINIMIZES THE POTENTIAL FOR CONTAMINATION, INCLUDING, BUT NOT LIMITED TO:
      - A. SLEEVING THE NEWLY INSTALLED MAIN, OR
      - B. UTILIZING UPGRADED PIPING MATERIAL (DIP WITH HOT DIP BITUMINOUS COATING OR PVC C900 PIPE-DR 14 WHERE REQUIRED.)

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

**CITY OF ORANGE WATER DIVISION STANDARDS**

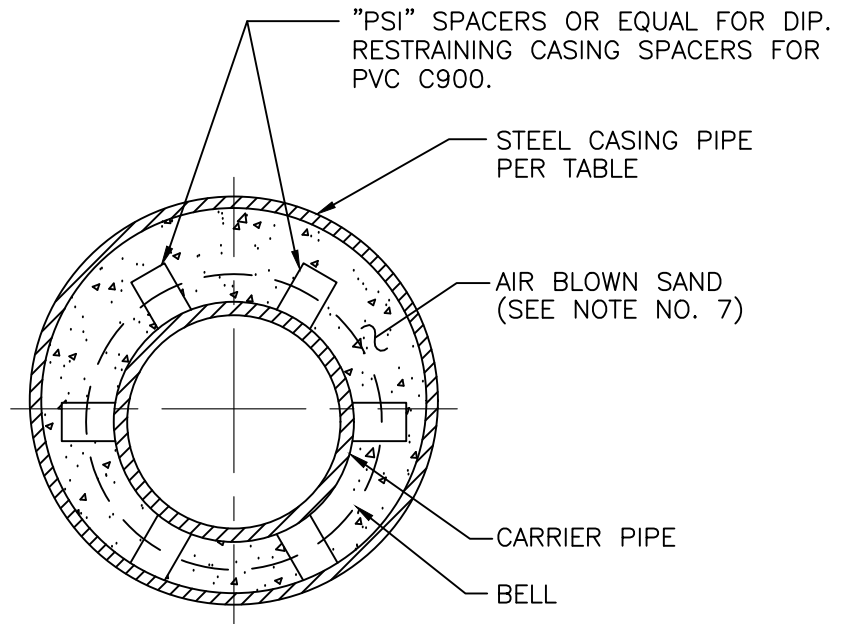
**SEPARATION OF WATERMAINS, SANITARY SEWERS  
AND STORM DRAINS**

OWD STD. DWG.

**OWD-113**

SHEET 3 OF 3

PIPE SIZE	MIN. CASING SIZE	MIN. WALL THICKNESS
6"	16" I.D.	1/4"
8"	18" I.D.	1/4"
10"	21" I.D.	5/16"
12"	24" O.D.	5/16"



CROSS SECTION

NOTES:

1. CASING SHALL BE INSTALLED BY THE BORE, JACK AND/OR TUNNEL METHOD.
2. "PSI" SPACERS MODEL C8G-2 OR APPROVED EQUAL SHALL BE PROVIDED PER MANUFACTURER'S RECOMMENDATIONS FOR DIP CONSTRUCTION.
3. MINIMUM SIZE AND MINIMUM THICKNESS OF CASING SHALL BE AS SHOWN IN TABLE.
4. ALL CASING SECTIONS TO BE JOINED BY CONTINUOUS WELD.
5. EACH END OF CASING SHALL BE SEALED WITH "LINK SEAL" OR A "PSI" MODEL C END SEAL OR APPROVED EQUAL.
6. ALL PIPE JOINTS WITHIN THE CASING SHALL BE RESTRAINED WITH EBAA IRON RESTRAINER SERIES 1100 MEGALUG FOR DIP OR FORD UFRCS 1390 RESTRAINING CASING SPACER FOR PVC C900 OR APPROVED EQUAL.
7. UNLESS OTHERWISE NOTED ON THE PLANS, THE ANNULAR SPACE WITHIN THE CASING SHALL BE FILLED WITH AIR BLOWN SAND.
8. INSTALLATION RECOMMENDATIONS FOR PVC C900 CONSTRUCTION:  
 EACH PIPE BELL JOINT WITHIN CASING SHALL BE RESTRAINED AND SUPPORTED WITH A FORD METER BOX COMPANY UFRCS 1390 RESTRAINING CASING SPACER. ADDITIONALLY, MANUFACTURER RECOMMENDS A UFRCS 1300 BE INSTALLED EVERY TEN FEET (10') OF THE PIPELINE. FOR 4"-8" CARRIER PIPE, RUNNERS SHALL BE INSTALLED ON TIE ROD EARS AND CLAMPING BOLT PADS. TOTAL OF FOUR (4) ON THE UFRCS 1300 AND EIGHT (8) ON THE UFRCS 1390. FOR 10" AND 12" CARRIER PIPE, RUNNERS SHALL BE INSTALLED ON TIE ROD EARS. TOTAL OF FOUR (4) FOR UFRCS 1300 AND EIGHT (8) FOR UFRCS 1390.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James E. [Signature]* 1/31/2023  
CITY ENGINEER

*[Signature]* 1/31/2023  
PUBLIC WORKS DIRECTOR

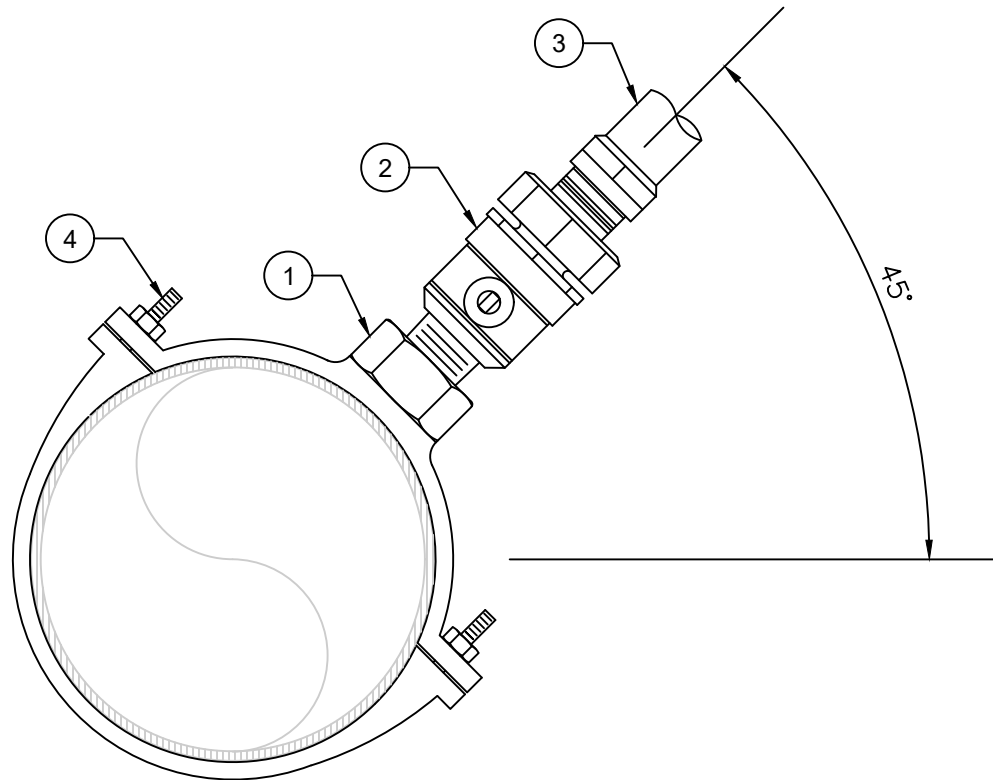
CITY OF ORANGE WATER DIVISION STANDARDS

STEEL CASING PIPE

OWD STD. DWG.

**OWD-114**

SHEET 1 OF 1



**ITEM MATERIALS**

- ① BRASS SERVICE SADDLE, CC/ TAPERED THREAD OUTLET.
- ② BRASS CORPORATION STOP, CC THREAD X COMPRESSION COUPLING.
- ③ COPPER TUBING, TYPE "K" W/ P.E. WRAP.
- ④ TYPE 316 STAINLESS STEEL SADDLE BOLT AND NUTS.

**NOTES:**

1. ALL HOT TAPS SHALL BE PERFORMED PER OWD SPEC. SECTION 306-8.8.4.
2. ALL SERVICE TAPS 2-INCHES AND SMALLER SHALL BE INSTALLED WITH A SERVICE SADDLE PER OWD SPEC. SECTION 212-10.3.3.
3. ALL SERVICE SADDLES FOR DIP SHALL BE BRASS, DOUBLE STRAP, CC THREAD AS MANUFACTURED BY FORD, JONES, MUELLER, OR APPROVED EQUAL.
4. ALL SERVICE SADDLES FOR PVC C900 SHALL BE BRASS, DOUBLE STAINLESS STEEL BAND TYPE, CC THREAD AS MANUFACTURED BY FORD, SMITH-BLAIR, AY MCDONALD, OR APPROVED EQUAL.
5. NON-ACTIVE WATER MAINS NEWLY INSTALLED BY DEVELOPER: 2" AND SMALLER SERVICE TAPS MAY BE INSTALLED UNDER CITY WATER INSPECTOR PER WATER DIVISION APPROVED PLANS AND THE WATER DIVISION STANDARD PLANS AND SPECIFICATIONS.
6. SADDLE NUTS SHALL BE FINISHED WITH TRIPAC 2000 BLUE COATING SYSTEM OR APPROVED EQUAL.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

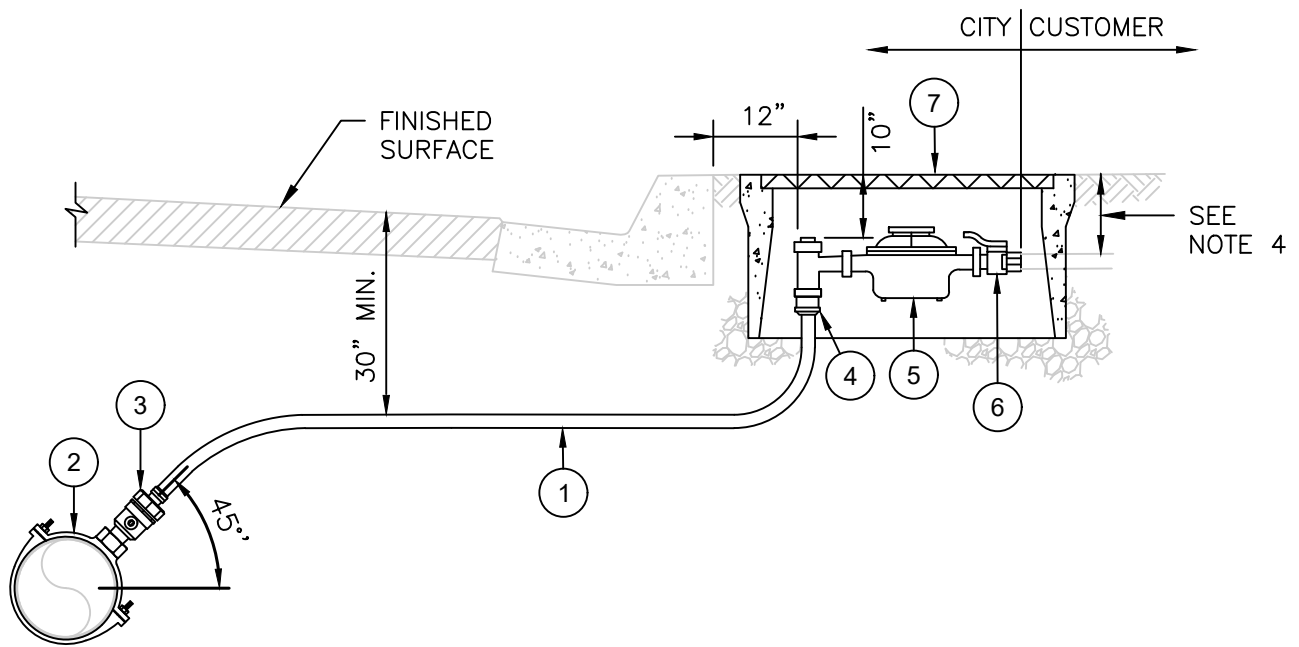
**CITY OF ORANGE WATER DIVISION STANDARDS**

**SERVICE TAP INSTALLATION  
(COPPER TUBING)**

OWD STD. DWG.

**OWD-201**

SHEET 1 OF 1



ITEM	MATERIALS	QTY.
①	3/4" SOFT COPPER TUBING, TYPE "K" W/ P.E. WRAP.	VARIES
②	BRASS SERVICE SADDLE, CC/ TAPERED THREAD OUTLET.	1 EA
③	3/4" CORPORATION STOP, CC THREAD X COMPRESSION COUPLING.	1 EA
④	3/4" ANGLE METER STOP.	1 EA
⑤	5/8" X 3/4" DISC METER (SEE NOTE 2).	1 EA
⑥	3/4" CURB STOP W/ LEVER HANDLE.	1 EA
⑦	METER BOX – PER SPEC. SECTION 212–10.6.1.	1 EA

NOTES:

1. CONNECTION TO WATER MAIN PER STD. OWD–201.
2. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD. OWD–213.
3. SOLDER SHALL BE 5% SILVER SOLDER, HARRIS CO, STAY BRITE, OR APPROVED EQUAL.
4. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE. ELEVATION VARIES. ADJUSTMENT MAY BE NECESSARY.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

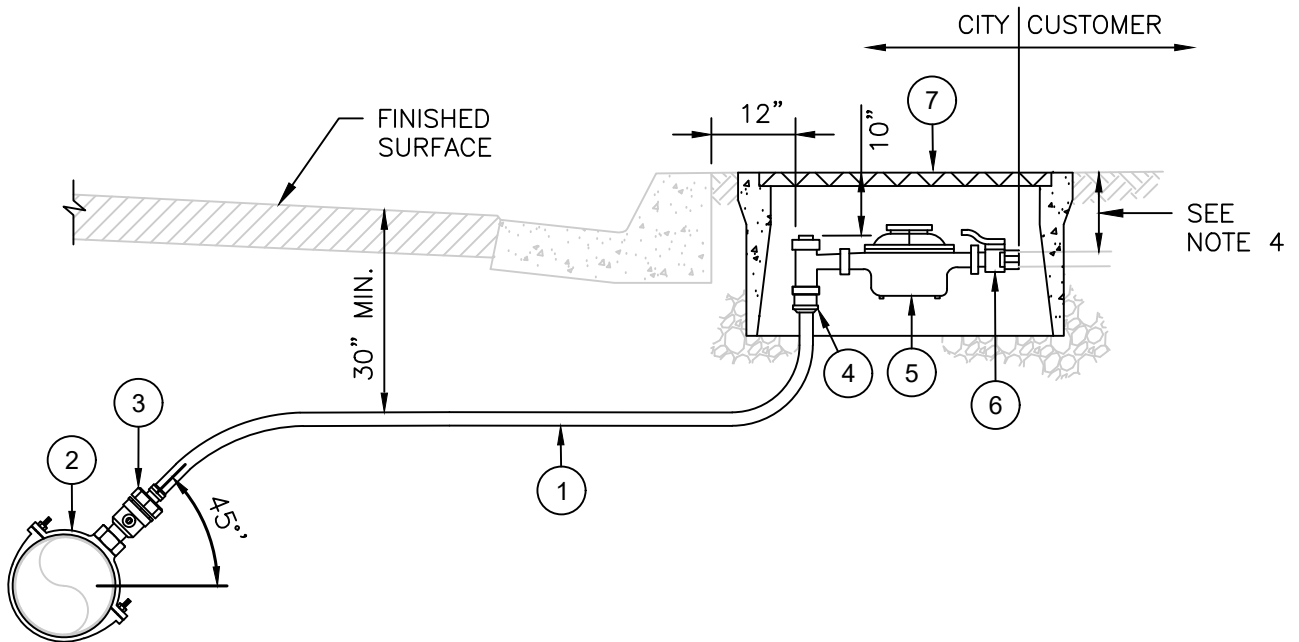
CITY OF ORANGE WATER DIVISION STANDARDS

3/4" SERVICE INSTALLATION  
(COPPER TUBING)

OWD STD. DWG.

OWD-202

SHEET 1 OF 1



ITEM	MATERIALS	QTY.
①	1" SOFT COPPER TUBING, TYPE "K" W/ P.E. WRAP.	VARIABLES
②	BRASS SERVICE SADDLE, CC/ TAPERED THREAD OUTLET.	1 EA
③	1" CORPORATION STOP, CC THREAD X COMPRESSION COUPLING.	1 EA
④	1" ANGLE METER STOP.	1 EA
⑤	1" DISC METER (SEE NOTE 2).	1 EA
⑥	1" CURB STOP W/ LEVER HANDLE.	1 EA
⑦	METER BOX – PER SPEC. SECTION 212–10.6.1.	1 EA

NOTES:

1. CONNECTION TO WATER MAIN PER STD. OWD–201.
2. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD. OWD–213.
3. SOLDER SHALL BE 5% SILVER SOLDER, HARRIS CO, STAY BRITE, OR APPROVED EQUAL.
4. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE. ELEVATION VARIES. ADJUSTMENT MAY BE NECESSARY.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James E. ...* 1/31/2023  
CITY ENGINEER

*...* 1/31/2023  
PUBLIC WORKS DIRECTOR

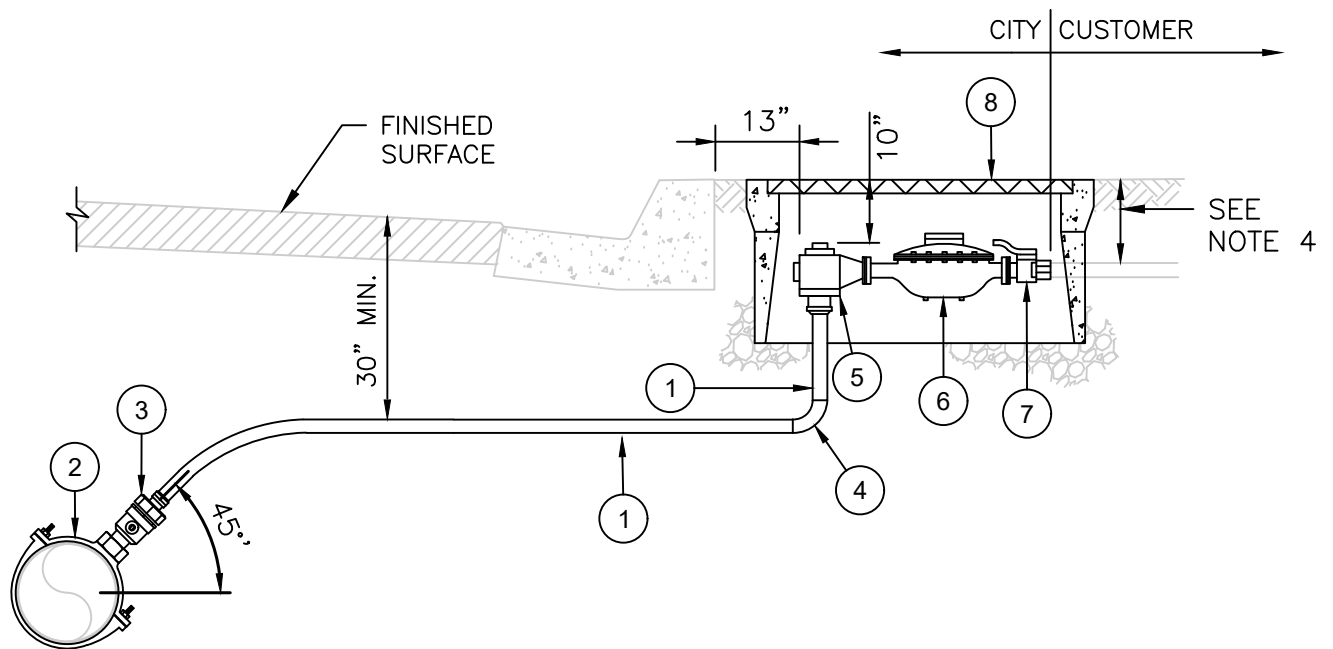
CITY OF ORANGE WATER DIVISION STANDARDS

1" SERVICE INSTALLATION  
(COPPER TUBING)

OWD STD. DWG.

OWD-203

SHEET 1 OF 1



ITEM	MATERIALS	QTY.
①	1-1/2" SOFT COPPER TUBING, TYPE "K" W/ P.E. WRAP.	VARIABLES
②	BRASS SERVICE SADDLE, CC/ TAPERED THREAD OUTLET.	1 EA
③	1-1/2" CORPORATION STOP, CC THREAD X COMPRESSION COUPLING.	1 EA
④	1-1/2" COPPER 90° ELL, SWEAT X SWEAT.	1 EA
⑤	1-1/2" ANGLE METER STOP.	1 EA
⑥	1-1/2" DISC METER (SEE NOTE 2).	1 EA
⑦	1-1/2" CURB STOP W/ LEVER HANDLE.	1 EA
⑧	METER BOX - PER SPEC. SECTION 212-10.6.1.	1 EA

**NOTES:**

1. CONNECTION TO WATER MAIN PER STD. OWD-201.
2. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD. OWD-213.
3. SOLDER SHALL BE 5% SILVER SOLDER, HARRIS CO, STAY BRITE, OR APPROVED EQUAL.
4. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE. ELEVATION VARIES. ADJUSTMENT MAY BE NECESSARY.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

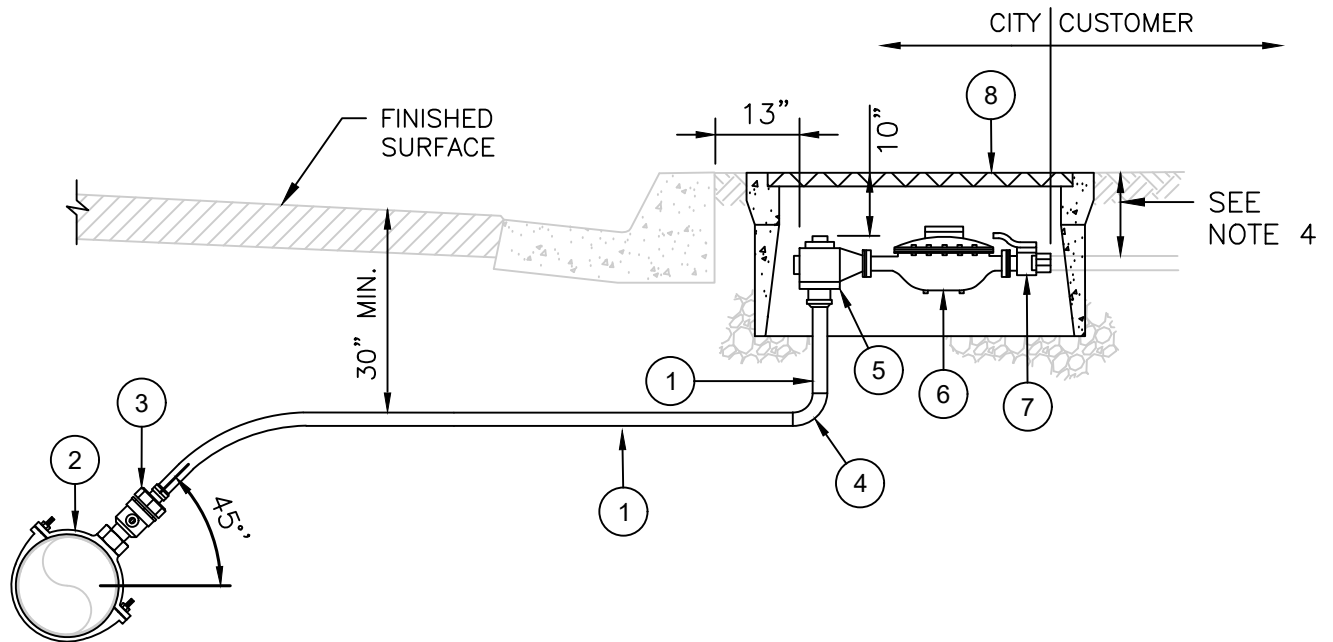
**CITY OF ORANGE WATER DIVISION STANDARDS**

**1-1/2" SERVICE INSTALLATION  
(COPPER TUBING)**

OWD STD. DWG.

**OWD-204**

SHEET 1 OF 1



ITEM	MATERIALS	QTY.
①	2" SOFT COPPER TUBING, TYPE "K" W/ P.E. WRAP.	VARIABLES
②	BRASS SERVICE SADDLE, CC/ TAPERED THREAD OUTLET.	1 EA
③	2" CORPORATION STOP, CC THREAD X COMPRESSION COUPLING.	1 EA
④	2" COPPER 90° ELL, SWEAT X SWEAT.	1 EA
⑤	2" ANGLE METER STOP.	1 EA
⑥	2" DISC METER (SEE NOTE 2).	1 EA
⑦	2" CURB STOP W/ LEVER HANDLE.	1 EA
⑧	METER BOX – PER SPEC. SECTION 212–10.6.1.	1 EA

**NOTES:**

1. CONNECTION TO WATER MAIN PER STD. OWD–201.
2. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD. OWD–213.
3. SOLDER SHALL BE 5% SILVER SOLDER, HARRIS CO, STAY BRITE, OR APPROVED EQUAL.
4. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE. ELEVATION VARIES. ADJUSTMENT MAY BE NECESSARY.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

**CITY OF ORANGE WATER DIVISION STANDARDS**

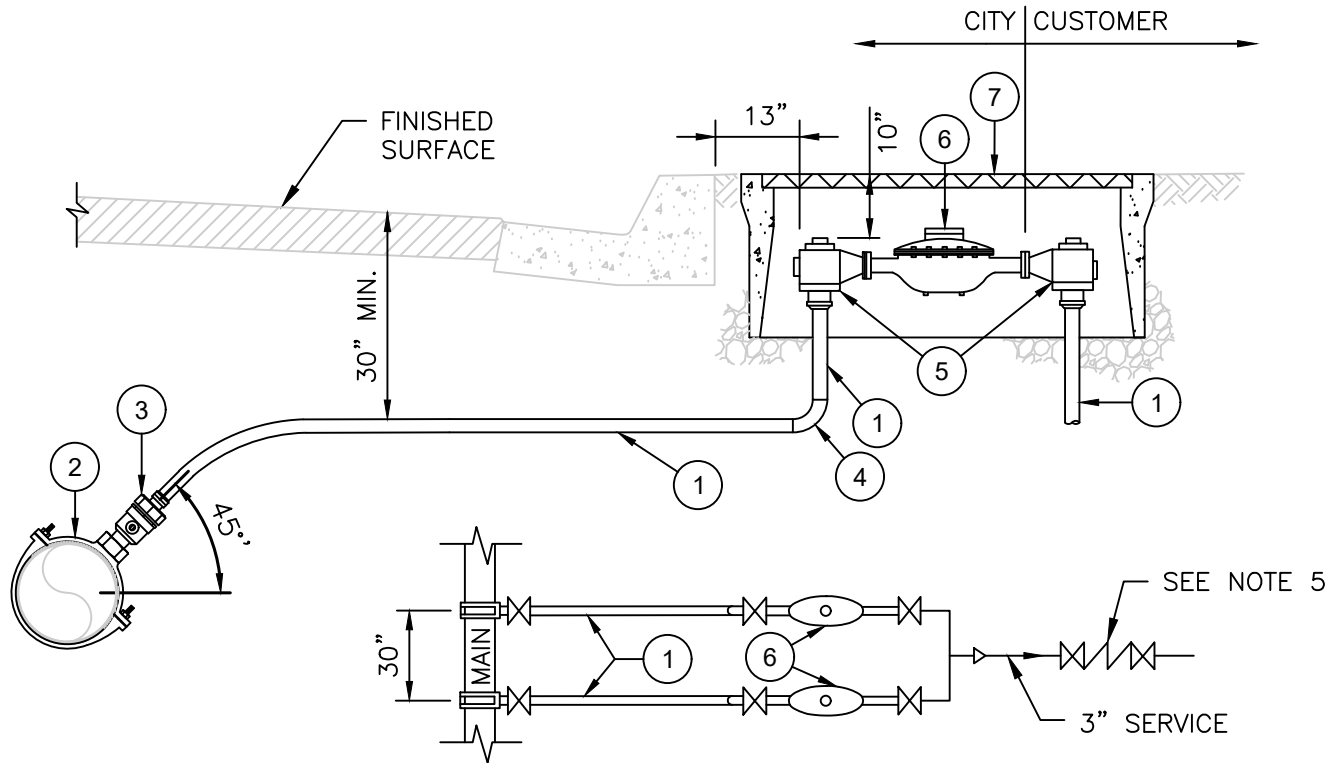
**2" SERVICE INSTALLATION  
(COPPER TUBING)**

OWD STD. DWG.

**OWD-205**

SHEET 1 OF 1





ITEM	MATERIALS	QTY.
①	2" SOFT COPPER TUBING, TYPE "K" W/ P.E. WRAP.	VARIABLES
②	BRASS SERVICE SADDLE, CC/ TAPERED THREAD OUTLET.	2 EA
③	2" CORPORATION STOP, CC THREAD X COMPRESSION COUPLING.	2 EA
④	2" COPPER 90° ELL, SWEAT X SWEAT.	2 EA
⑤	2" ANGLE METER STOP.	4 EA
⑥	2" DISC METER (SEE NOTE 2).	2 EA
⑦	METER BOX – PER SPEC. SECTION 212-10.6.1.	2 EA

**NOTES:**

1. CONNECTION TO WATER MAIN PER STD. OWD-201.
2. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD. OWD-213.
3. SOLDER SHALL BE 5% SILVER SOLDER, HARRIS CO, STAY BRITE, OR APPROVED EQUAL.
4. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE. ELEVATION VARIES. ADJUSTMENT MAY BE NECESSARY.
5. BACKFLOW PREVENTION DEVICE ASSEMBLY PER STD. OWD-305.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

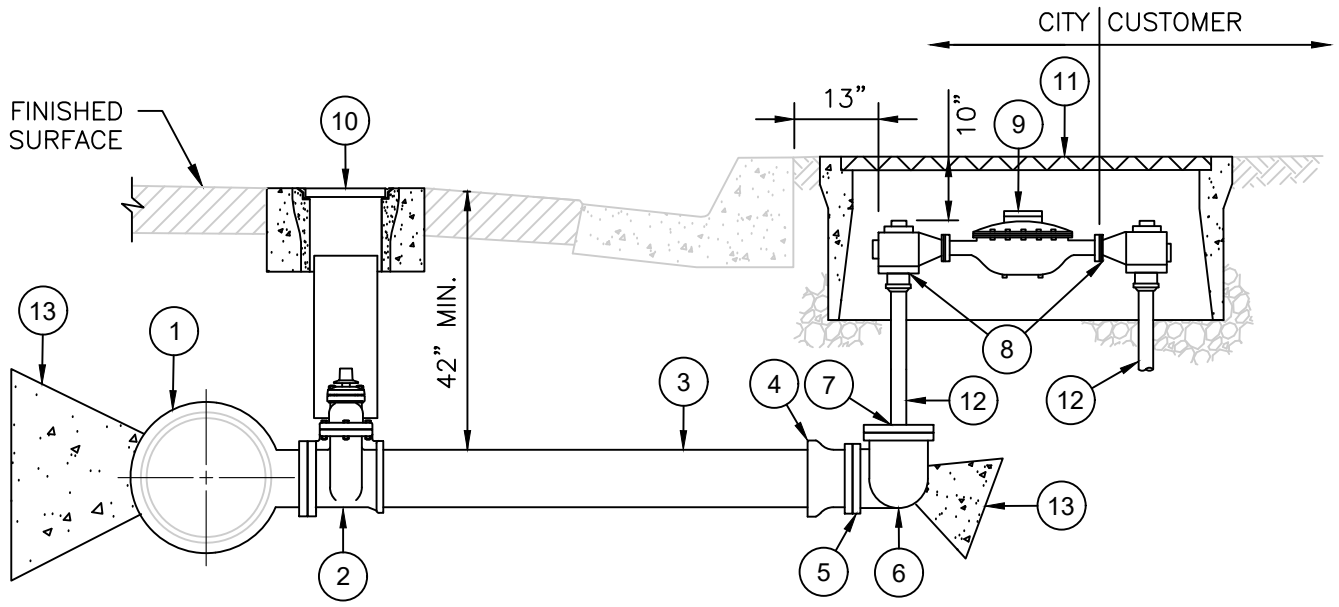
**CITY OF ORANGE WATER DIVISION STANDARDS**

**3" SERVICE INSTALLATION  
(COPPER TUBING)**

OWD STD. DWG.

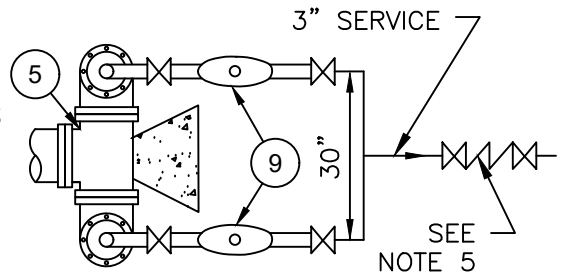
**OWD-206**

SHEET 1 OF 1



**ITEM MATERIALS**

ITEM	MATERIALS	QTY.
①	DI TEE, MAIN SIZE X 4" (MJ X FLG. OUTLET).	1 EA
②	4 RW GATE VALVE, FLG. X MJ.	1 EA
③	DIP OR C-900 PVC WHERE REQUIRED.	VARIABLES
④	4" MJ X FLG. ADAPTER.	1 EA
⑤	4" X 4" FLG. X FLG. TEE.	1 EA
⑥	4" 90° ELL, FLG. X FLG.	2 EA
⑦	4" BLIND FLANGE W/ 2" TAP.	2 EA
⑧	2" ANGLE METER STOP.	4 EA
⑨	2" DISC METER (SEE NOTE 2).	2 EA
⑩	VALVE BOX PER STD. OWD -101.	1 EA
⑪	METER BOX PER SPEC. SECTION 212-10.6.1.	2 EA
⑫	2" SOFT COPPER TUBING, TYPE "K" W/ P.E. WRAP.	VARIABLES
⑬	THRUST BLOCK PER STD. OWD-109.	VARIABLES



**NOTES:**

1. CONNECTION TO WATER MAIN PER STD. OWD-108. HOT TAP CONNECTION MAY BE REQUIRED AS DETERMINED BY OWD.
2. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD. OWD-213.
3. HARDWARE USE ON FLANGED FITTINGS PER OWD SPEC. SECTION 212-2. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE. ELEVATION VARIES. ADJUSTMENT MAY BE NECESSARY.
4. BACKFLOW PREVENTION DEVICE ASSEMBLY PER STD. OWD-305.
5. ALL MECHANICAL JOINTS SHALL BE THRUST BLOCKED AND RESTRAINED WITH MECHANICAL JOINT RESTRAINTS.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James E. ...* 1/31/2023  
CITY ENGINEER

*...* 1/31/2023  
PUBLIC WORKS DIRECTOR

**CITY OF ORANGE WATER DIVISION STANDARDS**

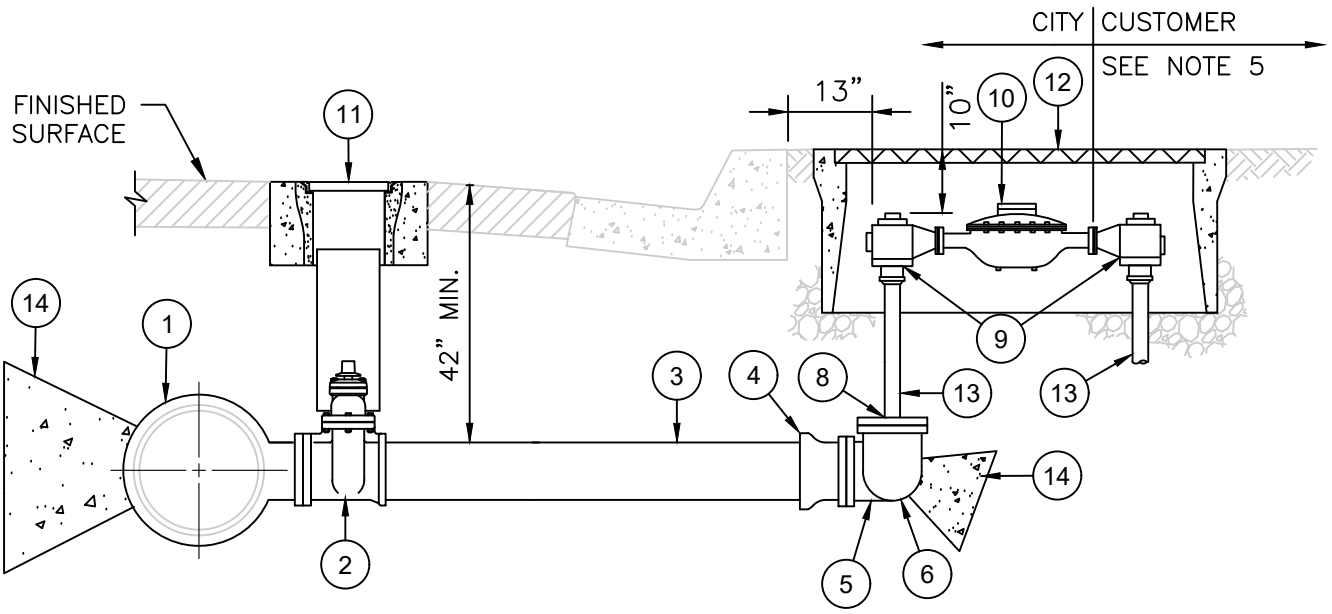
**3" SERVICE INSTALLATION**

**LONG SIDE (DUCTILE IRON LATERAL)**

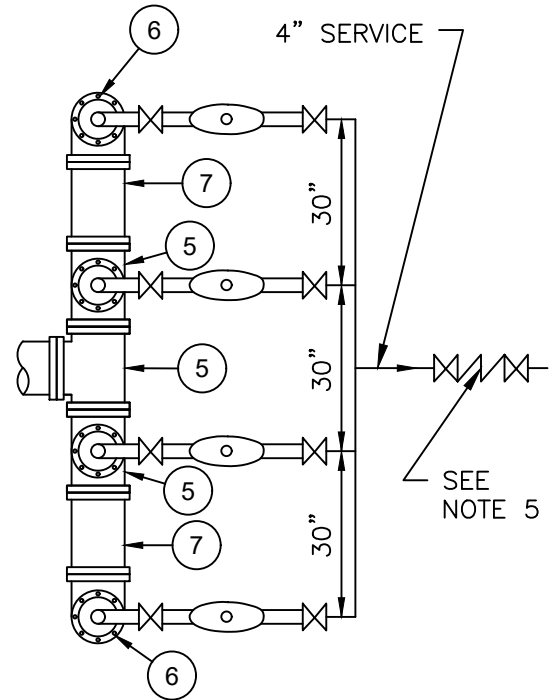
OWD STD. DWG.

**OWD-207**

SHEET 1 OF 1



ITEM	MATERIALS	QTY.
①	DI TEE, MAIN SIZE X 4" (MJ X FLG. OUTLET).	1 EA
②	4 RW GATE VALVE, FLG. X MJ.	1 EA
③	DIP OR C-900 PVC WHERE REQUIRED.	VARIES
④	4" MJ X FLG. ADAPTER.	1 EA
⑤	4" X 4" FLG. X FLG. TEE	3 EA
⑥	4" 90° ELL, FLG. X FLG.	2 EA
⑦	4" DIP SPOOL, FLG. X FLG.	VARIES
⑧	4" BLIND FLANGE W/ 2" TAP.	4 EA
⑨	2" ANGLE METER STOP.	8 EA
⑩	2" DISC METER (SEE NOTE 2)	4 EA
⑪	VALVE BOX PER OWD -101	1 EA
⑫	METER BOX PER SPEC. SECTION 212-10.6.1.	4 EA
⑬	2" SOFT COPPER TUBING, TYPE K W/ P.E. WRAP.	VARIES
⑭	THRUST BLOCK PER STD. OWD-109.	VARIES



**NOTES:**

1. CONNECTION TO WATER MAIN PER STD. OWD-108. HOT TAP CONNECTION MAY BE REQUIRED AS DETERMINED BY OWD.
2. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD. OWD-213.
3. HARDWARE USE ON FLANGED FITTINGS PER OWD SPEC. SECTION 212-2.5.1
4. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE.
5. BACKFLOW PREVENTION DEVICE ASSEMBLY PER STD. OWD-305.
6. ALL MECHANICAL JOINTS SHALL BE THRUST BLOCKED AND RESTRAINED WITH MECHANICAL JOINT RESTRAINTS.

*David D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B. [Signature]* 1/31/2023  
CITY ENGINEER

*[Signature]* 1/31/2023  
PUBLIC WORKS DIRECTOR

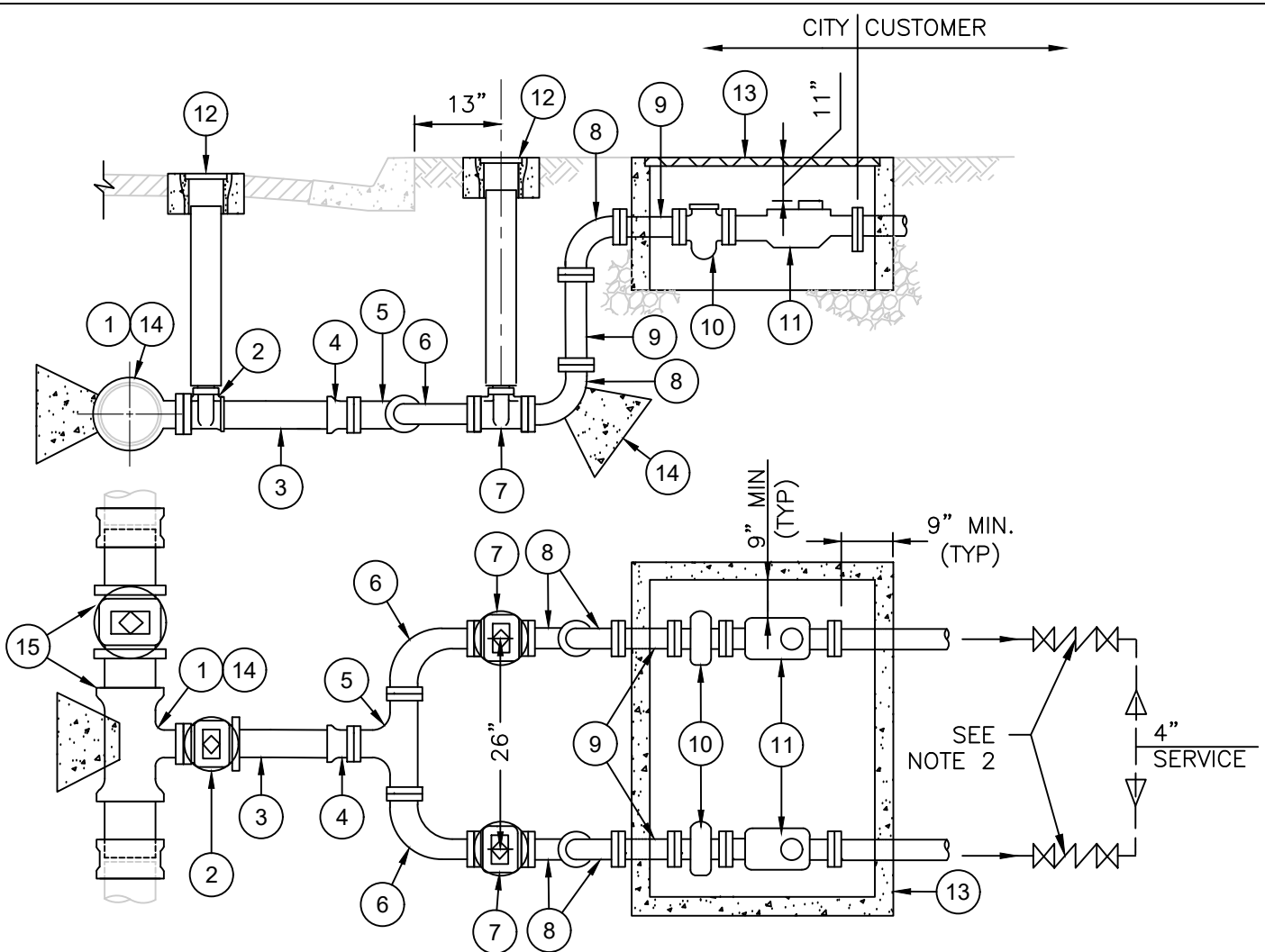
**CITY OF ORANGE WATER DIVISION STANDARDS**

**4" SERVICE INSTALLATION  
DUCTILE IRON LATERAL - (4) 2" METERS**

OWD STD. DWG.

**OWD-208**

SHEET 1 OF 1



ITEM	MATERIALS	QTY.	ITEM	MATERIALS	QTY.
①	DI TEE, MAIN X 4" (MJ X FLG. OUTLET)	1 EA	⑨	3" DIP SPOOL, FLG. X FLG.	VARIES
②	4" RW GATE VALVE, FLG. X MJ.	1 EA	⑩	3" BRASS STRAINER.	2 EA
③	DIP OR C-900 PVC WHERE REQUIRED.	VARIES	⑪	3" COMPOUND METER W/ REMOTE READ.	2 EA
④	4" MJ X FLG. ADAPTER.	1 EA	⑫	VALVE BOX PER OWD-101.	3 EA
⑤	DI TEE, 4" X 4", FLG. X FLG.	1 EA	⑬	CONC. VAULT PER SPEC. SECTION 212-10.6.3.	1 EA
⑥	4" X 3" REDUCING 90° ELL, FLG. X FLG.	2 EA	⑭	THRUST BLOCK PER STD. OWD-109.	VARIES
⑦	3" RW GATE VALVE, FLG. X FLG.	2 EA	⑮	CUT-IN TEE AND VALVE PER STD. OWD-108.	VARIES
⑧	3" DI 90° ELL, FLG. X FLG.	4 EA			

**NOTES:**

1. CONNECTION TO WATER MAIN PER STD. OWD-108. HOT TAP CONNECTION MAY BE REQUIRED AS DETERMINED BY OWD.
2. BACKFLOW PREVENTION DEVICE ASSEMBLY PER STD. OWD-305.
3. ALL MECHANICAL JOINTS SHALL BE THRUST BLOCKED AND RESTRAINED WITH MECHANICAL JOINT RESTRAINTS.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

**CITY OF ORANGE WATER DIVISION STANDARDS**

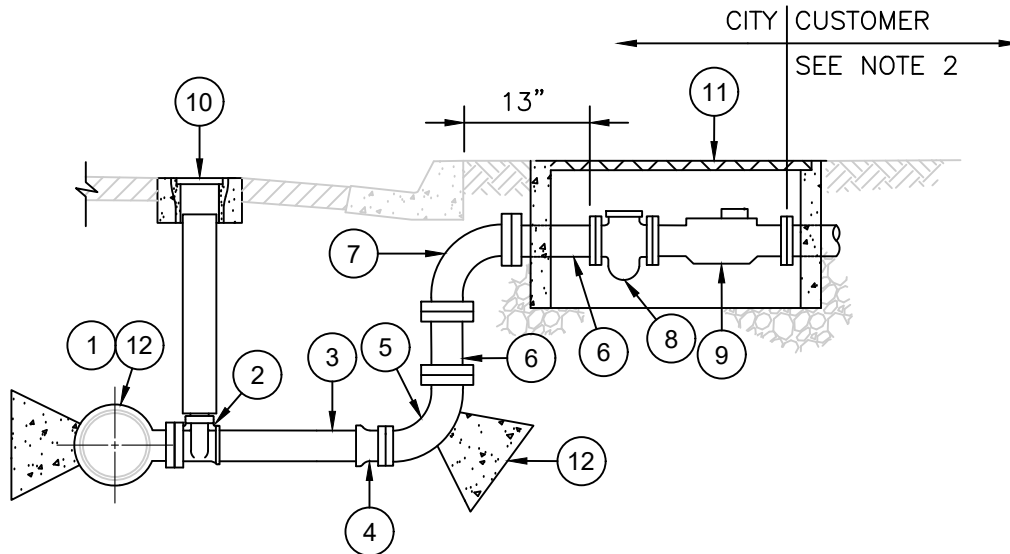
**4" SERVICE INSTALLATION**

**DUCTILE IRON LATERAL - (2) 3" METERS**

OWD STD. DWG.

**OWD-209**

SHEET 1 OF 1

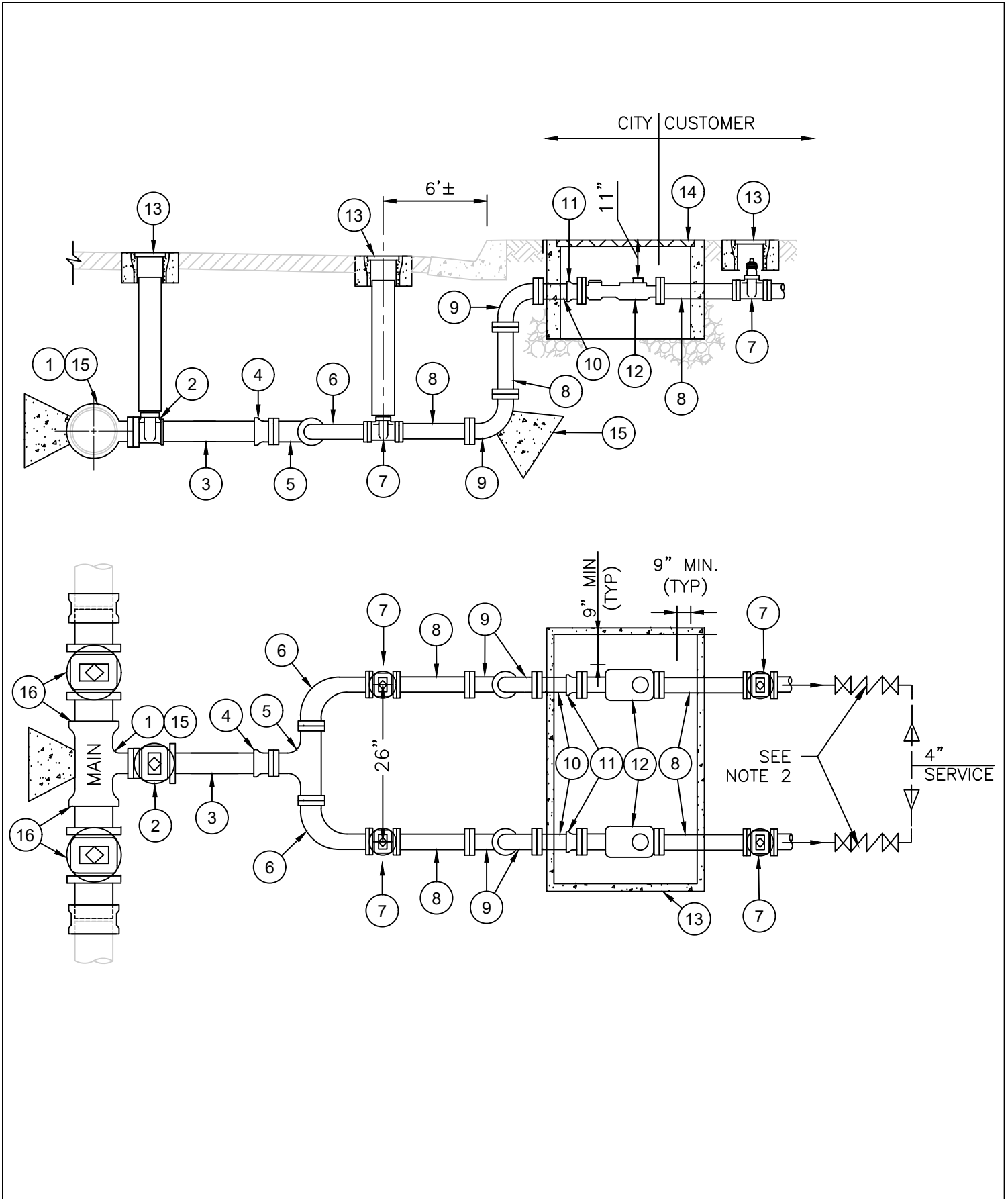


ITEM	MATERIALS	QTY.
①	DI TEE, MAIN SIZE X 4" (MJ X FLG. OUTLET).	1 EA
②	4" RW GATE VALVE, FLG. X MJ.	1 EA
③	4" DIP OR C-900 PVC WHERE REQUIRED.	VARIES
④	4" MJ X FLG. ADAPTER.	1 EA
⑤	*4" x 3" REDUCER 90° ELL, OR 4" 90° ELL, FLG. X FLG.	1 EA
⑥	*3" OR 4" DIP SPOOL, FLG. X FLG.	VARIES
⑦	*3" OR 4" 90° ELL, FLG. X FLG.	1 EA
⑧	*3" OR 4" BRASS STRAINER.	1 EA
⑨	*3" OR 4" TURBINE METER (RADIO READ R900i W/ ANTENNA).	1 EA
⑩	VALVE BOX PER OWD-101.	1 EA
⑪	CONC. VAULT PER SPEC. SECTION 212-10.6.3.	1 EA
⑫	THRUST BLOCK PER STD. OWD-109.	VARIES

**NOTES:**

- \* THE SMALLER SIZE SHOWN CORRESPONDS TO THE 3" SERVICE.  
THE LARGER SIZE CORRESPONDS TO THE 4" SERVICE.
- 1. CONNECTION TO WATER MAIN PER STD. OWD-108. HOT TAP CONNECTION MAY BE REQUIRED AS DETERMINED BY OWD.
- 2. BACKFLOW PREVENTION DEVICE ASSEMBLY PER STD. OWD-305
- 3. ALL MECHANICAL JOINTS SHALL BE THRUST BLOCKED AND RESTRAINED WITH MECHANICAL JOINT RESTRAINTS.

<p><i>David Dief</i> 1/31/2023 CITY WATER MANAGER</p> <p><i>James</i> 1/31/2023 CITY ENGINEER</p> <p><i>John</i> 1/31/2023 PUBLIC WORKS DIRECTOR</p>	<p><b>CITY OF ORANGE WATER DIVISION STANDARDS</b></p> <p><b>3" &amp; 4" IRRIGATION SERVICE INSTALLATION</b></p>	<p>OWD STD. DWG.</p> <p><b>OWD-210</b></p> <p>SHEET 1 OF 1</p>
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*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

6" & 8" SERVICE INSTALLATION

OWD STD. DWG.

**OWD-211**

SHEET 1 OF 2

<u>ITEM</u>	<u>MATERIALS</u>	<u>QTY.</u>
①	DI TEE, MAIN SIZE X 8" (MJ X FLG. OUTLET).	1 EA
②	8" RW GATE VALVE, FLG. X MJ.	1 EA
③	8" DIP OR C-900 PVC WHERE REQUIRED.	VARIES
④	8" MJ X FLG. ADAPTER.	1 EA
⑤	DI TEE, 8" X 8", FLG. X FLG.	1 EA
⑥	*8" X 4" OR 8" X 6", REDUCING 90° ELL, FLG. X FLG.	2 EA
⑦	*4" OR 6" RW GATE VALVE, FLG. X FLG.	4 EA
⑧	*4" OR 6" D.I. PIPE SPOOL, FLG. X FLG.	VARIES
⑨	*4" OR 6" 90° ELL, FLG. X FLG.	4 EA
⑩	*4" OR 6" D.I. PIPE SPOOL, FLG. X PE.	VARIES
⑪	*4" OR 6" D.I. COUPLING ADAPTER, MJ X FLG.	2 EA
⑫	*4" OR 6" COMPOUND METER W/ REMOTE READ	2 EA
⑬	VALVE BOX & EXTENSION PIPE PER OWD-101	5 EA
⑭	CONC. VAULT AND STEEL OR ALUMINUM TRAFFIC RATED LID	1 EA
⑮	THRUST BLOCK PER STD. OWD-109	VARIES
⑯	CUT-IN TEE AND VALVES PER STD. OWD-108.	VARIES

NOTES:

- \* THE SMALLER SIZE SHOWN CORRESPONDS TO 6" SERVICE.  
THE LARGER SIZE CORRESPONDS TO 8" SERVICE.
- 1. SPOOL LENGTH UPSTREAM AND DOWNSTREAM OF METER SHALL BE MINIMUM 4 PIPE DIAMETERS.
- 2. CONTRACTOR TO VERIFY CURRENT MANUFACTURER'S INFORMATION FOR METER LENGTH.
- 3. METERS, NUMBER AND LOCATION OF MAIN VALVES DETERMINED BY OWD.
- 4. CONNECTION TO WATER MAIN PER STD. OWD-108. HOT TAP CONNECTION MAY BE REQUIRED AS DETERMINED BY OWD.
- 5. BACKFLOW PREVENTION DEVICE ASSEMBLY PER STD. OWD-305.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

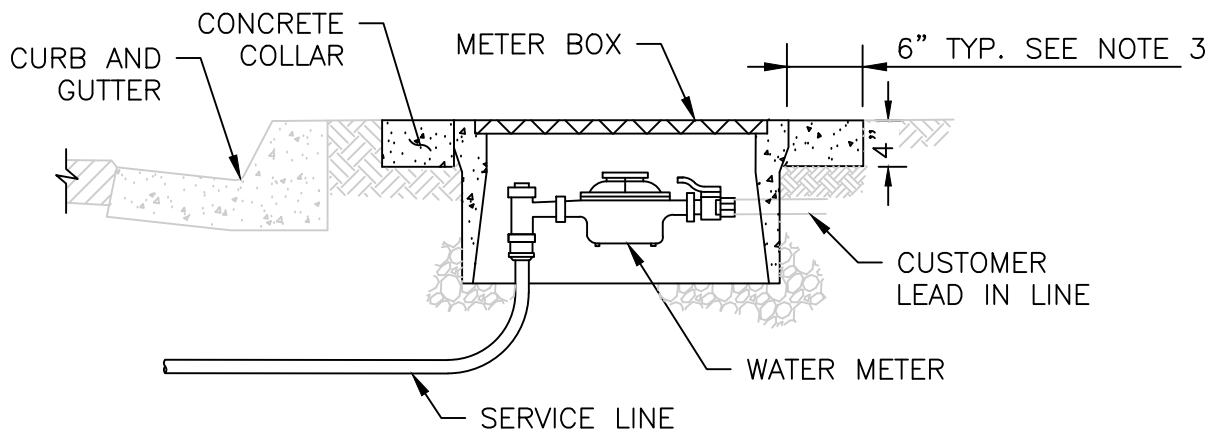
CITY OF ORANGE WATER DIVISION STANDARDS

8" & 6" SERVICE INSTALLATION

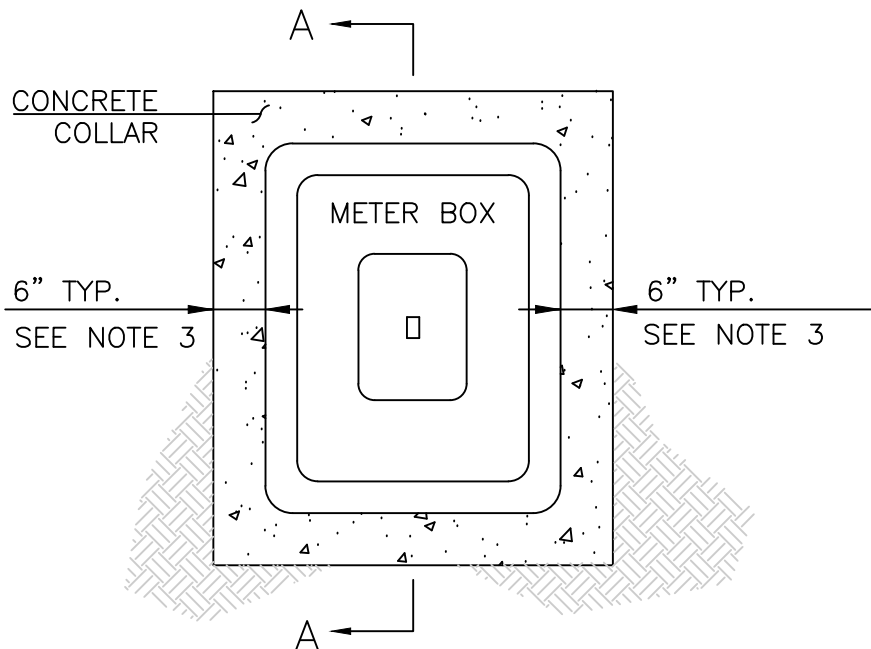
OWD STD. DWG.

**OWD-211**

SHEET 2 OF 2



SECTION A - A



NOTES:

1. METER BOX WILL BE RAISED TO THE SAME ELEVATION AS THE TOP OF THE CURB BY THE DEVELOPER.
2. THE CONCRETE SHALL BE CLASS 520-C-2500 CONTAINING NOT LESS THAN FIVE SACKS PER CUBIC YARD.
3. THE WIDTH OF CONCRETE COLLAR WILL BE REDUCED TO 2" FOR 3" AND 4" SERVICE WITH MULTIPLE METERS, INSTALL METER BOXES 2" APART.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

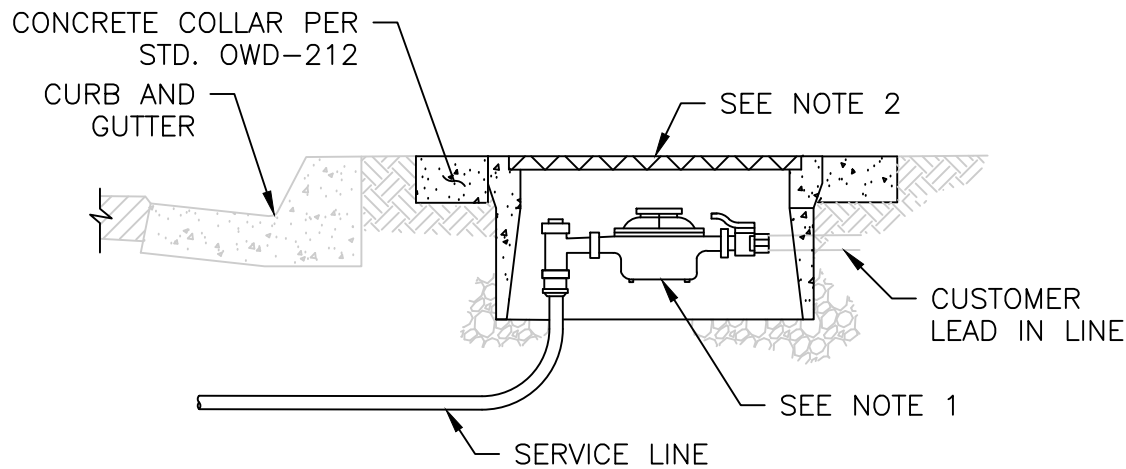
METER BOX INSTALLATION IN LANDSCAPED AREA

OWD STD. DWG.

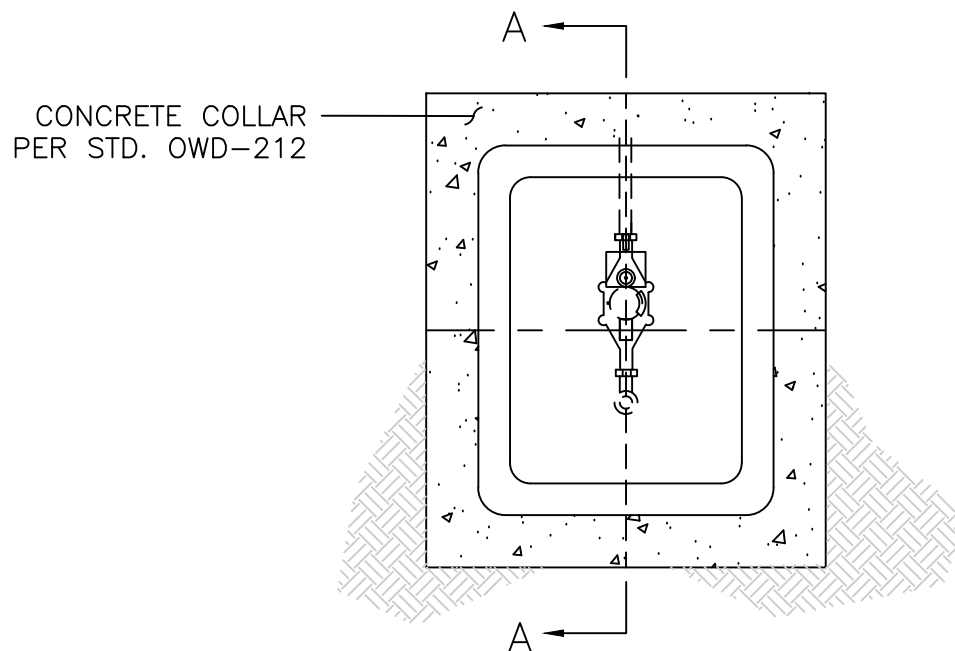
OWD-212

SHEET 1 OF 1





SECTION A - A



NOTES:

1. MACH 10 ULTRASONIC METER WITH R900i REGISTER - PIT VERSION BY NEPTUNE.
2. PROVIDE METER BOX AND COVERS WITH AMR/AMI TOP MOUNT PER SPEC. SECTION 212-10.6.1.
3. A UNION STYLE COUPLING IS REQUIRED ON BOTH SIDES OF THE METER SO THAT THE METER CAN BE REMOVED AND REPLACED WITHOUT DISTURBING THE SERVICE LINE OR THE CUSTOMER LEAD IN LINE.
4. CONTRACTOR/CUSTOMER IS RESPONSIBLE FOR CONNECTION SERVICE TO THE CUSTOMER SIDE.

*Scott D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B. [Signature]* 1/31/2023  
CITY ENGINEER

*[Signature]* 1/31/2023  
PUBLIC WORKS DIRECTOR

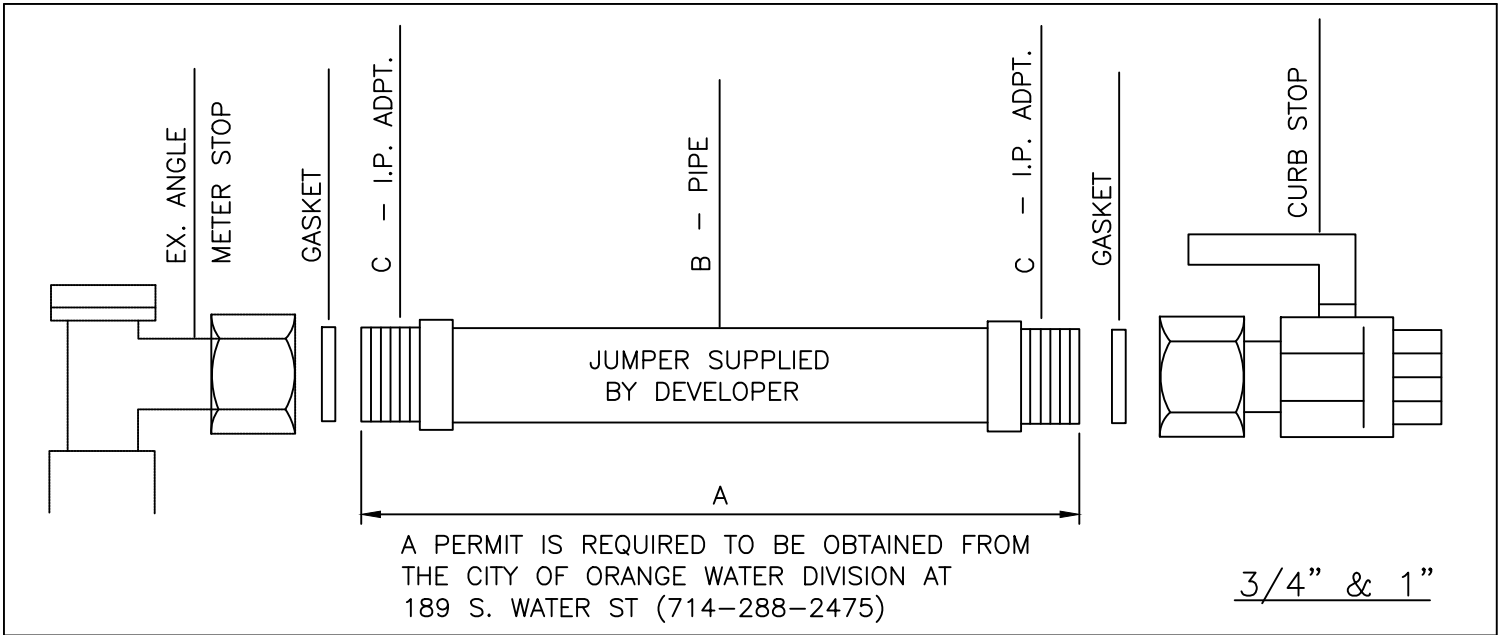
CITY OF ORANGE WATER DIVISION STANDARDS

RADIO READ METER

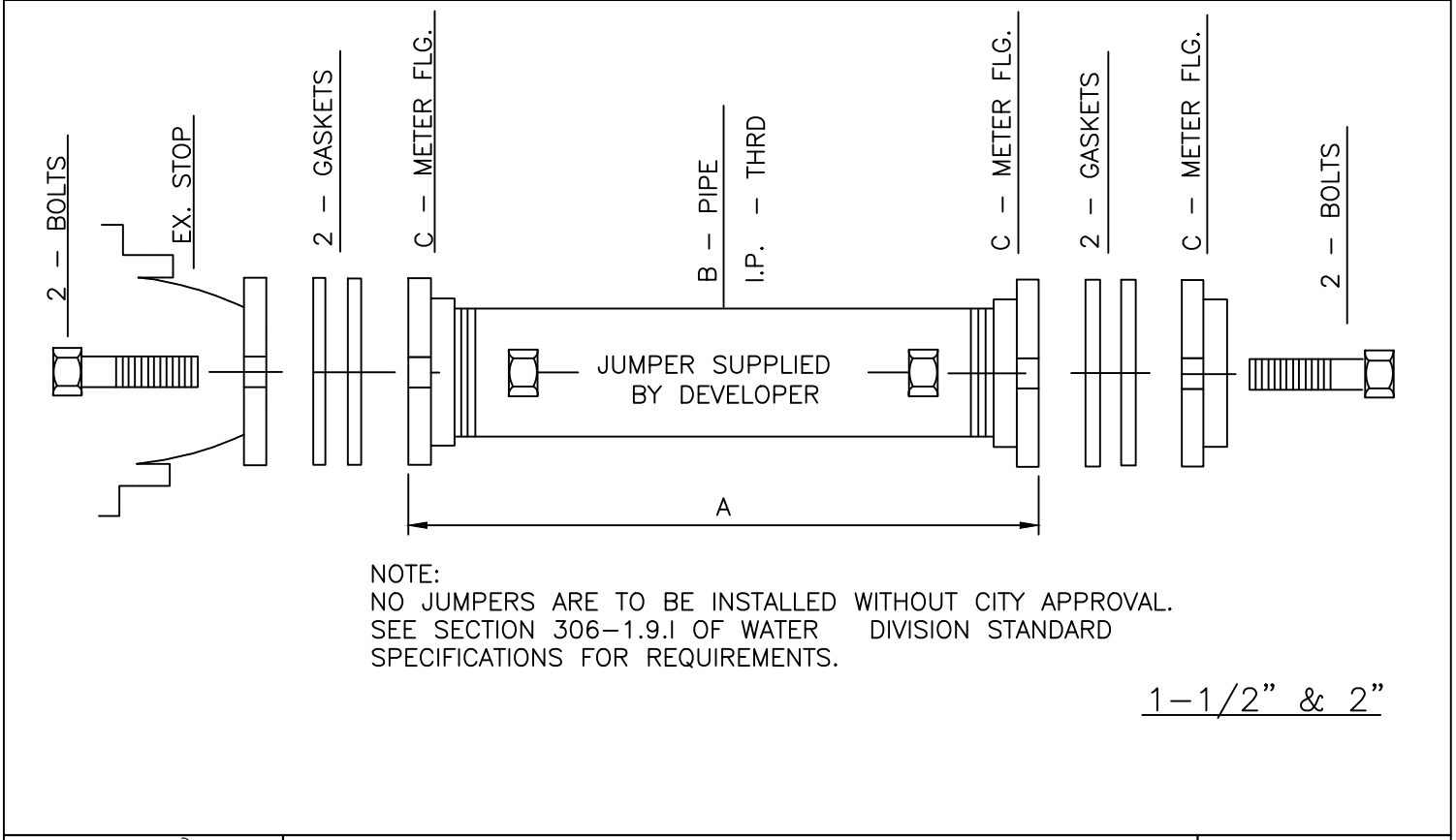
OWD STD. DWG.

OWD-213

SHEET 1 OF 1



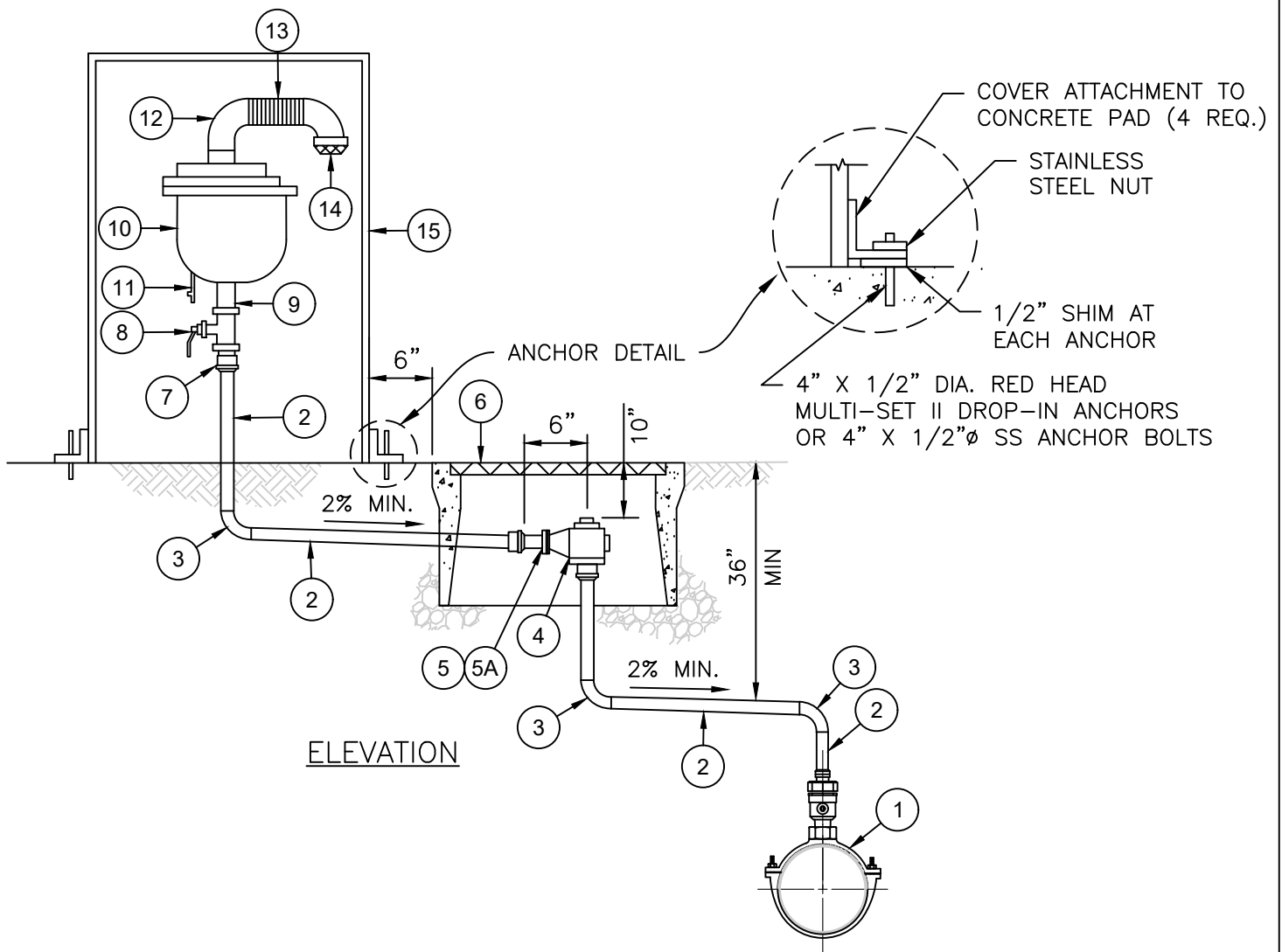
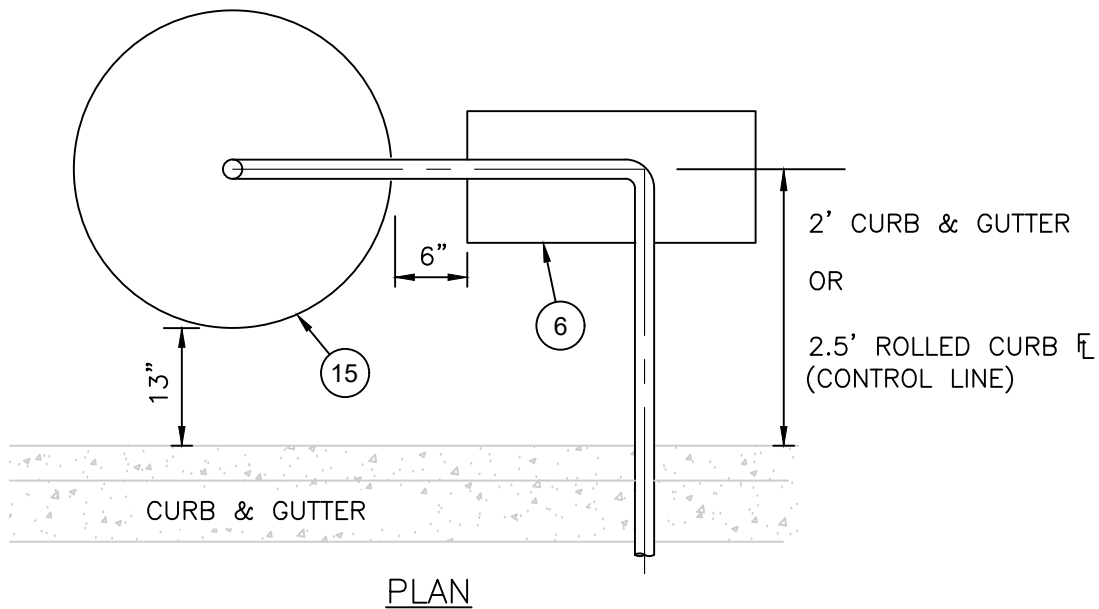
JUMPER TO BE SUPPLIED BY DEVELOPER.	METER SIZE	A	B	C
	3/4"	7 3/4"	1" DIA.	1"
1"	10 3/4"	1 1/4" DIA.	1 1/4"	
1 1/2"	13"	2" DIA.	2"	
2"	17"	2" DIA.	2"	



*David D. Dief* 1/31/2023  
 CITY WATER MANAGER  
*James B.* 1/31/2023  
 CITY ENGINEER  
*John A.* 1/31/2023  
 PUBLIC WORKS DIRECTOR

**CITY OF ORANGE WATER DIVISION STANDARDS**  
**JUMPER INSTALLATION**

OWD STD. DWG.  
**OWD-301**  
 SHEET 1 OF 1



*David Siof* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*Chad* 1/31/2023  
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

AIR AND VACUUM VALVE ASSEMBLY

OWD STD. DWG.

OWD-302

SHEET 1 OF 2

ITEM    MATERIALS

- ① 1" OR 2" SERVICE CONNECTION PER STD. OWD-201.
- ② RIGID COPPER TUBING, TYPE "K" W/ P.E. WRAP.
- ③ 1" OR 2" 90° COPPER ELL, SWEAT X SWEAT.
- ④ 1" OR 2" ANGLE METER STOP.
- ⑤ 1" SWEAT X M.I.P.
- ⑤A 2" METER FLANGE, 2" BRASS NIPPLE, 2" SWEAT X F.I.P COUPLING.
- ⑥ 1" METER BOX – PER SPEC. SECTION 212-10.6.1.
- ⑦ 1" OR 2" M.I.P. X COMPRESSION ADAPTER.
- ⑧ 1" OR 2" BRASS BALL VALVE W/ LEVER HANDLE JONES J-1900W AND J-2815 OR EQUAL.
- ⑨ 1" OR 2" BRASS CLOSE NIPPLE.
- ⑩ 1" OR 2" AIR & VACUUM VALVE PER SPEC. SECTION 212-5.6.2.
- ⑪ 1/2" TEST DRAIN VALVE 1/2" I.P. x 3/4" LONG CLOSE NIPPLE
- ⑫ SCH 80 90° STREET ELL.
- ⑬ SCH 80 PVC SHORT NIPPLE.
- ⑭ SCH 80 PVC 90° ELL W/ SCREEN.
- ⑮ 18" DIA. X 30" (HIGH) LINEAR LOW DENSITY POLYETHYLENE ENCLOSURE AS MANUFACTURED BY PIPELINE PRODUCTS ADVANTAGE SERIES; TAN; PART NO. VCAS-1830-TN) OR APPROVED EQUAL.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

**CITY OF ORANGE WATER DIVISION STANDARDS**

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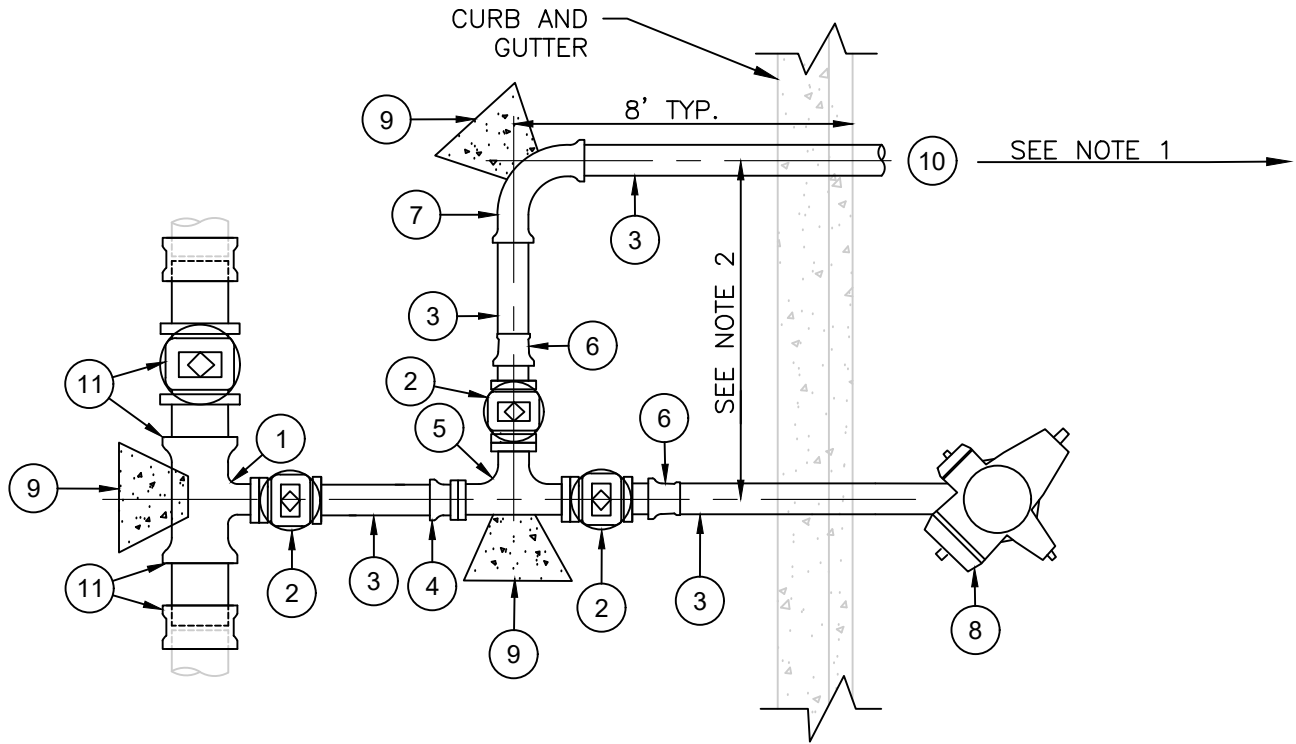
**AIR AND VACUUM VALVE ASSEMBLY**

OWD STD. DWG.

**OWD-302**

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SHEET 2 OF 2



ITEM	MATERIALS	QTY.
①	DI TEE, MAIN SIZE X LATERAL SIZE, MJ X FLG. OUTLET.	1 EA
②	RW GATE VALVE (SIZE VARIES), FLG. X MJ.	3 EA
③	DIP OR C-900 PVC WHERE REQUIRED (SIZE VARIES).	VARIES
④	MJ X FLG. ADAPTER (SIZE VARIES).	1 EA
⑤	DI TEE, FLG. (SIZE VARIES).	1 EA
⑥	DI REDUCER, MJ X MJ (SIZE VARIES).	VARIES
⑦	DI 90° ELL, MJ X MJ (SIZE VARIES).	2 EA
⑧	FIRE HYDRANT ASSEMBLY PER STD. OWD-102	1 EA
⑨	THRUST BLOCK PER STD. OWD-109	VARIES
⑩	APPROVED BACKFLOW DEVICE ASSEMBLY	1 EA
⑪	CUT-IN TEE AND VALVE PER STD. OWD-108.	VARIES

**NOTES:**

1. SIZE OF LATERAL TO MATCH SIZE OF DOUBLE CHECK BACKFLOW PREVENTION DEVICE.
2. OFFSET TO BE DETERMINED BY CITY INSPECTOR BASED ON SITE CONDITIONS.
3. ALL MECHANICAL JOINTS SHALL BE THRUST BLOCKED AND RESTRAINED WITH MECHANICAL JOINT RESTRAINTS.

*David Siof* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

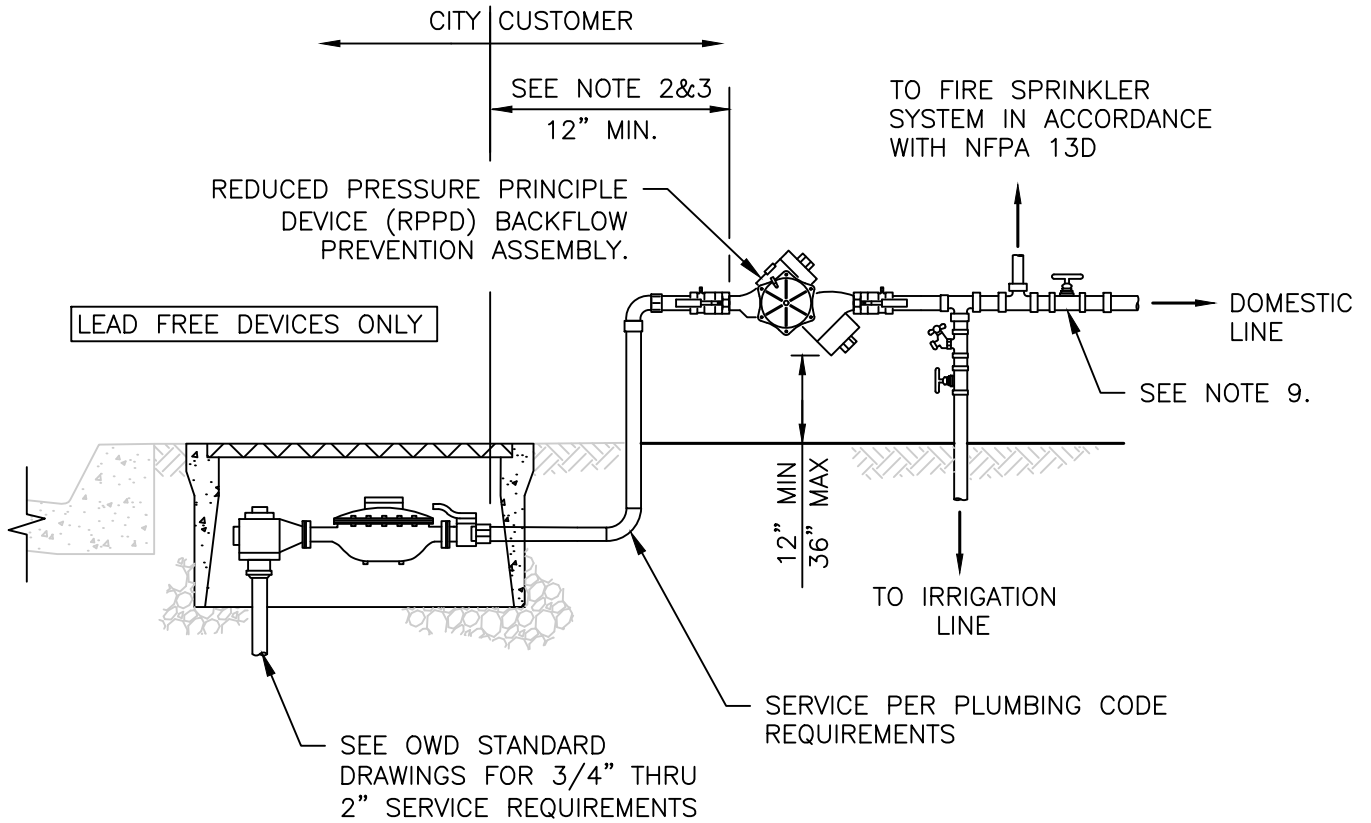
**CITY OF ORANGE WATER DIVISION STANDARDS**

**COMBINATION FIRE HYDRANT & APPROVED BACKFLOW  
DEVICE ASSEMBLY FOR LONG SIDE STREET CROSSING**

OWD STD. DWG.

**OWD-303**

SHEET 1 OF 1



**NOTES:**

1. RPPD BACKFLOW ASSEMBLY SHALL BE THE SAME SIZE DIAMETER AS THE WATER SERVICE.
2. DEVICES SHALL BE INSTALLED ABOVE GROUND AND IMMEDIATELY BEHIND AND ON THE CUSTOMER'S SIDE OF THE METER AND SHALL BE READILY ACCESSIBLE FOR TESTING.
3. TEES, APPURTENANCES AND CONNECTIONS ARE PROHIBITED BETWEEN THE METER AND BACKFLOW DEVICE.
4. BACKFLOW PREVENTION DEVICES SHALL BE INSTALLED AT LOCATIONS OTHER THAN IMMEDIATELY BEHIND THE WATER METER WHEN REQUIRED BY LAW, OR WHEN DETERMINED BY THE WATER DIVISION AND HEALTH AGENCY THAT SUCH ADDITIONAL DEVICES ARE NECESSARY TO ADEQUATELY PROTECT THE WATER SUPPLY.
5. ALL BACKFLOW DEVICES SHALL BE CERTIFIED BY A CERTIFIED BACKFLOW DEVICE TESTER AFTER INSTALLATION AND PRIOR TO USE OF WATER SERVICE.
6. THERE SHALL BE A MINIMUM ONE FOOT CLEARANCE WHEN THE BACKFLOW DEVICE IS ADJACENT A STRUCTURE. THE DEVICE'S TEST COCKS SHALL FACE THE STRUCTURE.
7. MINIMUM METER AND BACKFLOW DEVICE SIZE PER FIRE DEPARTMENT AND/OR BUILDING REQUIREMENTS.
9. PRIVATE PROPERTY SHUT-OFF SHALL BE ACCESSIBLE AND LOCKABLE.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

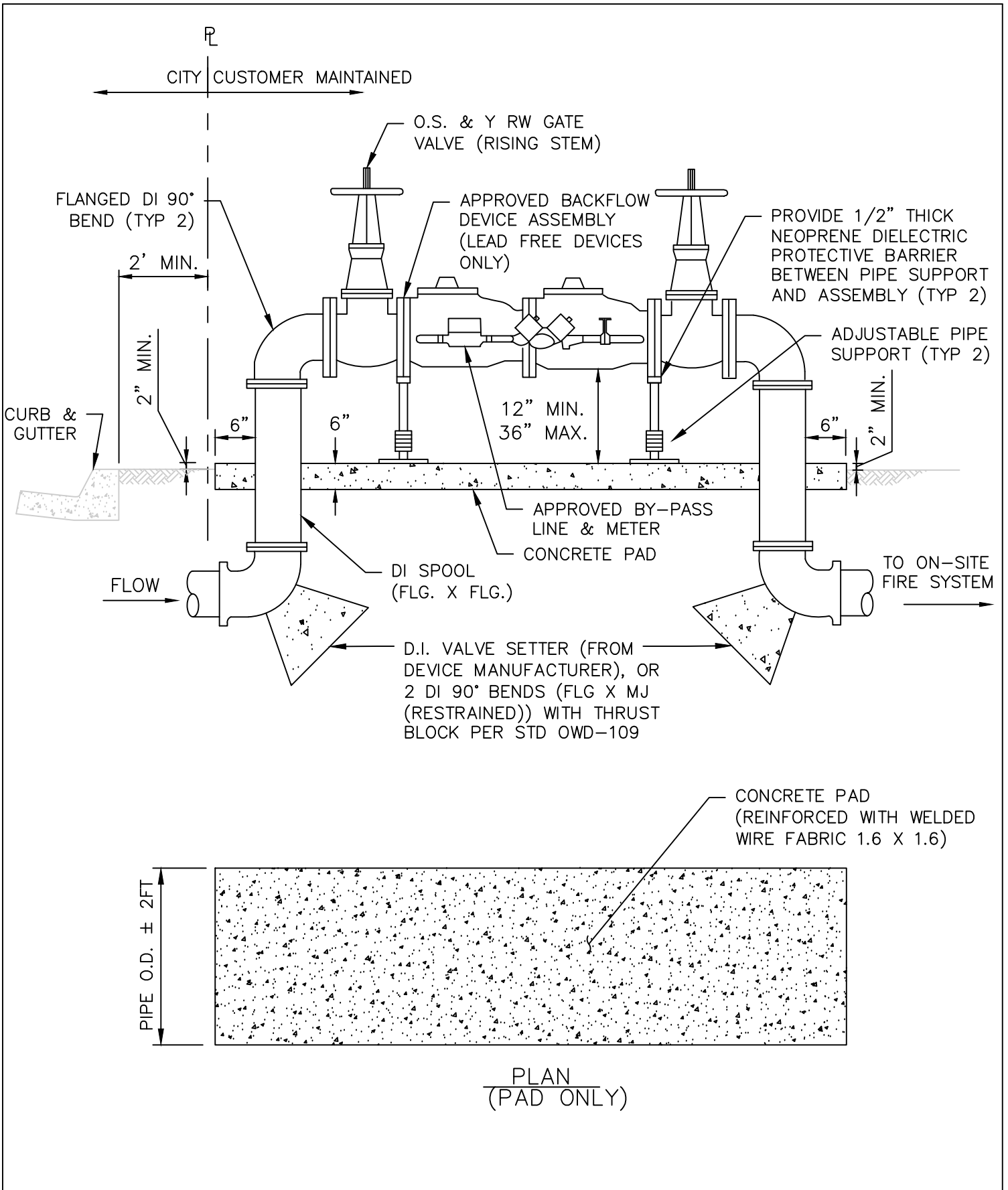
**CITY OF ORANGE WATER DIVISION STANDARDS**

**COMBINATION FIRE AND DOMESTIC SERVICE**  
**INSTALLATION (3/4" TO 2")**  
**(COPPER TUBING)**

OWD STD. DWG.

**OWD-304**

SHEET 1 OF 1



PLAN  
(PAD ONLY)

*Scott D. Dief* 1/31/2023  
CITY WATER MANAGER

*James B.* 1/31/2023  
CITY ENGINEER

*John A.* 1/31/2023  
PUBLIC WORKS DIRECTOR

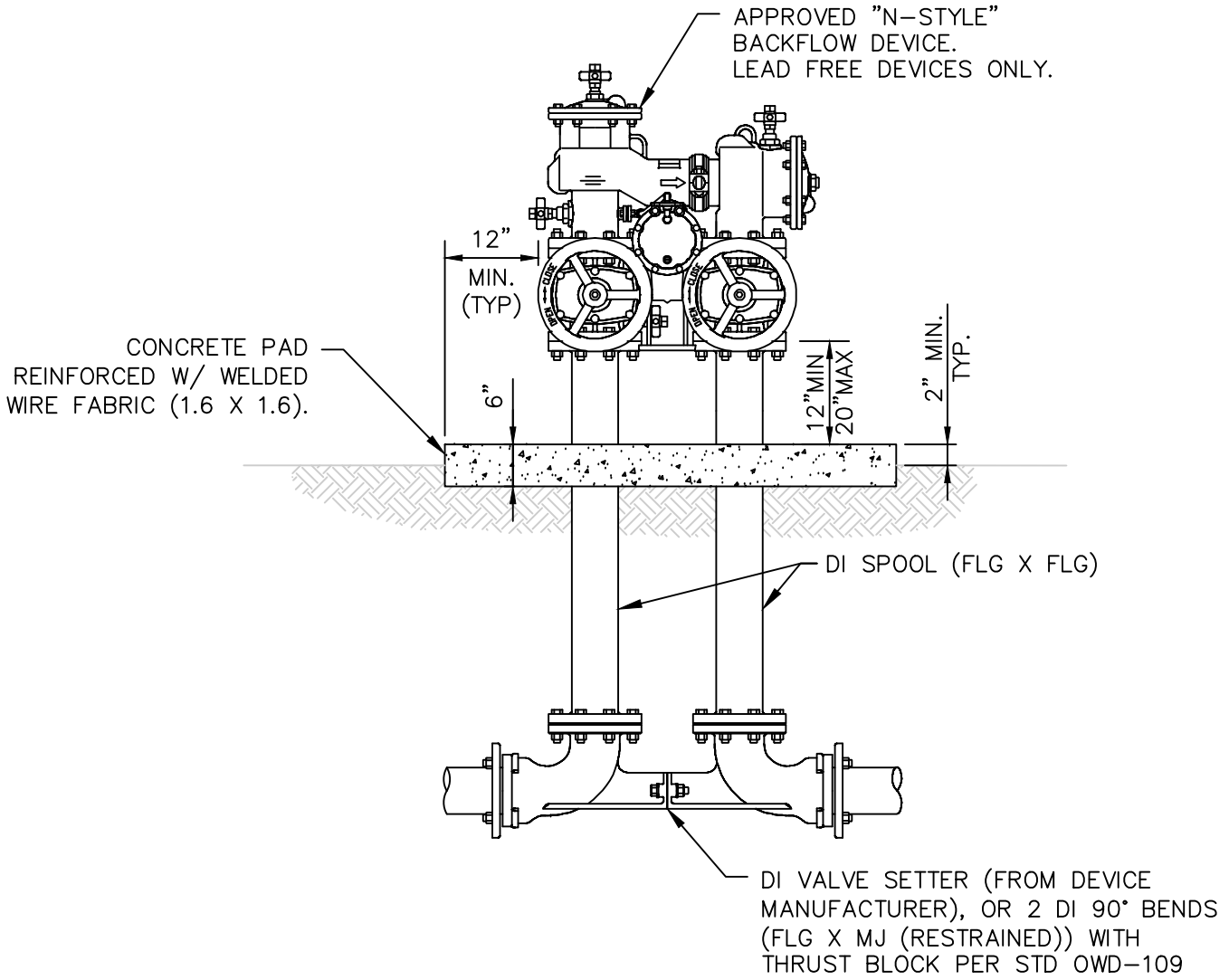
CITY OF ORANGE WATER DIVISION STANDARDS

TYPICAL 3" AND LARGER  
BACKFLOW PREVENTION DEVICE

OWD STD. DWG.

**OWD-305**

SHEET 1 OF 3



BACKFLOW DEVICE (COMPACT)

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

TYPICAL 3" AND LARGER  
BACKFLOW PREVENTION DEVICE

OWD STD. DWG.


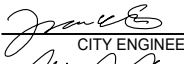

**OWD-305**

SHEET 2 OF 3



NOTES:

1. BACKFLOW PREVENTION DEVICES WHICH ARE APPROVED FOR INSTALLATION IN THE CITY OF ORANGE ARE THOSE DEVICES WHICH ARE APPROVED FOR USE BY THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH.
2. CUSTOMER SHALL SUPPLY, INSTALL, & MAINTAIN ALL ON-SITE MATERIALS.
3. GATE VALVES SHALL BE A RISING STEM TYPE APPROVED BY THE FIRE DEPT.
4. BY-PASS METER SHALL BE A NEPTUNE REMOTE READ DISC METER WITH 900i.
5. FIRE SUPPRESSION SERVICES ARE SUBJECT TO WATER DIVISION AND FIRE DEPARTMENT REVIEW AND APPROVAL. INSPECTION SHALL BE MADE BY BOTH THE FIRE DEPARTMENT AND CITY WATER INSPECTOR.
6. EFFECTIVE JANUARY 1, 2010 THE CALIFORNIA HEALTH AND SAFETY CODE (SECTION 116875) REQUIRES THAT THE MAXIMUM ALLOWABLE LEAD CONTENT IN PIPES, PIPE OR PLUMBING FIITINGS, FIXTURES, SOLDER OR FLUX INTENDED TO CONVEY OR DISPENSE WATER FOR HUMAN CONSUMPTION THROUGH DRINKING OR COOKING BE LIMITED TO 0.25 PERCENT LEAD. THIS APPLIES TO ALL DEVICES PROPOSED TO BE INSTALLED ON DOMESTIC SERVICES, LANDSCAPE IRRIGATION SERVICES AND COMBINATION FIRE AND DOMESTIC SERVICES.

 1/31/2023 CITY WATER MANAGER
 1/31/2023 CITY ENGINEER
 1/31/2023 PUBLIC WORKS DIRECTOR

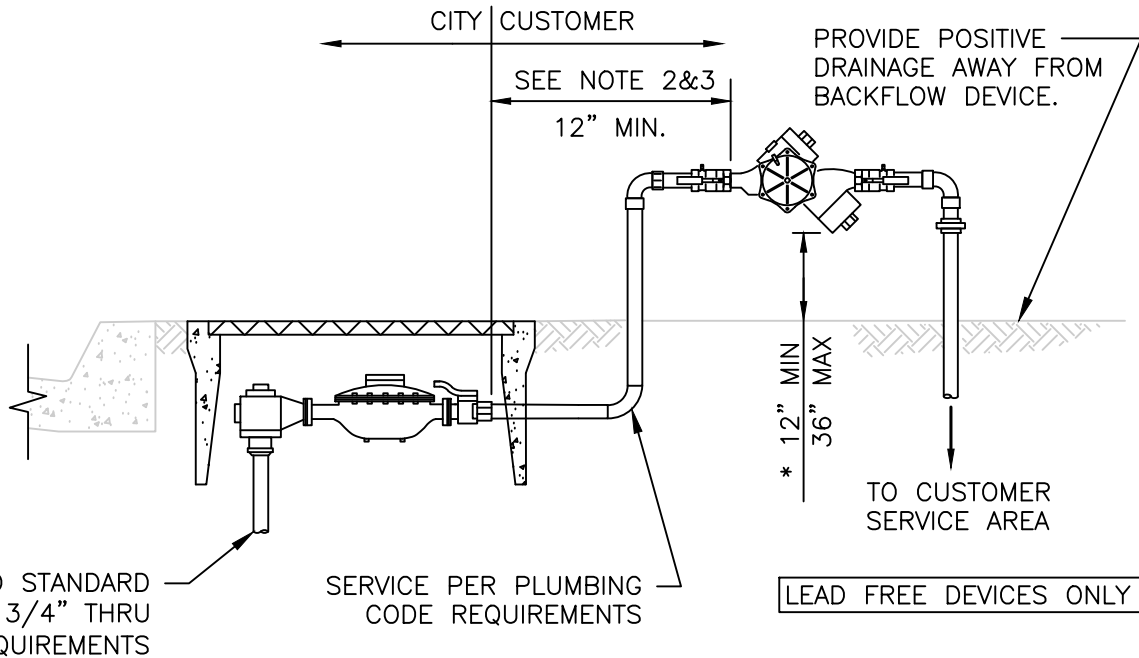
CITY OF ORANGE WATER DIVISION STANDARDS

TYPICAL 3" AND LARGER  
BACKFLOW PREVENTION DEVICE

OWD STD. DWG.

**OWD-305**

SHEET 3 OF 3



\*IF THE BACKFLOW PREVENTION DEVICE TO BE INSTALLED IS OF THE TYPE KNOWN AS A "VACUUM DEVICE", IT SHALL BE INSTALLED A MINIMUM OF 12" ABOVE THE HIGHEST POINT OF USAGE DOWN- STREAM FROM THE DEVICE.

**NOTES**

1. BACKFLOW PREVENTION DEVICES WHICH ARE APPROVED FOR INSTALLATION IN THE CITY OF ORANGE ARE THOSE DEVICES APPROVED FOR USE BY THE UNIVERSITY OF SOUTHERN CALIFORNIA FOUNDATION FOR CROSS CONNECTION CONTROL AND HYDRAULIC RESEARCH.
2. DEVICES SHALL BE INSTALLED ABOVE GROUND AND IMMEDIATELY BEHIND AND ON THE CUSTOMER'S SIDE OF THE METER AND SHALL BE READILY ACCESSIBLE FOR TESTING.
3. TEES, APPURTENANCES AND CONNECTIONS ARE PROHIBITED BETWEEN THE METER AND BACKFLOW DEVICE.
4. BACKFLOW PREVENTION DEVICES SHALL BE INSTALLED AT LOCATIONS OTHER THAN IMMEDIATELY BEHIND THE WATER METER WHEN REQUIRED BY LAW, OR WHEN DETERMINED BY THE WATER DIVISION AND HEALTH AGENCY THAT SUCH ADDITIONAL DEVICES ARE NECESSARY TO ADEQUATELY PROTECT THE WATER SUPPLY.
5. ALL BACKFLOW DEVICES SHALL BE CERTIFIED BY A CERTIFIED BACKFLOW DEVICE TESTER AFTER INSTALLATION AND PRIOR TO USE OF WATER SERVICE.
6. EFFECTIVE JANUARY 1, 2010 THE CALIFORNIA HEALTH AND SAFETY CODE (SECTION 5. 116875) REQUIRES THAT THE MAXIMUM ALLOWABLE LEAD CONTENT IN PIPES, PIPE OR PLUMBING FITTINGS, FIXTURES, SOLDER OR FLUX INTENDED TO CONVEY OR DISPENSE WATER FOR HUMAN CONSUMPTION THROUGH DRINKING OR COOKING BE LIMITED TO 0.25 PERCENT LEAD. THIS APPLIES TO ALL DEVICES PROPOSED TO BE INSTALLED ON DOMESTIC SERVICES, LANDSCAPE IRRIGATION SERVICES AND COMBINATION FIRE AND DOMESTIC SERVICES.

*Lois M. Dief* 1/31/2023  
CITY WATER MANAGER

*James E. ...* 1/31/2023  
CITY ENGINEER

*...* 1/31/2023  
PUBLIC WORKS DIRECTOR

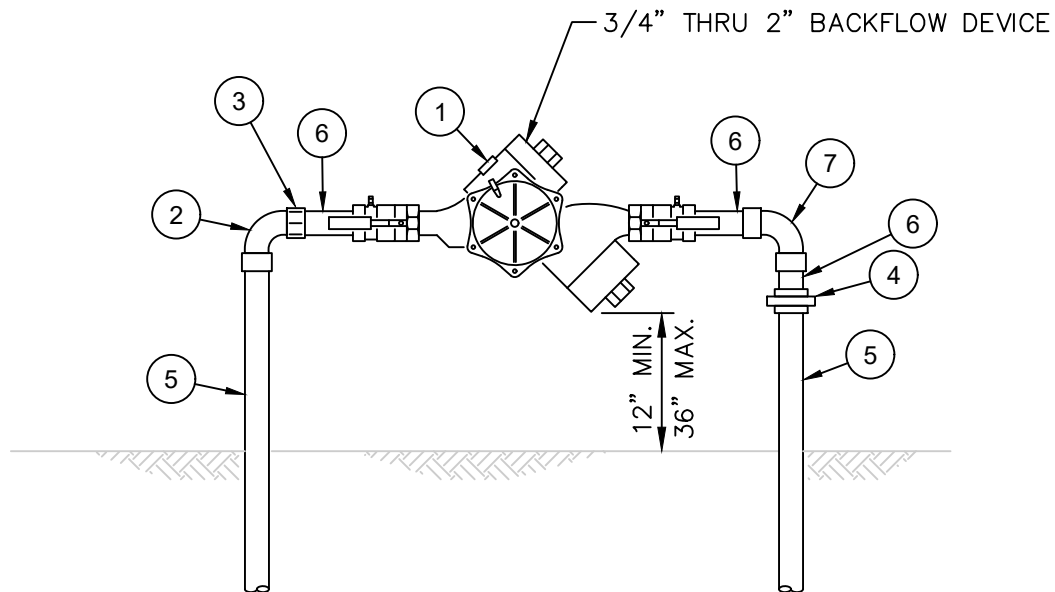
**CITY OF ORANGE WATER DIVISION STANDARDS**

**TYPICAL 2" AND SMALLER  
BACKFLOW PREVENTION DEVICE**

OWD STD. DWG.

**OWD-306**

SHEET 1 OF 2



ITEM    MATERIALS

- ① APPROVED BACKFLOW PREVENTION ASSEMBLY.
- ② SOLDER 90° ELL.
- ③ F.I.P. SOLDER ADAPTER.
- ④ SOLDER UNION.
- ⑤ COPPER TUBING, TYPE K W/ P.E. WRAP FOR BURIED PORTION.
- ⑥ BRASS NIPPLE.
- ⑦ BRASS 90° ELL (THREADED).

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

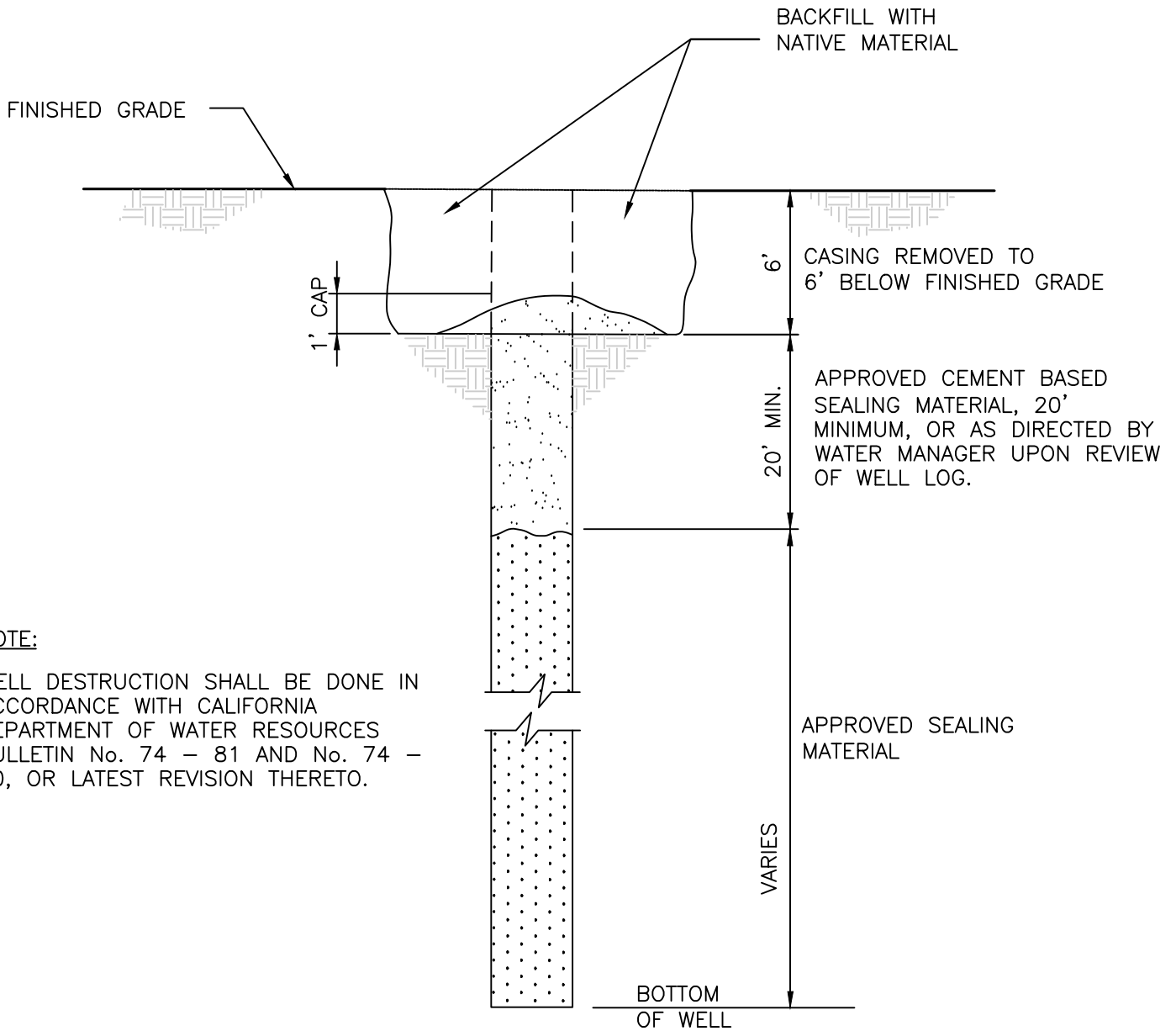
CITY OF ORANGE WATER DIVISION STANDARDS

TYPICAL 2" AND SMALLER  
BACKFLOW PREVENTION DEVICE

OWD STD. DWG.

**OWD-306**

SHEET 2 OF 2



**NOTE:**

WELL DESTRUCTION SHALL BE DONE IN ACCORDANCE WITH CALIFORNIA DEPARTMENT OF WATER RESOURCES BULLETIN No. 74 - 81 AND No. 74 - 90, OR LATEST REVISION THERETO.

A PERMIT IS REQUIRED TO BE OBTAINED FROM THE CITY OF ORANGE WATER DIVISION AT 189 S. WATER ST (714-288-2475)

*David Siof* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

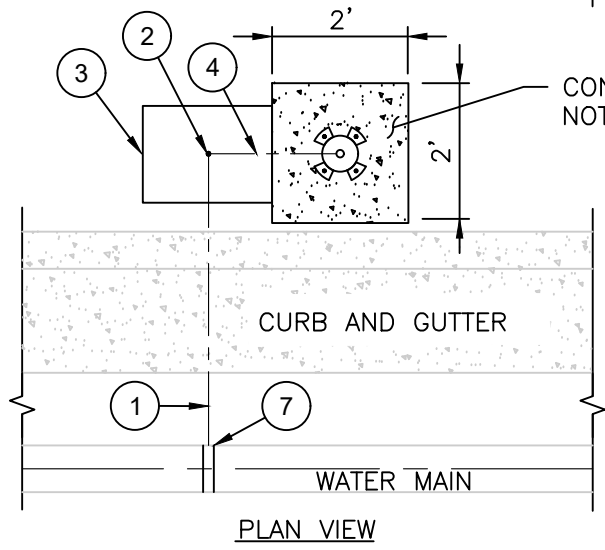
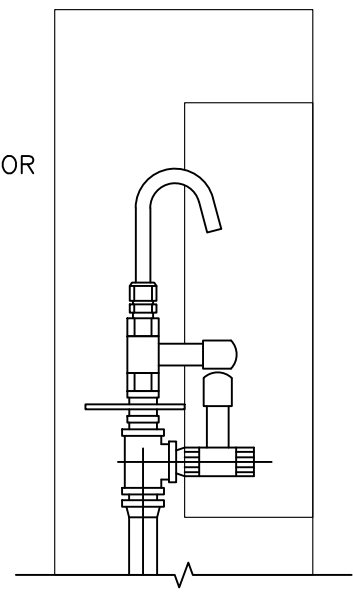
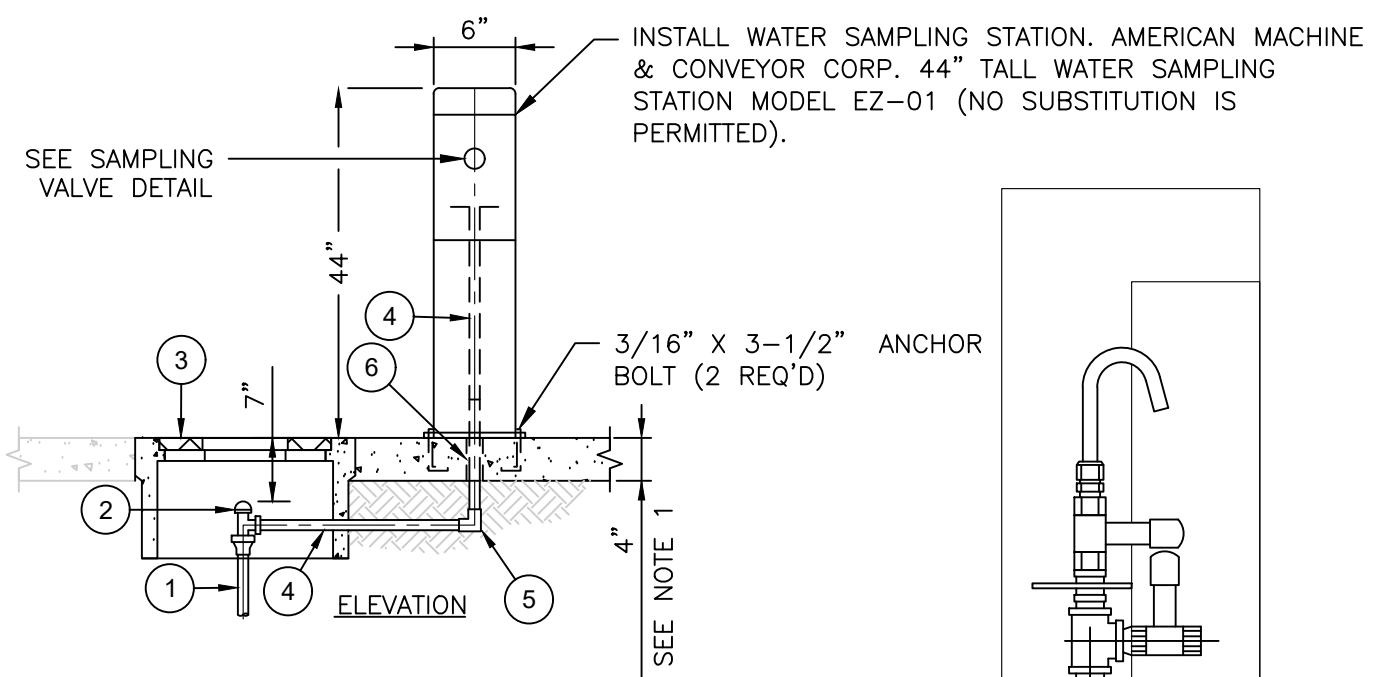
CITY OF ORANGE WATER DIVISION STANDARDS

OWD STD. DWG.

WELL DESTRUCTION

OWD-307

SHEET 1 OF 1



NOTES:

1. IF INSTALLATION IS WITHIN THE SIDEWALK, THE THICKNESS OF THE FOOTING WILL BE THE SAME AS THE SIDEWALK. IF NO CONCRETE SIDEWALK EXISTS, CONSTRUCT A 2' X 2' X 4" CONCRETE PAD.

ITEM MATERIALS

- ① 1" SOFT COPPER TUBING, TYPE "K" W/ P.E. WRAP.
- ② 1" ANGLE METER STOP.
- ③ METER BOX (USE 1" SERVICE METER BOX) PER STD. OWD-212.
- ④ 3/4" SOFT COPPER TUBING, TYPE "K".
- ⑤ 3/4" COPPER 90° ELL, SWEAT X SWEAT.
- ⑥ 1-1/2"Ø PVC SLEEVE.
- ⑦ 1" SERVICE CONNECTION PER STD. OWD-203.

*David Dief* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER DIVISION STANDARDS

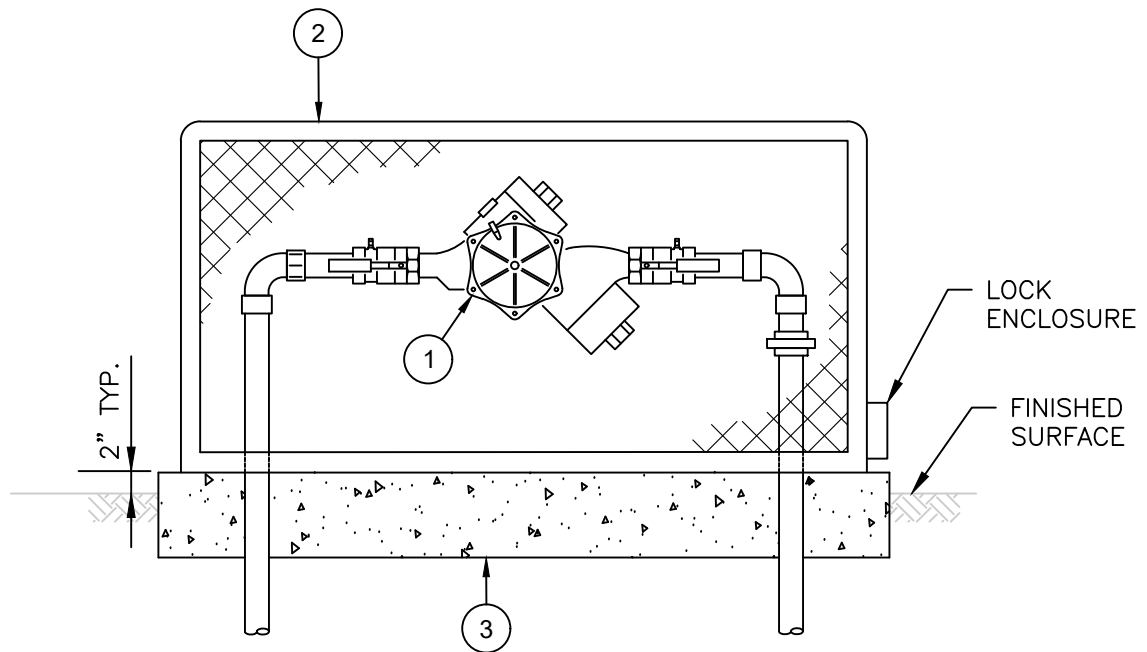
WATER QUALITY SAMPLING STATION

OWD STD. DWG.

**OWD-308**

SHEET 1 OF 1





**ITEM MATERIALS**

- ① APPROVED BACKFLOW PREVENTION ASSEMBLY PER STD. OWD-306.
- ② WEATHER RESISTANT LOCKABLE METAL CAGE TYPE ENCLOSURE.
- ③ CONCRETE BASE REINFORCED WITH W1.4 X W1.4 WELDED WIRE FABRIC.

**NOTES:**

1. ENCLOSURES MAY BE REQUIRED BY THE WATER DIVISION ON A CASE BY CASE BASIS.
2. CONTRACTOR SHALL LAYOUT ABOVE GROUND PIPING TO ASSURE ENCLOSURE WILL CLEAR.
3. FOR 1" AND SMALLER BACKFLOW DEVICE: GUARDSHACK BPGI, MODEL GS-2 OR APPROVED EQUAL (10" WIDE X 24" HIGH X 30' LONG).  
FOR 1 1/2" AND 2" BACKFLOW DEVICE: GUARDSHACK BPGI, MODEL GS-3 OR APPROVED EQUAL (10" WIDE X 24" HIGH X 40' LONG).
4. FOR 1" AND SMALLER BACKFLOW DEVICE: CONCRETE PAD DIMENSIONS: 24" WIDE X 40" LONG.  
FOR 1 1/2" AND 2" BACKFLOW DEVICE: CONCRETE PAD DIMENSIONS: 24" WIDE X 48" LONG.

*David Siof* 1/31/2023  
CITY WATER MANAGER

*James* 1/31/2023  
CITY ENGINEER

*John* 1/31/2023  
PUBLIC WORKS DIRECTOR

**CITY OF ORANGE WATER DIVISION STANDARDS**

**ENCLOSURE FOR 2" AND SMALLER  
BACKFLOW PREVENTION DEVICE**

OWD STD. DWG.

**OWD-310**

SHEET 1 OF 1