STANDARD PLANS
AND
SPECIFICATIONS

Serving the City of Orange for Over 100 Years

City of Orange
Public Works Department
WATER DIVISION

2019
# CITY OF ORANGE
## WATER DIVISION
### STANDARD PLANS AND SPECIFICATIONS

**November 2019**

**TABLE OF CONTENTS**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>GENERAL WATER CONSTRUCTION NOTES</td>
<td>1</td>
</tr>
<tr>
<td>PUBLIC WORKS CONTRACTS</td>
<td>6</td>
</tr>
<tr>
<td>ADDITIONS TO THE STANDARD SPECIFICATIONS</td>
<td>6</td>
</tr>
</tbody>
</table>

## PART 1: GENERAL PROVISIONS

### SECTION 1: GENERAL TERMS, DEFINITIONS, ABBREVIATIONS, UNIT OF MEASURE AND SYMBOLS

1-2 Terms and Definitions ........................ ................................................................................ 7
1-3 Abbreviations................................................................................................................. 7

### SECTION 2: SCOPE OF THE WORK

2-1.1 Award of Contract ........................................................................................................ 8
2-1.2 Plans and Specifications ............................................................................................ 8

### SECTION 4: CONTROL OF MATERIALS

4-1.6 Trade Names or Equals.................................................................................................. 9

### SECTION 6: PROSECUTION AND PROGRESS OF THE WORK

6-1.4 Public Works Inspection Outline ................................................................................ 9
6-9.1 Warranty ...................................................................................................................... 10

## PART 2: CONSTRUCTION MATERIALS

### SECTION 209: PRESSURE PIPE

209-0 General........................................................................................................................ 11
PART 3: CONSTRUCTION METHODS

SECTION 306: OPEN TRENCH CONDUIT CONSTRUCTION .......................................................... 31

306-0 General.......................................................................................................................... 31
306-0.1 Inspection .................................................................................................................. 31
306-0.2 Permits ...................................................................................................................... 31
306-0.3 Construction Sequencing .......................................................................................... 31
306-0.4 Well Destruction ...................................................................................................... 31
306-1.1 Backfill and Densification ......................................................................................... 32
306-1.1.1 Trench Excavation .................................................................................................................. 32
306-1.2.1 Bedding ................................................................................................................................... 32
306-1.2.2 Pipe Laying ............................................................................................................................. 33
306-1.4.5 Water Pressure Test .................................................................................................................. 34
306-1.8 Tapping of Pipe ............................................................................................................................ 34
306-1.9 Installation of Services and Appurtenances .................................................................................. 35
306-1.10 Connecting to Existing Water Mains ......................................................................................... 36
306-1.11 Disinfection .................................................................................................................................. 37
306-1.12 Valve Boxes ............................................................................................................................... 37
306-1.13 Final Inspection ........................................................................................................................... 38
306-1.14 Final Approval ............................................................................................................................ 38
306-2.7 Jacking Steel Pipe .......................................................................................................................... 38
306-2.7.1 General ...................................................................................................................................... 38
306-2.7.2 Steel Casing ............................................................................................................................... 39
306-2.7.3 Casing Seals .............................................................................................................................. 39
306-2.7.4 Grout Connections ..................................................................................................................... 39
306-2.7.5 Casing Skids .............................................................................................................................. 40
306-2.7.6 Annular Space ........................................................................................................................... 40
306-5 Abandonment of Conduits and Structures ....................................................................................... 40

PART 4: WATER DIVISION STANDARD PLANS
INTRODUCTION

All the improvements within the public rights-of-way and easements within the City of Orange shall conform to the City of Orange Standard Plans and Specifications available through the Public Works Department. All public water system improvements intended to be dedicated to the City of Orange shall conform to the City of Orange Water Division Standard Plans and Specifications. It is the City’s desire to provide water service and to standardize wherever possible the construction of the water facilities to be operated and maintained by the City.

The user shall keep fully informed of any latest revisions to the Public Works and Water Division Standard Plans and Specifications by contacting the office of the City Engineer, Public Works Department, City of Orange or the City of Orange Water Division at 189 S. Water Street. These Standard Plans and Specifications 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.

GENERAL WATER CONSTRUCTION NOTES

The following general water construction notes shall be included on all improvement plans that include any public water system improvements as well as water system construction plans:

1. ALL WORK SHALL BE IN CONFORMANCE WITH THE CITY OF ORANGE WATER DIVISION STANDARD PLANS AND SPECIFICATIONS AND SHALL ALSO BE DONE TO THE SATISFACTION OF THE CITY PUBLIC WORKS INSPECTOR.

2. CITY OF ORANGE WATER DIVISION STANDARD PLANS AND SPECIFICATIONS ARE AVAILABLE AT THE CITY OF ORANGE WATER DIVISION, 189 S. WATER STREET, ORANGE, CA 92866 AND FROM THE CITY’S WEBSITE.

3. THE APPLICANT/DEVELOPER SHALL FURNISH A DEDICATED AND GRADED MINIMUM FIFTEEN (15) FOOT UNENCUMBERED ACCESS AND UTILITY EASEMENT FOR FUTURE FACILITIES TO BE CONTIGUOUS TO THE EXISTING CITY RIGHT OF WAYS AND EASEMENTS AS DETERMINED BY THE WATER DIVISION FOR ALL PUBLIC WATER FACILITIES, INCLUDING WATER MAINS, SERVICES, METERS, DETECTOR CHECKS, AND FIRE HYDRANTS, PRIOR TO FINAL APPROVAL AND ACCEPTANCE OF THE WATER IMPROVEMENTS.
4. THE APPLICANT/DEVELOPER SHALL ENTER INTO A DECORATIVE IMPROVEMENT AGREEMENT/EASEMENT DEED AND AGREEMENT WITH THE CITY OF ORANGE PRIOR TO FINAL APPROVAL AND ACCEPTANCE OF THE WATER IMPROVEMENTS.

5. THE APPLICANT/DEVELOPER SHALL SATISFY ALL WATER MAIN CONNECTIONS, PLAN CHECK, AND INSPECTION CHARGES AS DETERMINED BY THE WATER DIVISION PRIOR TO APPROVAL OF THE WATER PLANS.

6. THE APPLICANT/DEVELOPER SHALL SATISFY ALL WATER BOND REQUIREMENTS FOR THE INSTALLATION OF THE WATER SYSTEM AS DETERMINED BY THE WATER DIVISION PRIOR TO APPROVAL OF THE WATER PLANS.

7. EACH BUILDING SHALL BE METERED SEPARATELY UNLESS OTHERWISE SPECIFICALLY APPROVED BY THE WATER DIVISION.

8. EACH BUILDING SHALL BE PROTECTED WITH A SEPARATE FIRE SUPPRESSION SERVICE UNLESS OTHERWISE SPECIFICALLY APPROVED BY THE FIRE DEPARTMENT AND THE WATER DIVISION.

9. IT IS THE RESPONSIBILITY OF THE DESIGN ENGINEER AND THE CONTRACTOR TO INDEPENDENTLY VERIFY THE EXISTING AVAILABLE PRESSURE AND FLOW CONDITIONS AND DESIGN THE VARIOUS ON-SITE SYSTEMS TO MEET THE SITE SPECIFIC REQUIREMENTS. FIRE FLOW AND PRESSURE TEST RESULTS ARE VALID ONLY WHEN FIELD TESTED BY THE APPROPRIATE FIRE AUTHORITIES HAVING JURISDICTION.

10. INDIVIDUAL PRESSURE REGULATORS SHALL BE FURNISHED AND INSTALLED BY THE APPLICANT/DEVELOPER ON SERVICES WHERE THE INCOMING PRESSURE EXCEEDS EIGHTY POUNDS PER SQUARE INCH (80 PSI).

11. THE APPLICANT IS RESPONSIBLE FOR OBTAINING STREET ADDRESS ASSIGNMENTS FOR EACH WATER METER AND BACKFLOW DEVICE LOCATION FROM THE CITY OF ORANGE DEPARTMENT OF PUBLIC WORKS SUBDIVISION SECTION PRIOR TO MAKING APPLICATION FOR METERS AND SERVICES.

12. AN EIGHT (8) FOOT MINIMUM CLEARANCE IS REQUIRED BETWEEN CITY WATER MAINS AND SIGNS, TREES, OR OTHER SUBSTANTIAL SHRUBS, BUSHES, OR PLANTS.

13. A TWENTY (20) FOOT SEPARATION SHALL BE MAINTAINED FROM THE CITY WATER MAINS TO THE PROPOSED BUILDINGS AND STRUCTURES UNLESS OTHERWISE APPROVED SPECIFICALLY BY THE WATER DIVISION.

14. PERMANENT SIGNS, AWNINGS, SURFACE WATER QUALITY FEATURES SUCH AS BUT NOT LIMITED TO INFILTRATION PLANTERS, BASINS, PERVIOUS PAVEMENT, OR OTHER STRUCTURES SHALL NOT BE PERMITTED TO BE INSTALLED OVER CITY WATER MAINS, LATERALS, SERVICES, METERS, AND FIRE HYDRANTS.
15. A MINIMUM OF FOURTEEN (14) CALENDAR DAYS PRIOR TO CONSTRUCTION, THE ENGINEER OF RECORD SHALL PREPARE AND PROVIDE PRODUCT MATERIAL SUBMITTALS CONSISTENT WITH THE WATER IMPROVEMENT PLANS, AS APPROVED BY THE WATER DIVISION, FOR REVIEW AND APPROVAL. THE SUBMITTALS SHALL INCLUDE THE FOLLOWING, AS A MINIMUM: CERTIFICATION THAT ALL PUBLIC WATER SYSTEM MATERIALS COMPLY WITH THE APPROVED PLANS AND WITH THE WATER DIVISION STANDARD PLANS AND SPECIFICATIONS; CERTIFICATION THAT ALL PUBLIC WATER SYSTEM MATERIALS COMPLY WITH CALIFORNIA HEALTH AND SAFETY CODE SECTION 116875; AND CATALOG CUTS FOR ALL PUBLIC WATER SYSTEM PIPE, VALVES, FITTINGS, APPURTENANCES, AND RELATED ITEMS.

16. THE ENGINEER SHALL SUBMIT ALL PROPOSED DEVIATIONS FROM THE ORIGINALLY APPROVED DESIGN THAT IMPACT THE PUBLIC WATER SYSTEM TO THE WATER DIVISION FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION AND SHALL MAINTAIN A COMPLETE SET OF SAID RECORD DRAWINGS/PLANS. UPON APPROVAL, THE ENGINEER WILL MAKE CHANGES TO THE ORIGINAL DRAWINGS INDICATING RECORD CONDITIONS AND PROVIDE PRINTS TO THE CONTRACTOR AND THE WATER DIVISION. UPON COMPLETION OF THE PROJECT, THE ENGINEER SHALL PROVIDE THE APPROPRIATE RECORDS TO THE CITY OF ORANGE WATER DIVISION.

17. WATER DIVISION AND THE CITY PUBLIC WORKS INSPECTOR SHALL BE NOTIFIED OF ANY AND ALL WATER SYSTEM CONSTRUCTION 24 HOURS PRIOR TO BEGINNING CONSTRUCTION AT (714) 744-5526.

18. 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 ORANGE WATER INSPECTOR IS REQUIRED FOR SYSTEM SHUT-DOWNS.

19. FIRE SUPPRESSION SERVICES ARE SUBJECT TO THE FIRE DEPARTMENT’S AND WATER DIVISION’S REVIEW AND APPROVAL. SEPARATE PLAN SUBMITTALS ARE REQUIRED.

20. ALL PUBLIC WATER SYSTEM IMPROVEMENTS SHALL BE INSTALLED BY A CONTRACTOR HOLDING A VALID CLASS “A” OR “C-34” SPECIALTY LICENSE FROM THE STATE OF CALIFORNIA.

21. CONTRACTOR TO VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF WATER MAINS AND OTHER UTILITIES PRIOR TO CONSTRUCTION.

22. INSTALLATION OF SEWER MAINS AND STORM DRAINS IN THE VICINITY OF NEW AND/OR EXISTING WATER MAINS SHALL BE DONE IN ACCORDANCE WITH THE WATER DIVISION STANDARD PLANS AND IN ACCORDANCE WITH THE CALIFORNIA STATE HEALTH DEPARTMENT REQUIREMENTS FOR MATERIALS AND HORIZONTAL AND VERTICAL SEPARATION. THE MOST RESTRICTIVE CITY/STATE REQUIREMENTS SHALL TAKE PRECEDENCE.
23. A SIX (6) FOOT MINIMUM HORIZONTAL CLEARANCE AND A ONE (1) FOOT MINIMUM VERTICAL CLEARANCE IS REQUIRED BETWEEN THE CITY WATER MAINS, LATERALS, SERVICES, METERS, AND FIRE HYDRANTS, AND ALL OTHER UTILITIES, EXCEPT FOR SEWER MAINS AND STORM DRAINS. SEE GENERAL WATER CONSTRUCTION NOTE NO. 22 FOR THE SEPARATION REQUIREMENTS FOR SEWER MAINS AND STORM DRAINS.

24. ALL MATERIALS SHALL BE NEW AND FREE OF DEFECTS.

25. WATER MAINS AND APPURTEANCES SHALL BE INSTALLED IN ACCORDANCE WITH AWWA STANDARD C-600 “FOR INSTALLATION OF DUCTILE IRON WATER MAINS AND THEIR APPURTEANCES”, LATEST REVISION, AND THE WATER DIVISION STANDARD PLANS AND SPECIFICATIONS.

26. ALL FITTINGS SHALL BE INSTALLED WITH THRUST BLOCKS AND MEGA-LUG RETAINING GLANDS OR APPROVED EQUAL.

27. ALL DUCTILE IRON PIPE, FITTINGS, VALVES, COPPER SERVICE LATERALS, AND APPURTEANCES SHALL BE WRAPPED WITH POLYETHYLENE PER AWWA STANDARD C-105 “DUCTILE IRON PIPING FOR WATER”, LATEST REVISION. POLYWRAP MATERIAL SHALL BE CLEAR 8 MIL POLYEHTYLENE FLAT TUBING WITH DIMENSIONS APPROPRIATE FOR THE SIZE OF PIPE.

28. WATER MAINLINES, FITTINGS AND APPURTEANCES SHALL BE INSTALLED THREE AND ONE-HALF (3.5) FEET BELOW FINISHED SURFACE TYPICALLY (NOT SUBGRADE) UNLESS INDICATED OTHERWISE ON THE APPROVED PLANS.

29. CONTRACTOR SHALL HAVE DESIGN CIVIL ENGINEER STAKE WATER PIPELINES, FIRE HYDRANTS, AND METER LOCATIONS.

30. PUBLIC WATER VALVES SHALL BE OPERATED BY CITY STAFF ONLY.

31. 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 4-INCHES ARE PERFORMED BY CITY CREWS AFTER THE EXCAVATION IS COMPLETED BY THE CONTRACTOR. CONTRACTOR IS RESPONSIBLE FOR OBTAINING A STREET ENCROACHMENT/ EXCAVATION PERMIT.

32. NON-ACTIVE WATER MAINS NEWLY INSTALLED BY DEVELOPER: 2-INCHES AND SMALLER SERVICE TAPS MAY BE INSTALLED BY DEVELOPER UNDER CITY PUBLIC WORKS INSPECTION PER WATER DIVISION APPROVED PLANS AND IN ACCORDANCE WITH THE WATER DIVISION STANDARD PLANS AND SPECIFICATIONS.

33. ALL CITY DEDICATED FIRE HYDRANTS SHALL BE PAINTED AFTER INSTALLATION WITH APPROVED SAFETY ORANGE COLOR.
34. 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.

35. 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.

36. INSTALLATIONS FOUND TO BE IN NON-COMPLIANCE WITH THESE GENERAL WATER CONSTRUCTION NOTES AND/OR THE WATER DIVISION STANDARD PLANS AND SPECIFICATIONS SHALL BE REMOVED AND RE-INSTALLED PER THE CITY PUBLIC WORKS INSPECTOR’S APPROVAL PRIOR TO FINAL JOB APPROVAL AT THE CONTRACTOR’S EXPENSE.

37. CONNECTIONS TO EXISTING CITY WATER MAINS SHALL BE MADE ONLY AFTER SUCCESSFUL PRESSURE TEST AND DISINFECTION HAS BEEN COMPLETED.

38. ALL UNUSED SERVICE LATERALS TO BE CUT AND CAPPED AT THE WATER MAIN WITH METER BOXES REMOVED AND DISPOSED OF BY THE CONTRACTOR PER THE CITY PUBLIC WORKS INSPECTOR’S APPROVAL. THE RELATED SIDEWALK/STREET REPAIR WORK TO BE COMPLETED BY THE CONTRACTOR.

39. ALL UNUSED SERVICE LATERALS 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.

40. ALL METERS, DETECTOR CHECKS, VALVES, VALVE BOX COVERS, AND FIRE HYDRANTS IMPACTED BY DEMOLITION WORK SHALL BE RETURNED TO THE CITY WATER YARD.

41. FINAL INSPECTION SHALL BE MADE AFTER COMPLETE INSTALLATION OF THE WATER SYSTEM AND APPURTENANCES, SUCCESSFUL PRESSURE TEST, DISINFECTION, RAISING TO GRADE OF ALL ON-SITE AND OFF-SITE VALVE BOXES, ADJUSTMENT TO GRADE OF ALL METER BOXES, AND INSTALLATION OF FIRE HYDRANT SUPPORT COLLARS.

The following general water construction notes shall be included on all landscape architect landscaping and irrigation plans:

1. AN EIGHT (8) FOOT MINIMUM CLEARANCE IS REQUIRED BETWEEN THE CITY WATER MAINS, AND TREES OR OTHER SUBSTANTIAL SHRUBS, BUSHES AND PLANTS.
2. WHERE A PROPOSED FENCE INSTALLATION CROSSES A CITY WATER MAIN, THE FOOTINGS SHALL BE SPACED TO ALLOW FOR THE MAXIMUM SEPARATION BETWEEN THE FOOTINGS AND THE WATER MAIN PER THE CITY PUBLIC WORKS INSPECTOR’S APPROVAL.

3. WHERE A PROPOSED WALL INSTALLATION CROSSES A CITY WATER MAIN, FIRE HYDRANT AND/OR SERVICE LATERALS, THE WALL AND FOOTING DETAILS SHALL BE SUBMITTED TO THE WATER DIVISION FOR REVIEW AND APPROVAL PRIOR TO THE PLAN BEING APPROVED BY THE CITY.

4. INSTALLATIONS FOUND TO BE IN NON-COMPLIANCE WITH THESE CONSTRUCTION NOTES SHALL BE REMOVED AND RE-INSTALLED PER THE CITY OF ORANGE PUBLIC WORKS INSPECTOR’S APPROVAL PRIOR TO THE FINAL JOB APPROVAL AT THE CONTRACTOR’S EXPENSE.

PUBLIC WORKS CONTRACTS

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. If there is a conflict between the “Standard Specifications” and these provisions, these provisions shall have precedence. The numbering of sections for the purpose of these provisions refers to corresponding numbering of sections of the “Standard Specifications”.

If these provisions specify the use of "Standard Specifications and Standard Plans for the Construction of Local Streets and Roads, of the State of California, Department of Transportation," herein referred to as “Caltrans”, for a certain portion of the work, the latest edition of the publication shall be used.

The City of Orange has adopted a Local Implementation Plan (LIP) as part of a compliance program to the California Regional Water Quality Control Board. All improvements shall comply with the latest LIP in the prosecution of the work. The LIP is available and on file at the Public Works Department.

ADDITIONS TO THE “STANDARD SPECIFICATIONS”

The following additions to the “Standard Specifications” are intended to delete, replace, amend, or supplement the corresponding section in the “Standard Specifications”.
PART 1: GENERAL PROVISIONS

SECTION 1 – GENERAL TERMS, DEFINITIONS, ABBREVIATIONS, UNIT OF MEASURE, AND SYMBOLS

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 conforms to the latest edition of the United States Public Health Service Drinking Water Standards, the California Safe Drinking Water Act, or other applicable standards.

(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

(a) **OWD:** City of Orange Water Division

(b) **AWWA:** American Water Works Association

(c) **DIPRA:** Ductile Iron Pipe Research Association

(d) **CAL-OSHA:** California Occupational Safety and Health Administration

(e) **SCAQMD:** South Coast Air Quality Management District

(f) **SSPC:** Steel Structures Painting Council
SECTION 2 – SCOPE OF THE WORK

2-1.1 Award of Contract

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.

2-1.2 Plans and Specifications

DESIGN

The Developer or his Private Engineer or Contractor shall be responsible for preparation of the necessary design drawings showing the proposed large service installation together with meter and appurtenances. The drawings shall be prepared by a Registered Professional Civil Engineer licensed by the State of California, shall be submitted to the Water Division for review and approval and must be approved prior to beginning construction.

The drawings shall be prepared on 24” x 36” Standard Plan and Profile sheets drawn to horizontal and vertical scale. The drawing shall show, but not be limited to, the following major items:

- Street Name and Cross Street Name
- Station from C/L of Street Intersection
- Size, Type and Location of Street Main
- Public and Private Utilities
- Above and Below Ground Improvements
- Scale and North Arrow
- Width of Street, Location of Curb, Sidewalk and Property Line
- Location and Size of Proposed Assembly
- For Vault Installations identify Type of Vault and Cover Required (Traffic Bearing or Pedestrian)
- Easement, if required.
- Size of Service Lateral and Meter
- Reference to Standard Detail Drawings
FEES

The Water Division will require the payment of plan check and inspection fees concurrently with filing the application and submission of the drawing for review. A fee for checking, preparing and recording of easement documents, when applicable, will also be required prior to drawing approval. Fees shall conform to the latest revision of the Water Division’s Fee Schedule.

RECORD DRAWINGS

The contractor shall have on file one (1) set of construction plans, hereinafter referred to as “Record Drawings”, upon which he shall record all variations between the work as constructed and as originally shown on the approved construction plans. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to indicate fully the work as actually constructed. Said record drawings shall be accessible at all times during the construction period and shall be delivered to the Water Division upon completion of the work.

SECTION 4 – CONTROL OF MATERIALS

4-1.6 Trade Names or Equals

Whenever materials or equipment are specified or described in these Standard Plans and Specifications by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicated that no substitution is permitted, the name shall be deemed to be followed by the words “or approved equal” and the materials or equipment of other suppliers may be accepted by the Water Division if sufficient information is submitted by the contractor to allow the Water Division to determine that the material or equipment proposed is equivalent to that named.

In compliance with the provisions of Section 4380 of the Government Code of the State of California, the contractor will have thirty (30) calendar days after award of the Contract to submit data substantiating a request for substitution of any “or equal” items, when allowed.

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK

6-1.4 Public Works Inspection Outline

Section 6-1.2 (Public Works Inspection Outline) of the City of Orange Public Works Standard Plans and Specifications shall be modified to include the following water system construction:

Required Inspections:

I. (F) Water main, valves, laterals, services, fire hydrants and appurtenances

II. (F) Water main, valves, laterals, services, fire hydrants and appurtenances
   1) Department of Industrial Safety Permit
2) Certificate of Compliance
3) Trenching Operations
4) Pipe laying and bedding
5) Fire hydrants, valves, services and appurtenances
6) Butterfly valve field testing
7) Backfill of trenches
8) Pressure Testing
9) Disinfection
10) Electrical continuity test (for PVC Pipe locator wire)
11) Raising of valve boxes, meter boxes, fire hydrant collars

6-9.1 Warranty

The applicant/developer or his contractor shall warranty the public water systems against leaks and breaks due to defective materials or workmanship furnished by the contractor and against settlement of backfill and damage to pavement for a period of one year from the date of acceptance by the Water Division. Damage or leaks due to acts of God or from sabotage and/or vandalism are specifically excluded from this warranty.

The date of acceptance by the Water Division will be the date on which the public water systems for the entire tract or commercial or industrial complex is accepted by the Water Division. Partial releases are not considered to relieve the applicant/developer or the contractor of responsibilities under this section.

In emergencies demanding immediate attention, the City of Orange Water Division shall have the right to repair the defective material or workmanship or damage and charge the applicant/developer or contractor with the actual cost of all labor and material required.
PART 2: CONSTRUCTION MATERIALS

SECTION 209 – PRESSURE PIPE

209-0 General

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 Plans and 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.

Unless otherwise specifically authorized by the Water Division, all pipe 4-inches through 12-inches 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, typically construction east of 55 Freeway.

209-1.1 Ductile Iron Pipe for Water

209-1.1.1 General

Ductile Iron Pipe shall be manufactured in accordance with ANSI/AWWA C-151, latest revision. The minimum wall thickness for ductile iron pipe shall be as specified in AWWA C-150, latest revision, for the design pressure class for the bell and spigot pipe. Pipe 4-inches through 12-inches in diameter shall be push-on type, single-gasket joint, Pressure Class 350 Ductile Iron Pipe. Pipe 16-inches 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 fourteen (14) inches are not allowed unless otherwise specifically authorized by the Water Division.
209-2.2.4  Pipe Joints

Ductile iron pipe shall be furnished in eighteen (18) foot nominal laying length and shall have a push-on type, single gasket joint employing a rubber gasket in accordance with AWWA Standard C 111, latest revision.

Above ground or exposed pipe joints shall be flanged. Flanges shall be “screwed-on” type in accordance with ANSI/AWWA C 115, latest revision.

Where restrained joints are indicated on the plans or required by the Water Division, the push-on joints or fittings shall be restrained in accordance with the requirements specified in 209-2.2.8 (Restrained Joints).

209-2.2.5  Fittings

Ductile iron pipe fittings shall be full sized ductile iron fittings manufactured in accordance with ANSI/AWWA C-110, latest revision. Ductile iron compact body fittings may be used for fitting sizes 4-inches through 12-inches in diameter and shall be manufactured in accordance with ANSI/AWWA C-153, latest revision.

Fittings are to be restrained mechanical joint by restrained mechanical joint or restrained mechanical joint by flange as specified in Section 209-2.2.8 unless specifically called out on the construction drawings and approved by the Water Division.

Ductile iron mechanical joint fittings shall comply with AWWA C-111, latest revision, with a pressure rating of 250 psi and ANSI Class 125 and Class 150 bolt patterns. Tee-head bolts and hexagonal nuts for all mechanical joints shall be Grade A307, blue coated steel. Nuts and bolts shall be finished with the TRIPAC 2000 Blue coating system or approved equal, to reduce the effects of corrosion.

All fittings with flanged ends shall comply with AWWA C-110, latest revision, with a pressure rating of 250 psi and a Class 125 AME/ANSI B-16.1 flange or AWWA C-115 Class 125 flange. The contractor shall be careful to confirm the mating flange, especially of valves, to make sure the compatibility of the two flanges. The gasket surface shall have a serrated finish of approximately 16 serrations per inch, approximately 1/32-inch deep, with serrations in either a concentric or spiral pattern.

209-2.2.6  Lining and Coating

The interior of all ductile iron pipe and fittings shall be lined with cement-mortar per ANSI/AWWA C-104, latest revision.

Exterior surfaces of buried pipe and fittings shall be coated with an asphaltic material in conformance with ANSI/AWWA C-110, latest revision, and ANSI/AWWA C-151, 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.
209-2.2.7 Polyethylene Encasement for External Corrosion Protection

All ductile iron pipe and fittings shall be wrapped with polyethylene in accordance with ANSI/AWWA C-105, latest revision. Polyethylene material shall be clear 8 mil polyethylene flat tubing with dimensions appropriate for the size of pipe installed.

209-2.2.8 Restrained Joints

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. For 8-inches in diameter and smaller pipe, 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. For 10-inches in diameter and larger pipe, 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” as manufactured by EBBA Iron, Inc.; “UNIFLANGE Series 1400” as manufactured by The Ford Meter Box Co.; 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. All threaded harness parts shall be manufactured of type 316 stainless steel. 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 fittings.

Maximum allowable deflections permitted shall be as specified in Section 306-1.2.2. In addition to mechanical joint restraints, locking gaskets and or locking restrained pipe and fittings, the mechanical joint fittings shall be thrust blocked and or anchored with the Water Division Standard Plan (Thrust Block Details) unless otherwise and specifically authorized by the Water Division on the plans.
209-2.2.9 Grooved Pipe

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 C-606, rigid radius-cut groove. Grooved end couplings shall be ductile iron, ASTM A-536, Grade 65-45-12. Bolts shall be Type 316 stainless steel and conform to ASTM A-183, minimum tensile strength of 110,000 psi. Gaskets shall be EPDM and shall conform to ASTM D-2000. Couplings shall be Victualic Style 77, Gustin-Bacon, Grinnel or approved equal.

All of the threaded parts shall be Type 316 stainless steel and shall be lubricated with anti-seize compound, N-5000 Loctite® anti-seize/rust preventer lubricant manufactured by the Henkel Company or approved equal.

209-2.2.10 Outlets

Outlets for ductile iron pipe shall be as follows:

2” or smaller: Double strap brass saddle as specified in Section 306-1.8
4” and larger: Ductile iron tee fitting

209-2.2.11 Gaskets

Gaskets for push-on, mechanical, and restrained joints shall be synthetic or natural rubber in accordance with AWWA C-111, latest revision.

Gaskets for flanged joints shall be 1/8-inch 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.

Full face type gaskets with pre-punched holes shall be used where both flanges are flat face. Ring gaskets extending to the inner edge of the bolts may be used where a raised face flange is present.

209-2.3 Bolts, Nuts and Washers

Bolts, nuts and washers for buried flanges, flanges located outdoors above ground, and flanges located in open vaults and structures, shall be Type 316 stainless steel conforming to ASTM A 193, Grade B8M for bolts, and ASTM A 194, Grade 8M for nuts.

Washers shall be provided for each nut and shall be Type 316 stainless steel.

The length of each bolt or stud shall be such that between ¼ inch and ½ inch will project through the nut when drawn tight.

For all stainless steel nuts and bolts, the contractor shall use N-5000 Loctite® anti-seize/rust preventer lubricant manufactured by the Henkel Company or approved equal.
209-4 Special Applications Using Polyvinyl Chloride (PVC) Pressure Pipe

209-4.1 General

At the sole discretion of the Water Division, polyvinyl chloride (PVC) pipe material may be required in areas of highly corrosive soil, typically construction east of 55 Freeway. Otherwise, PVC pipe is not an acceptable pipe material. PVC pipe shall be manufactured in accordance with AWWA C-900, 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 pipes larger than twelve (12) inches in diameter shall not be allowed. PVC pipe shall have gasket bell end or plain end with elastomeric gasket coupling. All PVC pressure pipe shall be colored blue.

209-4.2 Pipe Requirements

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 (20) feet nominal with the manufacturer’s option to supply up to 15% random (minimum of ten (10) feet). 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 C-900). Pipe shall be as manufactured by CertainTeed Corporation, IPEX, Inc., Vinyltech Corporation, Diamond Plastics Corporation, or approved equal.

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.

209-4.3 Fittings

Fittings for PVC pressure pipe shall be ductile iron fittings as specified in Section 209-2.2.5, except the fittings shall be lined and coated with 8 mils of fusion bonded epoxy. The fusion bonded epoxy shall conform to AWWA C-116, latest revision, and C-550, latest revision, as manufactured by 3-M or approved equal.

The fittings shall also be coated with the special protection of metal surfaces for all construction east of the 55 Freeway as specified in Section 209-9. In addition, the fitting shall be wrapped with a polyethylene encasement as specified in Section 209-2.2.7.

All fittings shall be thrust-blocked and/or anchored in accordance with the Water Division Standard Plan (Thrust Block Details). In addition to thrust blocks, the mechanical joint fitting shall be restrained. The restraint at the mechanical joint fitting shall be restrained using split, serrated restraint ring with 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 EBBA Iron, Inc. The connecting rods shall be Type 316 stainless steel. The fitting restraint shall be EBBA Iron, Inc. Series 1900MJ, The Ford Meter Box Company, Inc. Series 1300 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. The restraint device shall be coated with the special protection of metal surfaces for all construction east of the 55 Freeway as specified in Section 209-9. In addition, the fitting and restraint device shall be wrapped with a polyethylene encasement as specified in Section 209-2.2.7.

209-4.4 Service Saddles

Service saddles shall be designed for use on AWWA C-900 PVC Pipe for 1-inch and 2-inch diameter outlets. Service saddles shall be manufactured of brass with stainless steel band. The strong, extra wide fabricated stainless steel band will conform to the PVC pipe surface resulting in nearly 360 degree. 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 2-inches in diameter, ductile iron tees with flanged outlets shall be used.

209-4.5 Curved Alignment (Deflections)

The PVC pipe shall not be laid along curves at a radius less than 1146 feet for 20-foot pipe lengths or 573 feet for 10-foot pipe lengths. The minimum radius curves are determined by the limit of 1-degree deflection for AWWA C-900 PVC pipe joints with factory-assembled bell couplings. For integral bell PVC pipe, the minimum radius curves obtained by deflecting joints shall not exceed the manufacturer’s recommendation (which may be less than one degree). 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.

Pipe sections shall not be bent to achieve a curve. For curves of smaller radius, ductile iron fittings or high deflection couplings shall be used. High deflection couplings may be used for angles 4° or less.

209-4.6 PVC Couplings

The high deflection couplings shall be PVC couplings, meeting the requirements of AWWA C-900, latest revision, with twin elastomeric gaskets which allow two (2) degrees of deflection at each gasket for a total of four (4) degrees per coupling. The couplings shall be provided for ductile iron equivalent outside diameter and have a 200 psi working pressure rating. The high deflection couplings shall be “High Deflection (HD) Stop Couplings” as manufactured by CertainTeed, or approved equal.

For closure applications, PVC couplings, meeting the requirements of AWWA C-900, latest revision, with twin elastomeric gaskets which are designed to connect plain ends of pipe can be used. The closure couplings shall be provided for ductile iron equivalent outside diameter and have a 200 psi working pressure rating. The closure couplings shall be “Closure/Repair Couplings” as manufactured by CertainTeed, or approved equal. Do not deflect pipe in these couplings.
209-4.7  Locator Wire

Copper tracer wire shall be placed continuously along the pipe for the purpose of providing a continuous signal path for electronic pipe locators used to determine the pipe alignment after installation. The copper tracer wire shall be Copperhead Industries Model #10CCS High Strength 600# Break Load with Locking SnakeBite Tracer Wire Connectors, or approved equal. The wire shall be electrically continuous throughout the entire pipe system including adjacent service line assemblies. The connectors shall be spaced at not more than 13 feet apart.

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. All wire connectors and splices shall be wrapped with PVC tape and the wire shall be tied to the pipe at ten (10) foot intervals with plastic adhesive tape.

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.

209-5  Main Line Valves

209-5.1  General

For four (4) inches through twelve (12) inches diameter valves, resilient-seated solid wedge gate valves shall be provided. For valves larger than 12-inches in diameter, butterfly valves or resilient seated gate valves shall be provided.

Valves shall have 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 2-inch 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.

Body bolts for all valves shall be Type 316 stainless steel.
209-5.2 Gate Valves

Gate valves for twelve (12) inches 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 C-509, latest revision.

Valve stems and stem nuts shall be of 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 C-116, latest revision, and C-550, latest revision. The interior coating shall be certified to NSF 61.

The following manufacturers are approved for use within the City of Orange: Clow RW Valve Model 2639; Kennedy Ken-Seal Valve 7000 Series; M&H Resilient Wedge Valve Style 7000; Mueller A-2362 Resilient Wedge Valve; and U.S. Pipe Model No. A-USP2 Resilient Wedge Valve. No substitution is permitted.

209-5.3 Butterfly Valves

Butterfly valves shall be short body, restrained mechanical joint, or restrained mechanical joint by flange, conforming to AWWA Standard C-504, 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, ANSI 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.

Valves shall be Pratt Groundhog, Desurik BAW, Mueller Lineseal, or approved equal.

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 C-550, 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.

Gear actuators shall be provided on all butterfly valves fourteen (14) inches and larger. Butterfly valves less than 24-inch 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, Dezuirk M-Series, Mueller MDT, or approved equal. Gear actuators for valves 24-inch 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 larger than 12-inches in diameter 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 (5) 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 (20) 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.

209-5.4 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.

209-5.5 Valve Boxes

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 10 ¼ inch, and cast iron top with a triangular cover marked “water”. Valve boxes shall be Eisel Enterprises #4TT, Brooks #4-TT, H&C 4-TT, or approved equal.

Valve box riser pipe shall be standard 8-inch diameter SDR 35 PVC pipe.

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

209-6 Fire Hydrant Assemblies

209-6.1 General

Fire hydrants shall be California type, wet-barrel, ductile iron body, conforming to AWWA C-503, latest revision.

209-6.2 Materials and Parts

Fire hydrants shall have on 2 ½” hose outlet and one 4” pumper outlet. Outlet threads shall be American National Standard Hose Threads. Outlet caps shall be cast iron and shall include chains and gaskets.

Valve stems shall be NDZ Bronze. All stems shall have pentagon operating nuts measuring 1 ½” from point to flat. Flange drilling shall be 6-hole. Bolts shall be the break-off type 5/8” x 3” plated
hexagon-head machine bolts. Gaskets shall be full flange gaskets, made from 1/8” cloth-inserted rubber sheet.

Interior ferrous surfaces shall be coated with a fusion-bonded epoxy with a dry film thickness of not less than 8 mils in accordance with AWWA Standard C-550, latest revision.

Exterior ferrous surfaces shall be painted with a “Safety Orange” coating, as specified within Section 209-13.4.

Hydrant bury shall be ductile iron with 6-inch mechanical joint inlet connection. Interior surfaces shall be coated with a fusion-bonded epoxy with a dry film thickness of not less than 8 mils in accordance with AWWA Standard C-550, latest revision.

Hydrant extensions shall be ductile iron and shall be fusion epoxy lined with a dry film thickness of not less than 8 mils in accordance with AWWA Standard C-550, latest revision.

The following hydrant is approved for use within the City of Orange: Clow 850. No substitution is permitted.

209-7  Service Materials

209-7.1  General

All valves and fittings for use in the buried service line from the main to the meter shall conform to the requirements of AWWA Standard C-800 (Underground Service Line Valves and Fitting), latest revision, and meet the California Health & Safety Code Section 116875. Materials in contact with potable water shall be provided with materials that meet the lead free requirements as defined in AB 1953.

209-7.2  Copper Pipe and Tubing

Copper piping shall conform to ASTM B88. Copper pipe and tubing shall be cylindrical, of uniform wall thickness, and shall be free from any cracks, seams, or other defects.

All 3/4”, 1”, 1 ½”, and 2” service laterals shall be installed using Type “K” soft copper pipe.

All service lateral piping shall be wrapped with polyethylene tubing in accordance with AWWA Standard C-105, latest revision. Polyethylene material shall be clear 8 mil polyethylene flat tubing with dimensions appropriate for the size of pipe to be wrapped.

Copper pipe 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. Connections for ¾” and 1” services shall be made with 1” Mueller 110 compression coupling or approved equal. Connections for 1½” services shall be made with 1½” Mueller 110 compression couplings or approved equal, or soldered copper couplings. Connections for 2” services shall be made with 2” Mueller 110 compression couplings, or approved equal, or soldered copper couplings.
Soldered copper couplings for the 1½-inch and 2-inch service laterals shall be made with copper tube fittings in accordance with ANSI 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.

209-7.3 Brass Pipe and Nipples

Short threaded nipples and brass pipe shall conform to ASTM B43, regular wall thickness, except that nipples and pipe of sizes 1-inch and smaller shall be extra strong. Threads shall conform to ANSI B1.20.1. Brass material shall conform to ANSI/AWWA Standard C-800, latest revision, with a maximum lead content of 0.25% by average weight.

209-7.4 Brass Appurtenances

All items shall be manufactured of brass conforming to AWWA Standard C-800, latest revision, with a maximum lead content of 0.25% by average weight. All potable water facilities shall be provided with materials that meet the lead free requirements as defined in AB 1953.

a. Service saddles shall be double strap type for all sizes of ductile iron pipe. Service saddle bodies shall be manufactured of brass. Saddles shall be tapped with a cs/tapered thread outlet (to receive a corporation stop thread). The seal with the outer wall of the pipe shall be effected with either a rubber gasket or an O-ring. The straps (or bails) shall be flat and shall be manufactured of Everdur or Silnie bronze or stainless steel. Service saddles shall be as manufactured by Ford, Jones, Mueller, or approved equal. See Section 209-4.4 for service saddles for AWWA C-900 PVC pressure pipe.

b. Corporation stops shall be manufactured of brass. The inlet connection shall be corporation stop thread when used with a saddle, and the outlet connection shall be a compression connection. 1-1/2-inch and 2-inch corporation stops shall be “ball style”, or key angle.

The following manufacturers are approved for use within the City of Orange (no substitution is permitted):

- ¾” Corporation Stop:   Jones J-3401-SQ, Ford F1000Q, or Mueller H15008.
- 1” Corporation Stop:   Jones J-3401-SQ, Ford F1000Q, or Mueller B25008.
- 1½” Corporation Stop:  Jones J-1937-SQ, Ford FB1000Q, or Mueller B25008.
- 2” Corporation Stop:   Jones J-1937-SQ, Ford FB1000Q, or Mueller B25008.

b. Angle meter stops shall be manufactured of brass. The inlet connection shall be compression connection, and the outlet connection shall be a meter flange or meter coupling. The following manufacturers are approved for use within the City of Orange (no substitution is permitted):

- ¾” 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
1½” 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

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

e. All bolts, nuts and washers for flanged fittings shall be made using Type 316 stainless steel. All stainless steel threaded parts shall be lubricated with anti-seize compound, N-5000 Loctite® anti-seize/rust preventer lubricant manufactured by the Henkel Company or approved equal.

209-7.5 Meter Box

Water meter boxes shall be manufactured by Armorcast or approved equal. Meter boxes shall be straight wall polymer concrete. Covers shall be AMR/AMI top mount. The following are the meter box and cover size for each size of meter (with no courtesy valve):

<table>
<thead>
<tr>
<th>Meter Size</th>
<th>Meter Box Size</th>
<th>20K AMR/AMI Cover Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8” x ¾”</td>
<td>10” x 15” x 12”</td>
<td>A6001922-TH*</td>
</tr>
<tr>
<td>1”</td>
<td>12” x 20” x 12”</td>
<td>A6000484-TH*</td>
</tr>
<tr>
<td>1-1/2”</td>
<td>13” x 24” x 12”</td>
<td>A6001969-TH*</td>
</tr>
<tr>
<td>2”</td>
<td>17” x 30” x 12”</td>
<td>A6001947-TH*</td>
</tr>
</tbody>
</table>

The following are the meter box and cover size for each size of meter (with courtesy valve):

<table>
<thead>
<tr>
<th>Meter Size</th>
<th>Meter Box Size</th>
<th>20K AMR/AMI Cover Part #</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8” x ¾”</td>
<td>12” x 20” x 12”</td>
<td>A6000484-TH*</td>
</tr>
<tr>
<td>1”</td>
<td>13” x 24” x 12”</td>
<td>A6001969-TH*</td>
</tr>
<tr>
<td>1-1/2”</td>
<td>17” x 30” x 12”</td>
<td>A6001947-TH*</td>
</tr>
<tr>
<td>2”</td>
<td>17” x 30” x 12”</td>
<td>A6001947-TH*</td>
</tr>
</tbody>
</table>

Where required, meter boxes shall have traffic load rating covers. Traffic load rating covers will be allowed only with specific approval from the Water Division.
209-8  Appurtenances

209-8.1  Air and Vacuum Valve

Air and vacuum valves shall be combination air release and vacuum relief valves and shall be manufactured in accordance with AWWA Standard C-512, 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.

Valves shall be APCO 140C, Crispin UL, Cla-Val Series 36, and A.R.I. D-040 ST. No substitution is permitted.

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 18-inches in diameter and 30-inches high.

209-8.2  2-inch Blowoff

The 2-inch blow off shall be a 2-inch curb stop manufactured of brass.

The following manufacturers are approved: Jones J-1900, Ford B11-777, and Mueller B-20200 (no substitution is permitted).

209-8.3  Pressure Relief Valve

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. The valve shall be globe pattern CLA-VAL Model 50G-01, BKC with 150 lb flanges and shall be provided with CRL pilot 20-200 psi and X-101 indicator (no substitution is permitted).

The elastomers shall be EPDM rubber material. The main valve body and cover shall be ductile iron, ASTM A 536, Grade 60-40-18. The main valve trim and seat shall be Type 303 stainless steel. The
pilot control system shall be brass with Type 303 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.

### 209-8.4 Tapping Sleeves

Tapping sleeves for ductile iron 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. Bolts, nuts, and washers shall be Type 316 stainless steel.

Mechanical joint type sleeves shall be made of ductile iron and conform to the requirements of AWWA Standard C-110, latest revision, and AWWA Standard C-111, latest revision. All interior surfaces of the ductile iron sleeves shall be lined with a fusion bonded epoxy coating. Mechanical joint type sleeves shall be Mueller H-615, Tyler Ductile Iron MJ Tapping Sleeve, JCM Industries, Inc. JCM 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 C-207, latest revision.

Stainless steel tapping sleeves shall be Mueller Model H-304 SS, Power Seal Model 3490 AS, Smith-Blair Model 663, JCM Industries, Inc. JCM Model 432, Ford Style FAST, Romac Style SST III, or approved equal.

### 209-8.5 Couplings

Sleeve type couplings for ductile iron pipe shall provide a flexible water tight connection between two plain ends of ductile iron pipe. Ductile iron pipe 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 7-inches for pipe sizes up to 6-inches in diameter and shall be a minimum of 10-inches for larger than 6-inch 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 C-111.

Sleeve type couplings for ductile iron pipe shall be Clow MJ Solid Long Sleeves, Tyler Long Solid Sleeves, Baker Series 228, Dresser Style 153, Ford Style FCI, Romac Style 501, or approved equal.

### 209-9 Special Protection of Metal Surfaces

For all construction east of 55 Freeway, 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 this coating, all metal surfaces as previously described, shall be wrapped with polyethylene in accordance with ANSI/AWWA C-105, latest revision. Polyethylene material shall be clear 8 mil polyethylene flat tubing with dimensions appropriate for the surfaces to be covered.
209-10  Precast Concrete Vaults

For the 4-inch service installation (with 3-inch meters), 6-inch service installation, and the 8-inch 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, Eisels 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 (G SA-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 1-1/2-inch 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.

209-11  Fire Suppression Services

209-11.1  Fire Suppression Service Requirements

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

All fire suppression services for two or more 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, 2-inches 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.

209-12 Backflow Prevention

209-12.1 Backflow Protection

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.

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”, 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.

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

- “Manual of Cross-Connection Control”, published by Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, School of Engineering.

209-12.2 Backflow Device Locations

All fire suppression services requiring a backflow assembly as specified in Section 209-11.1 (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.

209-12.3 Materials

Backflow prevention assemblies shall conform to the latest edition of AWWA Standard C-510 or C-511 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.

209-13 Painting

209-13.1 General

All above ground installations shall be painted in accordance with Section 310 (Painting) of the Standard Specifications and the following:

Remove all dirt, oil, grease, rust, bituminous coating, and other contaminants from the surfaces to be painted by sand-blasting, 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 immediate 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.

209-13.2 Fire Hydrant

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 Carborocrylic 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 Carborocrylic 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 Carborocrylic 3359 MC; Sherwin Williams Zero VOC Acrylic; Tnemec Series 1028 Enduratone; International/Devoe Devflex 4216 HP; or approved equal.

209-13.3 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.
209-13.4 Colors

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

<table>
<thead>
<tr>
<th>Item</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Hydrants</td>
<td>Safety Orange</td>
</tr>
<tr>
<td>Private Fire Hydrants (Contact the City Fire Prevention Bureau for color coding requirements related to private fire hydrants)</td>
<td></td>
</tr>
<tr>
<td>All Other Above Ground Pipe and Fittings</td>
<td>Medium or Pastel Green (unless otherwise approved by the Water Division)</td>
</tr>
<tr>
<td>(4-inch diameter or larger)</td>
<td></td>
</tr>
<tr>
<td>Guard Posts</td>
<td>Safety Yellow</td>
</tr>
<tr>
<td>Air and Vacuum/PRV Enclosures</td>
<td>Tan</td>
</tr>
</tbody>
</table>

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.
PART 3: CONSTRUCTION METHODS

SECTION 306 – OPEN TRENCH CONDUIT CONSTRUCTION

306-0 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.

306-0.1 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 are 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.

306-0.2 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.

306-0.3 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.

306-0.4 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).

306-1.1 Backfill and Densification

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.

306-1.1.1 Trench Excavation

The pipeline, fittings, and appurtenances shall be installed at a minimum depth of three and one-half (3.5) feet 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 (30) inches 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.

306-1.2.1 Bedding

For all water piping (ductile iron pipe, PVC pipe and copper tubing), backfill within the pipe zone, which is six (6) inches below the pipe to twelve (12) inches 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 ¾-inch 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 2-inches and not containing excessive amounts of clay and loam. Crushed stone is limestone or dolomite ledge-rock material that all passes a ½-inch 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.

306-1.2.2 Pipe Laying

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 five (5) percent. 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.

A. Ductile iron pipe and ductile iron fittings shall be installed in accordance with the applicable sections of AWWA Standard C-600 (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.

B. PVC Pressure Pipe and fittings shall be installed in accordance with AWWA Standard C-900, latest revision, and the applicable sections of AWWA Standard C-605 (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 209-4.5 (Curved Alignment) of these Standard Specifications.

306-1.4.5 Water 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.

306-1.8 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 4-inches 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. Service taps shall be performed at an angle of forty-five (45) degrees relative to the horizontal plane.

D. Direct tapping of Pressure Class 350 ductile iron pipe shall conform to the following requirements:

1. ¾-inch service shall be direct tap to all size mains.
2. 1-inch service shall be direct tapped on 6-inch diameter and larger mains. 4-inch diameter water mains shall be installed with a service saddle connection.
3. 1-1/2 inch service shall be direct tapped on 14-inch diameter and larger water mains. 12-inch diameter and smaller water mains shall be installed with a service saddle connection.
4. 2-inch service shall be direct tapped on 16-inch diameter and larger water mains. 14-inch diameter and smaller water mains shall be installed with a service saddle connection.

306.1.9 Installation of Services and Appurtenances

A. 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 mega-lug retaining glands or approved equal.

B. Polyethylene wrap: Polyethylene tubing shall be installed over all ductile iron pipe, copper tubing, valves, and appurtenances per AWWA Standard C-105, latest revision, and these Standard Specifications.

C. All City dedicated fire hydrants shall be painted after installation with approved Safety Orange coating in accordance with these Water Division Standard Specifications.

D. Water valves shall be set plumb, and shall be stabilized and supported separately from the pipeline. Backfill within 24-inches of the valve shall be clean washed sand.

E. 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.

F. 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.

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

H. 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.

I. 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.

J. 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.

K. 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.

306-1.10 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 water tight 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 306-1.11 (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 shut-downs.
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.

306-1.11 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 C-651 (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 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.

306-1.12 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.

306-1.13 Final Inspection

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.

306-1.14 Final Approval

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.

306-2.7 Jacking Steel Pipe

306-2.7.1 General

Jacking operations shall be performed in accordance with Section 306-2.7 (Jacking Operations) of the Standard Specifications and these Standard Plans and Specifications.

For each bore exceeding 30-inches 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.

306-2.7.2 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.

306-2.7.3 Casing Seals

Casing seals shall be 1/8-inch 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.

306-2.7.4 Grout Connections

For casing pipes 30-inches in diameter and larger, the contractor shall provide 1-inch 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 30-inches 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.

306-2.7.5 Casing Skids

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

306-2.7.6 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.

306-5 Abandonment of Conduits and Structures

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.
PART 9

SECTION 900 - ALTERNATE ROCK PRODUCTS, ASPHALT CONCRETE
PORTLAND CEMENT CONCRETE AND UNTREATED BASE MATERIAL

900 Portland Cement Concrete Aggregates

900-1.1 General

The Cleanness Value requirement of Section 200-1.4 shall be replaced with the following:

<table>
<thead>
<tr>
<th>Tests</th>
<th>Test Method No.</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleanness Value</td>
<td>California 227</td>
<td></td>
</tr>
<tr>
<td>Individual Test</td>
<td></td>
<td>70 Min.*</td>
</tr>
<tr>
<td>Moving Average</td>
<td></td>
<td>75 Min.*</td>
</tr>
</tbody>
</table>

The Sand Equivalent requirement of Section 200-1.5.3 shall be replaced with the following:

<table>
<thead>
<tr>
<th>Tests</th>
<th>Test Method No.</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand Equivalent:</td>
<td>California 217</td>
<td></td>
</tr>
<tr>
<td>Individual Test</td>
<td></td>
<td>70 Min.*</td>
</tr>
<tr>
<td>Moving Average</td>
<td></td>
<td>75 Min.*</td>
</tr>
</tbody>
</table>

*For 2500 or less class concrete, except concrete pavement, a minimum 65 Individual Test Result and minimum 70 Moving Average will be acceptable if the 28-day strength exceeds 2500 p.s.i. at a 6-inch slump or greater.

Portland Cement Concrete shall be sampled and tested in accordance with the following ASTM and California Test Methods:

- Sampling Fresh Concrete: California No. 539
- Obtaining Drilled Cores: C-42
- Molding and Curing Specimens: California No. 540
- Compressive Strength: California No. 521
- Flexural Strength: California No. 536
- Slump: C-143
- Air Content: California No. 504
- Unit Weight, Yield: California No. 518
- Setting of Mortar: C-191 or C-266
- Mortar Cube Test: California No. 515
- Drying Shrinkage (with admixture): California No. 530

Unless otherwise restricted by the City of Orange General Plan, Old Towne Historic District, Redevelopment Agency Standards or other Special Districts, no color admixtures shall be used in
Portland Cement Concrete (PCC) construction work within the public street right-of-way.

900-2 Processed Miscellaneous Base

At least 65 percent by weight of the material retained on No. 4 sieve shall be crushed particles as determined by Test Method No. California 205.

900-4.1 Asphalt Concrete: General

The asphalt concrete class shall be as designated in the following table:

**ASPHALT CONCRETE CLASS USE TABLE**

<table>
<thead>
<tr>
<th>Construction</th>
<th>Asphalt Concrete Class</th>
<th>Asphalt %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arterial Highways</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Course</td>
<td>III-B2-PG 64-10</td>
<td>4.6 to 6.0%</td>
</tr>
<tr>
<td>Surface Course</td>
<td>III-C3-PG 64-10</td>
<td>4.6 to 7.0%</td>
</tr>
<tr>
<td>Asphalt Rubber Hot Mix (ARHM)</td>
<td>ARHM-GG-B</td>
<td></td>
</tr>
<tr>
<td><strong>Other Streets (Residential)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Course</td>
<td>III-B2-PG 64-10</td>
<td>4.6 to 6.0%</td>
</tr>
<tr>
<td>Surface Course</td>
<td>III-C3-PG 64-10</td>
<td>4.6 to 7.0%</td>
</tr>
<tr>
<td>Asphalt Concrete Curb (berm)</td>
<td>III-D- PG 64-10</td>
<td>6.0 to 8.0%</td>
</tr>
<tr>
<td>Feathered edges of base course</td>
<td>III-C3- PG 64-10</td>
<td>4.6 to 7.0%</td>
</tr>
</tbody>
</table>

900-4.2 Coarse Aggregate

Coarse aggregate shall consist of a material of which at least 75 percent by weight shall be crushed particles.
CITY OF ORANGE WATER DIVISION

STANDARD PLANS
CITY OF ORANGE WATER DIVISION STANDARD PLANS

OWD-101   Valve Box Installation
OWD-102   Fire Hydrant Assembly
OWD-103   Fire Hydrant Concrete Collar and Landscape Area Installation
OWD-104   Fire Hydrant Guard Post Installation
OWD-105   End of Line Blowoff Assembly
OWD-106   Plug Installation
OWD-107   Hot Tap and/or Solid Sleeve Installation
OWD-108   Valve Installation
OWD-109   Thrust Block Details
OWD-110   Typical Trench Section
OWD-111   Offset Joint Detail (Typical Inverted Siphon and Typical Siphon)
OWD-112   Concrete Encasement and Slope Anchors
OWD-113   Separation of Water Mains, Sanitary Sewers and Storm Drains
OWD-114   Steel Casing Pipe

OWD-201   Service Tap Installation (Copper Tubing)
OWD-202   ¾” Service Installation  (Copper Tubing)
OWD-203   1” Service Installation  (Copper Tubing)
OWD-204   1-1/2” Service Installation  (Copper Tubing)
OWD-205   2” Service Installation (Copper Tubing)
OWD-206   3” Service Installation (Copper Tubing)
OWD-207   3” Service Installation – Long Side (Ductile Iron Lateral)
OWD-208   4” Service Installation – Ductile Iron Lateral – 4- 2” Meters
OWD-209   4” Service Installation – Ductile Iron Lateral – 2- 3” Meters
OWD-210   3” and 4” Irrigation Service Installation
OWD-211   8”/ 6” Service Installation
<table>
<thead>
<tr>
<th>OWD-212</th>
<th>Meter Box Installation in Landscaped Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>OWD-213</td>
<td>Radio Read Meter</td>
</tr>
<tr>
<td>OWD-301</td>
<td>Jumper Installation</td>
</tr>
<tr>
<td>OWD-302</td>
<td>Air and Vacuum Valve Assembly</td>
</tr>
<tr>
<td>OWD-303</td>
<td>Combination Fire Hydrant &amp; Approved Backflow Device Assembly for Long Side Street Crossing</td>
</tr>
<tr>
<td>OWD-304</td>
<td>Combination Fire Suppression and Domestic Service</td>
</tr>
<tr>
<td>OWD-305</td>
<td>Typical 4” and Larger Backflow Prevention Device</td>
</tr>
<tr>
<td>OWD-306</td>
<td>Typical 2” and Smaller Backflow Prevention Device</td>
</tr>
<tr>
<td>OWD-307</td>
<td>Well Destruction</td>
</tr>
<tr>
<td>OWD-308</td>
<td>Water Quality Sampling Station</td>
</tr>
<tr>
<td>OWD-309</td>
<td>3” Pressure Relief Valve Installation</td>
</tr>
<tr>
<td>OWD-310</td>
<td>Enclosure for 2” and Smaller Backflow Prevention Device</td>
</tr>
</tbody>
</table>
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 306-1.12 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.

---

CITY OF ORANGE WATER STANDARDS

STANDARD

VALVE BOX INSTALLATION

<table>
<thead>
<tr>
<th>REVISION</th>
<th>DRAWN</th>
<th>APP'D</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

APPROVED

04/30/18

CITY WATER MANAGER

04/30/18

CITY ENGINEER

04/30/18

PUBLIC WORKS DIRECTOR

04/30/18

DATE: APRIL 2018

OWD-101

STANDARD DRAWING NUMBER
NOTES:

1. THRUST BLOCKING SHALL CONFORM TO STD OWD—109.
2. TUNNEL BENEATH EXISTING CURB & GUTTER AND BACKFILL W/ SAND OR SLURRY.
3. ORIENT HYDRANT OUTLETS TO FACE STREET.
4. PROVIDE "BREAKAWAY" BOLTS AT HYDRANT FLANGE.
5. FIRE HYDRANT SHALL BE PAINTED SAFETY ORANGE PER SECTION 209—13.2 OF WATER DIVISION STANDARD SPECIFICATIONS.
6. IN SITUATIONS WHERE FIRE HYDRANT RUN IS OVER 20 FEET, THE SIZE OF THE HYDRANT LATERAL, AND VALVE SHALL BE 8-INCHES.
CONCRETE COLLAR

FIRE HYDRANT
ASSEMBLY PER
STD OWD-102
OR OWD-102SP

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.

SECTION A – A
FENCE / PROPERTY LINE / OR STRUCTURE

8' MIN. CLR. / FENCE / R
20' MIN. CLR. / STRUCTURE

3' CLEAR (TYP.)

4" STD. STEEL PIPE

4" STD STEEL PIPE FILL PIPE WITH CONCRETE (ROUNDED ON TOP)

3'

4" STD. STEEL PIPE

FINISHED GRADE

3' MIN.

CONCRETE

12"

NOTES:
1. 4" STD. STEEL PIPE SHALL BE GALVANIZED COATED.
2. NUMBER OF POSTS MAY VARY AS DETERMINED BY CITY INSPECTOR.

CITY OF ORANGE WATER STANDARDS
STANDARD
FIRE HYDRANT GUARD POST INSTALLATION

OWN-104
TYPICAL CUL-DE-SAC

WATER MAIN

6' MIN.

12' MIN. - 20' MAX.

VALVE BOX PER
STD OWD-101

F.S.

CEMENT GROUT IN VOID BETWEEN 4" D.I.P. & VALVE BOX

4" DUCTILE IRON PIPE

4" 90' BEND

THRUST BLOCK PER STD OWD-109

4" RW GATE VALVE (MJ-RESTRAINED)

4" D.I.P.

6' MIN.

REVISION DRAWN APP'D DATE

APPROVED 04/30/18

CITY WATER MANAGER 04/30/18

CITY ENGINEER 04/30/18

PUBLIC WORKS DIRECTOR 04/30/18

CITY OF ORANGE WATER STANDARDS
STANDARD

END OF LINE BLOWOFF ASSEMBLY

OWD-105
THRUPT BLOCK CUT INTO UNDISTURBED SOIL, PER STD OWD-109

TYTON PLUG TAPPED 2"

DUCTILE IRON MAIN

2" x 1 1/2" BUSHING
1 1/2" x 3/4" SERVICE WYE

2" BALL VALVE—J—1900 OR EQUAL
2" x 12" BRASS NIPPLE

TYPICAL DEAD END MAIN

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

SHORT BELL/SPIGOT PIECE

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

TYTON PLUG TAPPED 2"

DUCTILE IRON MAIN

2" BALL VALVE—J—1900 OR EQUAL
2" x 12" BRASS NIPPLE

TYPICAL TEMPORARY PLUG

SHORT SPOOL PIECE

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

TYTON PLUG TAPPED 2" (RESTRAINED)

DUCTILE IRON MAIN

RW GATE VALVE (MJ—RESTRAINED)

2" BALL VALVE—J—1900 OR EQUAL
2" x 12" BRASS NIPPLE

TYPICAL FUTURE TAKEOFF

CITY OF ORANGE WATER STANDARDS

STANDARD

PLUG INSTALLATION

OWD-106
TRENCH EXCAVATION TO BE PERFORMED BY CONTRACTOR. (3' W x 10' L minimum)

TAPPING SLEEVE, VALVE FLG X FLG AND VALVE BOX (PROVIDED BY CITY) CONTRACTOR TO INSTALL VALVE BOX PER STD OWD-101

DUCTILE IRON PIPE (FLG X PE)

SOLID SLEEVE (MJ X MJ) – RESTRANDED*

GAP SHALL NOT EXCEED 1”

NOTE: CONTRACTOR IS REQUIRED TO OBTAIN A PERMIT FROM DEPARTMENT OF PUBLIC WORKS IF WORKING IN THE CITY R/W

*MECHANICAL JOINT CONNECTIONS SHALL BE RESTRANDED PER SECTION 209–2.2.8 OF WATER STANDARD SPECIFICATIONS

CITY OF ORANGE WATER STANDARDS STANDARD

HOT TAP AND/OR SOLID SLEEVE INSTALLATION

OWD-107
NOTE:
MECHANICAL JOINT CONNECTIONS SHALL BE RESTRAINED PER SECTION 209-2.2.8 OF WATER DIVISION STANDARD SPECIFICATIONS.
CITY OF ORANGE WATER STANDARDS

STANDARD

THRUST BLOCK DETAILS

OWN-109

DATE: APRIL 2018

STANDARD DRAWING NUMBER

REVISION DRAWN APP'D DATE

APPROVED

CITY WATER MANAGER

CITY ENGINEER

PUBLIC WORKS DIRECTOR

DATE

DATE

DATE

DATE

04/30/18

04/30/18

04/30/18

04/30/18
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 209-2.2.8 OF WATER DIVISION STANDARD SPECIFICATIONS.

MINIMUM SIZE OF THRUST BLOCK BEARING SURFACE

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>11 1/4&quot; BEND</th>
<th>22 1/2&quot; BEND</th>
<th>45° BEND</th>
<th>90° BEND</th>
<th>TEE</th>
<th>END CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>1'-6&quot; 0'-9&quot;</td>
<td>1'-8&quot; 0'-9&quot;</td>
<td>2'-4&quot; 1'-0&quot;</td>
<td>3'-3&quot; 1'-4&quot;</td>
<td>2'-8&quot; 1'-3&quot;</td>
<td>2'-8&quot; 1'-3&quot;</td>
</tr>
<tr>
<td>6&quot;</td>
<td>1'-9&quot; 1'-0&quot;</td>
<td>2'-6&quot; 1'-3&quot;</td>
<td>3'-6&quot; 1'-6&quot;</td>
<td>4'-8&quot; 2'-3&quot;</td>
<td>4'-0&quot; 2'-0&quot;</td>
<td>4'-0&quot; 2'-0&quot;</td>
</tr>
<tr>
<td>8&quot;</td>
<td>2'-4&quot; 1'-0&quot;</td>
<td>3'-4&quot; 1'-6&quot;</td>
<td>4'-8&quot; 2'-0&quot;</td>
<td>6'-4&quot; 3'-0&quot;</td>
<td>5'-4&quot; 2'-4&quot;</td>
<td>5'-4&quot; 2'-4&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>3'-0&quot; 1'-4&quot;</td>
<td>4'-3&quot; 1'-9&quot;</td>
<td>5'-9&quot; 2'-6&quot;</td>
<td>7'-10&quot; 3'-6&quot;</td>
<td>6'-8&quot; 3'-0&quot;</td>
<td>6'-8&quot; 3'-0&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>3'-6&quot; 2'-0&quot;</td>
<td>5'-0&quot; 2'-3&quot;</td>
<td>6'-10&quot; 3'-0&quot;</td>
<td>9'-6&quot; 4'-3&quot;</td>
<td>7'-10&quot; 3'-6&quot;</td>
<td>7'-10&quot; 3'-6&quot;</td>
</tr>
</tbody>
</table>

VERTICAL DEAD LOAD (MIN. CUBIC YARDS)

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>11 1/4&quot; BEND</th>
<th>22 1/2&quot; BEND</th>
<th>45° BEND</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>0.3</td>
<td>0.5</td>
<td>0.9</td>
</tr>
<tr>
<td>6&quot;</td>
<td>0.5</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>8&quot;</td>
<td>0.9</td>
<td>1.8</td>
<td>3.5</td>
</tr>
<tr>
<td>10&quot;</td>
<td>1.4</td>
<td>2.8</td>
<td>5.5</td>
</tr>
<tr>
<td>12&quot;</td>
<td>2.0</td>
<td>4.0</td>
<td>7.8</td>
</tr>
</tbody>
</table>

CITY OF ORANGE WATER STANDARDS

STANDARD

THRUPT BLOCK DETAILS

OWN-109

DATE: APRIL 2018

STANDARD DRAWING NUMBER

SHHEET 2 OF 2
NOTE:
TRANSVERSE TRENCHES SHALL BE BACKFILLED
WITH 150-É-100 CONCRETE SLURRY PER PUBLIC
WORKS STANDARD PLAN NO. 125, EXCEPT WITHIN
PIPE ZONE.
AIR-VAC PER STD
OWD-302, LOCATION
PER ENGINEER

PROPOSED DIP MAIN
(NO UNRESTRAINED
JOINTS BETWEEN
FITTINGS)

SLURRY
OVER
SAND
BED

30" MINIMUM, UNLESS OTHERWISE
APPROVED BY ENGINEER.

EXIST. FINISHED SURFACE

PROPOSED DIP MAIN
(NO UNRESTRAINED
JOINTS BETWEEN
FITTINGS)

PROPOSED DIP MAIN
(TYP)

FIELD LOCK
GASKETS 2
JOINTS
BACK. (TYP)

THRUPT BLOCK
PER STD
OWD-109
(VERTICAL DEAD
LOAD)

2'
MIN.

VARIES

6" MIN
CLEAR

VARIES

2'
MIN.

(1) OFFSET OR
(2) 45° BENDS (MJ) & (4)
MEGALUGS/JOINT RESTRAINT
PER PLAN

(1) OFFSET OR
(2) 45° BENDS (MJ) & (4)
MEGALUGS/JOINT RESTRAINT
PER PLAN

BACKFILL TRENCH WITH 1-1/2 SACK SLURRY.

PROFILE (TYPICAL FOR ALL UTILITY CONFLICTS)
NOT TO SCALE

*NOTE
CONTRACTOR TO POTHOLE AND VERIFY ALL UTILITY
CONFLICTS IN THE FIELD.

CITY OF ORANGE WATER STANDARDS
STANDARD

OFFSET JOINT DETAIL
(TYPICAL INVERTED SIPHON)

CITY OF ORANGE WATER STANDARDS
STANDARD

OFFSET JOINT DETAIL
(TYPICAL INVERTED SIPHON)

REVISION DRAWN APP’D DATE

APPROVED

CITY WATER MANAGER DATE

CITY ENGINEER DATE

PUBLIC WORKS DIRECTOR DATE

DATE: APRIL 2018

OWD-111

SHEET 1 OF 2
PROFILE (TYPICAL FOR ALL UTILITY CONFLICTS)
NOT TO SCALE

NOTES:
1. CONTRACTOR TO POTHOLE AND VERIFY ALL UTILITY CONFLICTS IN THE FIELD.
2. FOR STORM DRAINS, NO JOINTS IN THE WATER MAIN FOR A MINIMUM OF 8 FEET FROM THE O.D. OF THE STORM DRAIN. SEE SEPARATION REQUIREMENTS STD OWD-113.
3. CONSTRUCT AIR-VAC PER STD OWD-302 IF A HIGH POINT IS CREATED. LOCATION PER ENGINEER.
UNDISTURBED SOIL

VARIABLE, DEPENDING UPON PIPE SIZE AND SOIL CONDITIONS

# 4 AT 24" C.C. (TYP)

# 4 BARS LONG. (TYP)

TYPE "B"

MIN. DETERMINED BY PIPE SIZE

SAND BEDDING

TYPE "C"

MIN. 6"

6" MIN.

6" MIN.

TRENCH WIDTH

UNDISTURBED SOIL

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.

SECTION

CONCRETE ENCASEMENT

<table>
<thead>
<tr>
<th>REVISION</th>
<th>DRAWN</th>
<th>APP'D</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

APPROVED

CITY WATER MANAGER

PUBLIC WORKS DIRECTOR

DATE: APRIL 2018

STANDARD DRAWING NUMBER

CONCRETE ENCASEMENT AND SLOPE ANCHORS

CITY OF ORANGE WATER STANDARDS STANDARD

OWD-112

SHEET 1 OF 2
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.

SLOPE ANCHORS

<table>
<thead>
<tr>
<th>PIPE SLOPE</th>
<th>X DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>20% TO 35%</td>
<td>36'</td>
</tr>
<tr>
<td>35% TO 50%</td>
<td>24'</td>
</tr>
<tr>
<td>&gt; 50%</td>
<td>16'</td>
</tr>
</tbody>
</table>

CITY OF ORANGE WATER STANDARDS STANDARD

CONCRETE ENCASEMENT AND SLOPE ANCHORS

OWD-112

SHEET 2 OF 2
 GENERAL 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.

FIGURE 1 – PARALLEL CONSTRUCTION
GENERAL NOTES:

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.

3. 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.

FIGURE 2 – CROSSINGS
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 (UPDATED FEBRUARY 2008) 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)
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.
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 A EBAA IRON RESTRAINER SERIES 1100 MEGALUG OR APPROVED EQUAL.
7. UNLESS OTHERWISE NOTED ON THE PLANS, THE ANNULAR SPACE WITHIN THE CASING SHALL BE FILLED WITH AIR BLOWN SAND.
3/4” & 1” SERVICE COPPER TUBING
CORP STOP W/ COMP CPLG

NOTES:
1. SERVICE TAPS FOR CLASS 350 DUCTILE IRON PIPE AS FOLLOWS:
   3/4” SERVICE: DIRECT TAP ALL PIPE SIZES
   1” SERVICE: DIRECT TAP 6” AND LARGER, SADDLE ON 4” PIPE

ESTIMATE OF MATERIALS
CORP STOP 1 EA
ANGLE STOP 1 EA
COPPER TUBING VARIES
PE WRAP VARIES

2. ALL TAPPING SADDLES SHALL BE BRASS, DOUBLE STRAPS, CS THREAD AS MANUFACTURED BY FORD, JONES, MUELLER, OR APPROVED EQUAL.

3. SOLDER SHALL BE 5% SILVER SOLDER, HARRIS CO., STAY BRITE, OR APPROVED EQUAL.

ALL HOT TAPS SHALL BE PERFORMED PER SECTION 306-1.8, WATER DIVISION STANDARD SPECIFICATIONS.

1 1/2” & 2” SERVICE COPPER TUBING

NOTES:
1. SERVICE TAPS FOR CLASS 350 DUCTILE IRON AS FOLLOWS:
   1-1/2” SERVICE: DIRECT TAP 14” MAINS AND LARGER, SADDLE ON 12” MAINS AND SMALLER
   2” SERVICE: DIRECT TAP 16” MAINS AND LARGER, SADDLE ON 14” MAINS AND SMALLER

ESTIMATE OF MATERIALS
CORP STOP 1 EA
COP x COP ELBOW 1 EA
ANGLE STOP 1 EA
COP x COP CPLG VARIES
COPPER TUBING (20’ LENGTHS)
PE WRAP VARIES

CITY OF ORANGE WATER STANDARDS
STANDARD
SERVICE TAP INSTALLATION (COPPER TUBING)

DATE: APRIL 2018
STANDARD DRAWING NUMBER
OWD-201
3/4" COPPER TUBING, TYPE K WITH PE WRAP
3/4" CORP STOP
3/4" ANGLE METER STOP
5/8" x 3/4" DISC METER (SEE NOTE 2)
3/4" CURB STOP (COURTESY VALVE)
METER BOX PER SPECIFICATIONS 209-7.5

NOTES:
1. FOR SERVICE TAP REQUIREMENTS, SEE 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.
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.
1" COPPER TUBING, TYPE K WITH PE WRAP
1" CORP STOP
1" ANGLE METER STOP
1" DISC METER (SEE NOTE 2)
1" CURB STOP (COURTESY VALVE)
METER BOX PER SPECIFICATIONS 209-7.5

NOTES:
1. FOR SERVICE TAP REQUIREMENTS, SEE 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.
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.
1-1/2" SERVICE

- 1-1/2" COPPER TUBING, TYPE K WITH PE WRAP
- 1-1/2" CORP STOP
- 1-1/2" COPPER x COPPER 90 ELBOW
- 1-1/2" COPPER x COPPER COUPLING
- 1-1/2" ANGLE METER STOP
- 1-1/2" DISC METER (SEE NOTE 2)
- 1-1/2" METER FLANGE J-129 OR EQUAL
- METER BOX PER SPECIFICATIONS 209-7.5

NOTES:

1. FOR SERVICE TAP REQUIREMENTS, SEE 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.
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.
2" SERVICE

2" COPPER TUBING. TYPE K WITH PE WRAP
2" CORP STOP
2" COPPER x COPPER 90 ELBOW
2" COP x COP COUPLING
2" ANGLE METER STOP
2" DISC METER (SEE NOTE 2)
2" METER FLANGE J–129 OR EQUAL
METER BOX PER SPECIFICATIONS 209–7.5

NOTES:
1. FOR SERVICE TAP REQUIREMENTS, SEE 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.
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.
3" SERVICE INSTALLATION
(COPPER TUBING)

2" COPPER TUBING, TYPE K WITH PE WRAP
2" COP x COP COUPLING
2" COPPER x COPPER 90° ELBOW
2" ANGLE STOP
2" DISC METER (SEE NOTE 2)

NOTES:
1. FOR SERVICE TAP REQUIREMENTS, SEE STD OWD–201
2. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD OWD–213
3. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE.
4. 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.

CITY OF ORANGE WATER STANDARDS
STANDARD

DATE: APRIL 2018
STANDARD DRAWING NUMBER
OWD-206
TEE WITH MAIN VALVE(S) MAY BE REQUIRED AND METER TYPE AS DETERMINED BY OWD.

NOTES:
1. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD OWD-213
2. HARDWARE USED ON FLANDED FITTINGS PER SPECIFICATIONS 209-2.3
3. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE.

<table>
<thead>
<tr>
<th>REVISION</th>
<th>DRAWN</th>
<th>APP'D</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>04/30/18</td>
</tr>
</tbody>
</table>

CITY OF ORANGE WATER STANDARDS

STANDARD

3" SERVICE INSTALLATION
LONG SIDE- (DUCTILE IRON LATERAL)

OWD-207
TEE WITH MAIN VALVE(S) MAY BE REQUIRED AND METER TYPE AS DETERMINED BY OWD.

NOTES:

1. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD OWD-213

2. HARDWARE USED ON FLANGED FITTINGS PER SPECIFICATIONS 209-2.3

3. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE.

4" SERVICE INSTALLATION
- DUCTILE IRON LATERAL - 4 - 2" METERS

CITY OF ORANGE WATER STANDARDS
STANDARD

4" DUCTILE IRON PIPE WITH PE WRAP VARIANT
2" COPPER TUBING, TYPE K WITH PE WRAP VARIANT
TAPPING SLEEVE & 4" TAPPING VALVE 1 EA
4" MJ x FLG. ADAPTER 1 EA
4" x 4" FLG x FLG TEE 3 EA
4"-90° FLG x FLG BEND 2 EA
4" FLG x FLG DIP SPOOL 2 EA
4" BLIND FLANGE WITH 2" TAP 4 EA
2" ANGLE STOP 8 EA
2" DISC METER (SEE NOTE 1) 4 EA
2" MIP x COMP 4 EA
VALVE BOX & EXTENSION PIPE 1 EA
METER BOX - PER SPECIFICATIONS 209-7.5 4 EA

CITY OF ORANGE WATER STANDARD DRAWING NUMBER
OWD-208
1. Tapping Sleeve per Std OWD-107
2. 4" Tapping Valve (FLG x FLG)
3. 4" D.I.P. with PE Wrap
4. 4" M.J. x FLG. Connecting Piece
5. 4" x 4" Tee - FLG.
6. 4" x 3" Reducer 90° Bend - FLG.
7. 3" Gate Valve - FLG.
8. 3" - 90° Bend - FLG.
9. 3" x (Y - 29") D.I.P. Spool (FLG)
10. 3" Brass Strainer
11. 3" CMPD. Meter Remote Read
12. M.J. Restrained Joint
13. Valve Box w/ Extension Pipe
14. Conc Vault and Steel or Aluminum Lid Rated for Occasional Veh. Traffic Loading

CITY OF ORANGE WATER STANDARDS
STANDARD

4" Service Installation - Ductile Iron Lateral - 2 - 3" Meters
TEE WITH MAIN VALVE(S) MAY BE REQUIRED AND METER TYPE AS DETERMINED BY OWD.

3” SERVICE

1. TAPPING SLEEVE PER STD OWD-107 1 EA.
2. 4” TAPPING VALVE (FLGxFLG) 1 EA.
3. 4” D.I.P. WITH PE WRAP VARIES
4. 4” M.J. x FLG. CONNECTION PIECE 1 EA.
5. 4” x 3” REDUCER 90° BEND – FLG. 1 EA.
6. 3” x (Y – 29”) D.I.P. SPOOL (FLG) 1 EA.
7. 3” – 90° BEND – FLG. 1 EA.
8. 3” BRASS STRAINER 1 EA.
9. 3” TURBINE METER (RADIO READ R900i WITH ANTENNA) 1 EA.
10. METER BOX & COVER (PER SPECIFICATIONS 209-7.5) 1 EA.
11. VALVE BOX W/ EXT. PIPE 1 EA.
12. MJ RESTRAINED JOINT 1 EA.

4” SERVICE

1. TAPPING SLEEVE PER STD OWD-107 1 EA.
2. 4” TAPPING VALVE (FLGxFLG) 1 EA.
3. 4” D.I.P. WITH PE WRAP VARIES
4. 4” M.J. x FLG. CONNECTION PIECE 1 EA.
5. 4” 90° BEND – FLG 1 EA.
6. 4” x (Y – 27”) D.I.P. SPOOL (FLG) 1 EA.
7. 4” 90° BEND – FLG 1 EA.
8. 4” BRASS STRAINER 1 EA.
9. 4” TURBINE METER (RADIO READ R900i WITH ANTENNA) 1 EA.
10. METER BOX & COVER (PER SPECIFICATIONS 209-7.5) 1 EA.
11. VALVE BOX COMPLETE 1 EA.
12. MJ RESTRAINED JOINT 1 EA.

CITY OF ORANGE WATER STANDARDS

STANDARD

3” & 4” IRRIGATION SERVICE INSTALLATION

DATE: APRIL 2018

STANDARD DRAWING NUMBER

OWD-210
*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.

CITY OF ORANGE WATER STANDARDS

STANDARD

METER BOX INSTALLATION IN LANDSCAPED AREA

OWD-212

DATE: APRIL 2018

STANDARD DRAWING NUMBER

Sheet 1 of 2
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.
ELEVATION VARIES, ADJUSTMENT MAY BE NEEDED TO CONNECT TO CUSTOMER SIDE (TYP).

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.
4. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE.

CITY OF ORANGE WATER STANDARDS
STANDARD
RADIO READ METER

OWD-213
A permit is required to be obtained from the City of Orange Water Division at 189 S. Water St (714-288-2475)

<table>
<thead>
<tr>
<th>METER SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>7 3/4&quot;</td>
<td>1&quot; DIAMETER</td>
<td>1&quot;</td>
</tr>
<tr>
<td>1&quot;</td>
<td>10 3/4&quot;</td>
<td>1 1/4&quot; DIAMETER</td>
<td>1 1/4&quot;</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>13&quot;</td>
<td>2&quot; DIAMETER</td>
<td>2&quot;</td>
</tr>
<tr>
<td>2&quot;</td>
<td>17&quot;</td>
<td>2&quot; DIAMETER</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

Note: No jumpers are to be installed without city approval. See Section 306-1.9.1 of water division standard specifications for requirements.

CITY OF ORANGE WATER STANDARDS

STANDARD

JUMPER INSTALLATION

OWD-301
18" DIA. X 30" (HIGH) LINEAR LOW DENSITY POLYETHYLENE COVER AS MANUFACTURED BY PIPELINE PRODUCTS (ADVANTAGE SERIES; TAN; PART NO. VCAS–1830–TN) OR APPROVED EQUAL.

1" OR 2" AIR & VACUUM VALVE
1/2" TEST DRAIN VALVE
1/2" I.P. X 3/4" LONG CLOSE NIPPLE

1" OR 2" BRASS BALL VALVE W/ LEVER HANDLE JONES J–1900W AND J–2815 OR EQUAL

1" OR 2" COPPER TUBING, TYPE K W/ PE WRAP
1"–12" MIN RADIUS
2"–90° COPPER BEND (SWEAT X SWEAT)

1" OR 2" CORP STOP

CONNECTION TO WATER MAIN PER STD OWD–201
1"–12" MIN RADIUS
2"–90° COPPER BEND (SWEAT X SWEAT)

2' CURB AND GUTTER
2.5' ROLLED CURB FE (CONTROL LINE) C

SECTION B

NOTE:
1. NON–ACTIVE WATER MAINS NEWLY INSTALLED BY DEVELOPER: 2" AND SMALLER SERVICE TAP MAY BE INSTALLED UNDER CITY PUBLIC WORKS INSPECTOR PER WATER DIVISION APPROVED PLANS AND THE WATER DIVISION STANDARD PLANS AND SPECIFICATIONS.

REVISION DRAWN APP'D DATE

APPROVED
CITY WATER MANAGER
CITY ENGINEER
PUBLIC WORKS DIRECTOR

CITY OF ORANGE WATER STANDARDS
STANDARD

AIR AND VACUUM VALVE ASSEMBLY

OWD–302

DATE: APRIL 2018
STANDARD DRAWING NUMBER

Sheet 1 of 2
THRU BLOCK PER STD OWD-109

HOT TAP CONNECTION PER STD OWD-107

THRUST BLOCK PER STD OWD-109

8' TYP.

FIRE HYDRANT ASSEMBLY PER STD OWD-102.

APPROVED BACKFLOW DEVICE ASSEMBLY PER STD OWD-305.

Curb & Gutter

1. TAPPING SLEEVE (SIZE VARIES)  1 EA.
2. TAPPING VALVE - FLG. X FLG. (SIZE VARIES)  1 EA.
3. D.I.P. (SIZE VARIES) WITH PE WRAP  VARIES
4. 6" D.I.P. WITH PE WRAP  VARIES
5. TEE - FLG. (SIZE VARIES)  1 EA.
6. _" X 6" REDUCER - FLG. (VARIES)  IF NECESSARY
7. VALVE BOX WITH EXT. PIPE  3 EA.
8. RESILIENT WEDGE VALVE - FLG. OR FLG. X MJ. (SIZE VARIES)  1 EA.
9. M.J. RESTRAINED JOINT  AT ALL MJ JOINTS
10. 90' BEND - M.J. (SIZE VARIES)  1 EA.

NOTES:
1. SIZE OF LATERAL TO MATCH SIZE OF DOUBLE CHECK DETECTOR (DCDA)/RPDA ASSEMBLY
2. TEE WITH MAIN VALVE(S) MAY BE REQUIRED AS DETERMINED BY OWD.

<table>
<thead>
<tr>
<th>REVISION</th>
<th>DRAWN</th>
<th>APP'D</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPROVED</td>
<td>04/30/18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CITY WATER MANAGER</td>
<td>DATE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CITY ENGINEER</td>
<td>DATE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUBLIC WORKS DIRECTOR</td>
<td>DATE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CITY OF ORANGE WATER STANDARDS

STANDARD

COMBINATION FIRE HYDRANT &

APPROVED BACKFLOW DEVICE ASSEMBLY

FOR LONG SIDE STREET CROSSING

DATE: APRIL 2018

STANDARD DRAWING NUMBER

OWD-303
GENERAL NOTES:

1. TEES, APPURTENANCES AND CONNECTIONS ARE PROHIBITED BETWEEN METER AND BACKFLOW DEVICE.
2. RPPD BACKFLOW ASSEMBLY SHALL BE THE SAME SIZE DIAMETER AS THE WATER SERVICE.
3. BACKFLOW DEVICE SHALL BE TESTED BY A CERTIFIED TESTER APPROVED BY THE CITY. NO SERVICE SHALL BE DEEMED ACCEPTABLE UNTIL THE DEVICE IS TESTED AND CERTIFIED.
4. THERE SHALL BE A MINIMUM ONE FOOT CLEARANCE WHEN BACKFLOW DEVICE IS ADJACENT TO A STRUCTURE. THE DEVICE'S TEST COCKS SHALL FACE AWAY FROM THE STRUCTURE.
5. MINIMUM METER AND BACKFLOW DEVICE SIZE PER FIRE DEPARTMENT AND/OR BUILDING REQUIREMENTS.
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 DEPT. 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 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.
APPROVED "N-STYLE" BACKFLOW DEVICE

CONCRETE PAD REINFORCED W/ W.W.F. (1.6 X 1.6)

12" MIN (TYP)

6

12" MIN 20" MAX

2" MIN.

D.I. SPOOL (FLG X FLG)

D.I. VALVE SETTER (FROM DEVICE MANUFACTURER), OR 2 D.I. 90' BENDS (FLGxMJ (RESTRAINED)) WITH THRUST BLOCK PER STD OWD-109

WATER PIPE

FRONT ELEVATION VIEW

TYPICAL 4" AND LARGER BACKFLOW DEVICE (COMPACT)
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. 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 DEPARTMENT AND HEALTH AGENCY THAT SUCH ADDITIONAL DEVICES ARE NECESSARY TO ADEQUATELY PROTECT THE WATER SUPPLY.

4. ALL BACKFLOW DEVICES SHALL BE CERTIFIED BY A CERTIFIED BACKFLOW DEVICE TESTER AFTER INSTALLATION.

5. EFFECTIVE JANUARY 1, 2010 THE CALIFORNIA HEALTH AND SAFETY CODE (SECTION 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.

---

CITY OF ORANGE WATER STANDARDS

STANDARD

TYPICAL 2” AND SMALLER BACKFLOW PREVENTION DEVICE

OWNERSHIP:

CITY OWNED & MAINTAINED

CUSTOMER OWNED & MAINTAINED

TO CUSTOMER SERVICE AREA

PROVIDE ADEQUATE DRAINAGE

*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 DOWNSTREAM FROM THE DEVICE.
ELEVATION

LEGEND OF MATERIAL:

ITEM NO. SIZE & DESCRIPTION

1. APPROVED BACKFLOW PREVENTION ASSEMBLY
2. SOLDER 90° ELL
3. MIP SOLDER ADAPTER
4. SOLDER UNION
5. TYPE "K" COPPER (BURIED PORTION WRAPPED W/ PE)
6. BRASS NIPPLES
7. BRASS 90° ELL (THREADED)

TYPICAL 2" AND SMALLER BACKFLOW DEVICE

CITY OF ORANGE WATER STANDARDS

STANDARD

TYPICAL 2" AND SMALLER
BACKFLOW PREVENTION DEVICE

OWD-306

DATE: APRIL 2018

STANDARD DRAWING NUMBER

SHEET 2 OF 2
A PERMIT IS REQUIRED TO BE OBTAINED FROM THE CITY OF ORANGE WATER DIVISION AT 189 S. WATER ST (714-286-2475).

APPROVED SEALING MATERIAL
APPROVED CEMENT BASED SEALING MATERIAL, 20' MIN. OR AS DIRECTED BY WATER MANAGER UPON REVIEW OF WELL LOG.

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

FINISHED GRADE
BACKFILL WITH NATIVE MATERIAL

1' CAP

VARIES

6'

20' MIN.
INSTALL WATER SAMPLING STATION. AMERICAN MACHINE & CONVEYOR CORP. 44" TALL WATER SAMPLING STATION MODEL EZ-01. (NO SUBSTITUTION IS PERMITTED)

2' X 2' X 4" CONCRETE PAD

3/4" 90° BEND

3/4" COPPER PIPE TYPE "K" W/ PE WRAP

SEE TYPICAL TYPE SERVICE CONNECTION PER STD OWD-203

WATER MAIN

CURB AND GUTTER

1" COPPER PIPE TYPE "K" W/ PE WRAP

PLAN VIEW
NOT TO SCALE

SAMPLE & FLUSH VALVE ASSEMBLY

NOTE:
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.

CITY OF ORANGE WATER STANDARDS

STANDARD

WATER QUALITY SAMPLING STATION

OWD-308

REVISION DRAWN APP'D DATE

APPROVED 04/30/18

CITY WATER MANAGER DATE

CITY ENGINEER DATE

PUBLIC WORKS DIRECTOR DATE
24" DIA. X 36" (HIGH) LINEAR LOW DENSITY POLYETHYLENE COVER AS MANUFACTURED BY PIPELINE PRODUCTS (ADVANTAGE SERIES; TAN; PART NO. VCAS-2436-TN) OR APPROVED EQUAL.

PRESSURE RELIEF VALVE
(CLA-VAL Model 50G-01, BKC 150Flg, CRL pilot 20–200 psi, with X-101 Indicator) (NO SUBSTITUTION IS PERMITTED)

VALVE BOX & EXTENSION PIPE PER STD OWD-101

INSECT SCREEN (BETWEEN FLANGES)

3" DI 90° BEND

3" DI 90° BEND
(FLGxFLARE)

3" DIP FLG. x PE SPOOL

13"

4"

4" DIP W/ PE WRAP

TAPPING SLEEVE & 4" TAPPING VALVE
PER STD OWD-107

ANCHOR DETAIL STD OWD-302 (SEE NOTE 1)

GRAVEL

4" x 3" MJ REDUCER
(RESTRAINED)

4" DIP

THRUST BLOCK
PER STD OWD-109

3" 90° BEND
(MJ. x MJ.
(RESTRAINED)

24" Ø COVER

PIPING ORIENTATION

NOTE:
1. MODIFY ANCHOR DETAIL ON STD OWD-302 BY ADDING ADDITIONAL STAINLESS STEEL WASHERS TO PROVIDE A MINIMUM OF 1/4" GAP TO A MAXIMUM OF 1/2" GAP FROM BOTTOM OF COVER TO TOP OF CONCRETE PAD

CENTER

3" PRV

CITY OF ORANGE WATER STANDARDS

STANDARD

3" PRESSURE RELIEF VALVE INSTALLATION

PIV. 5, 2018

APPROVED

CITY WATER MANAGER

DATE

CITY ENGINEER

DATE

PUBLIC WORKS DIRECTOR

DATE

STANDARD DRAWING NUMBER

OWD-309
LEGEND OF MATERIAL:

ITEM NO.  SIZE & DESCRIPTION

1  APPROVED BACKFLOW PREVENTION ASSEMBLY
2  WEATHER RESISTANT LOCKABLE METAL CAGE TYPE ENCLOSURE:
   FOR 1" AND SMALLER BACKFLOW DEVICE: GUARDSHACK BPDI, MODEL
   GS-2 OR APPROVED EQUAL
   (10" WIDE X 24" HIGH X 30' LONG)

   FOR 1 1/2" AND 2" BACKFLOW DEVICE: GUARDSHACK BPDI, MODEL
   GS-3 OR APPROVED EQUAL
   (10" WIDE X 24" HIGH X 40' LONG)

3  CONCRETE BASE REINFORCED WITH W1.4 X W1.4 WELDED WIRE FABRIC:
   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

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.

TYPICAL 2" AND SMALLER BACKFLOW DEVICE ENCLOSURE
CITY OF ORANGE WATER DIVISION

STANDARD PLANS

SPECIAL APPLICATIONS FOR PVC PIPE

Construction East of 55 Freeway (ONLY)
CITY OF ORANGE WATER DIVISION STANDARD PLANS –

SPECIAL APPLICATIONS For PVC PIPE

CONSTRUCTION EAST OF 55 FREEWAY - ONLY

OWD-102SP  Fire Hydrant Assembly
OWD-105SP  End of Line Blowoff Assembly
OWD-106SP  Plug Installation
OWD-107SP  Hot Tap and/or Solid Sleeve Installation
OWD-108SP  Valve Installation
OWD-109SP  Thrust Block Details
OWD-110SP  Typical Trench Section
OWD-111SP  Offset Joint Detail (Typical Inverted Siphon and Typical Siphon)
OWD-113SP  Separation of Water Mains, Sanitary Sewers and Storm Drains
OWD-114SP  Steel Casing Pipe
OWD-201SP  Service Tap Connection for PVC Pipe
OWD-207SP  3” Service Installation – Long Side – (PVC Lateral)
OWD-208SP  4” Service Installation – PVC Lateral – 4 - 2” Meters
OWD-209SP  4” Service Installation – PVC Lateral – 2 –3” Meters
OWD-210SP  3” & 4” Irrigation Service Installation
OWD-211SP  8”/ 6” Service Installation
OWD-303SP  Combination Fire Hydrant & Approved Backflow Device Assembly For Long Side Street Crossing
NOTES:

1. THRUST BLOCKING SHALL CONFORM TO STD OWD–109SP.

2. TUNNEL BENEATH EXISTING CURB & GUTTER AND BACKFILL W/ SAND OR SLURRY.

3. ORIENT HYDRANT OUTLETS TO FACE STREET.

4. PROVIDE "BREAKAWAY" BOLTS AT HYDRANT FLANGE.

5. FIRE HYDRANT SHALL BE PAINTED SAFETY ORANGE PER SECTION 209–13.2 OF WATER DIVISION STANDARD SPECIFICATIONS.

6. IN SITUATIONS WHERE FIRE HYDRANT RUN IS OVER 20 FEET, THE SIZE OF THE HYDRANT LATERAL, AND VALVE SHALL BE 8–INCHES.
TYPICAL CUL-DE-SAC

6' MIN.

12' MIN. – 20' MAX.

VALVE BOX PER STD OWD-101

CEMENT GROUT IN VOID BETWEEN 4" D.I.P. & VALVE BOX

4" PVC PIPE

4" 90° BEND

CONCRETE ANCHOR BLOCK (CLASS 560-C-3250) (10"L X 24" W X 10" H)

THRUSS BLOCK PER STD OWD-109SP.

4" RW GATE VALVE (MJ – RESTRAINED)

VALVE BOX EXT. PIPE

4" PVC PIPE

4" PVC PIPE

WATER MAIN

CURB

RW

4" G.V. BEND

04" 90° BEND

REVISION DRAWN APP'D DATE

APPROVED

04/30/18

CITY WATER MANAGER

04/30/18

CITY ENGINEER

04/30/18

PUBLIC WORKS DIRECTOR

04/30/18

CITY OF ORANGE WATER STANDARDS

STANDARD

END OF LINE BLOWOFF ASSEMBLY

OWD-105SP

DATE: APRIL 2018

STANDARD DRAWING NUMBER
THRUXT BLOCK CUT INTO UNDISTURBED SOIL, PER STD OWD-109SP

2" x 1 1/2" BUSHING

1 1/2" x 3/4" SERVICE WYE

2" BALL VALVE-J-1900 OR EQUAL

2" x 12" BRASS NIPPLE

TYPICAL DEAD END MAIN

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

THRUXT BLOCK CUT INTO UNDISTURBED SOIL, PER STD OWD-109SP

TYXTON PLUG TAPPED 2"

2" BALL VALVE-J-1900 OR EQUAL

2" x 12" BRASS NIPPLE

TYPICAL TEMPORARY PLUG

THRUXT BLOCK CUT INTO UNDISTURBED SOIL, PER STD OWD-109SP

TYXTON PLUG TAPPED 2" (RESTRAINED)

2" BALL VALVE-J-1900 OR EQUAL

2" x 12" BRASS NIPPLE

TYPICAL FUTURE TAKEOFF

CITY OF ORANGE WATER STANDARDS

STANDARD

PLUG INSTALLATION

OWD-106SP
THRU BLOCK PER STD OWD-109SP (TO BE INSTALLED BY CONTRACTOR)

TRENCH EXCAVATION TO BE PERFORMED BY CONTRACTOR. (3' W x 10'L minimum)

EXISTING WATER MAIN

THE CITY WILL PERFORM THE HOT TAP

TAPPING SLEEVE, VALVE FLG X FLG AND VALVE BOX (PROVIDED BY CITY) CONTRACTOR TO INSTALL VALVE BOX PER STD OWD-101

FLG X PVC ADAPTER (RESTRAINED)

PVC PIPE

SOLID SLEEVE (MJ X MJ) – RESTRAINED*

GAP SHALL NOT EXCEED 1"

PVC PIPE

NOTE: CONTRACTOR IS REQUIRED TO OBTAIN A PERMIT FROM DEPARTMENT OF PUBLIC WORKS IF WORKING IN THE CITY R/W

*MECHANICAL JOINT CONNECTIONS SHALL BE RESTRAMED PER SECTION 209-4.3 OF WATER DIVISION STANDARD SPECIFICATIONS.
NOTE:
MECHANICAL JOINT CONNECTIONS SHALL BE RESTRAINED PER SECTION 209-4.3 OF WATER DIVISION STANDARD SPECIFICATIONS.

RW GATE VALVE (MJ-RESTRAINED) VALVE BOX PER CITY STD OWD-101

RW GATE VALVE (MJ RESTRAINED) VALVE BOX PER STD OWD-101

THRUST BLOCK PER STD OWD-109SP

MJ TEE (RESTRAINED)
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 MECHANICAL JOINT FITTINGS SHALL BE RESTRAINED PER SECTION 209-4.3 OF WATER DIVISION STANDARD SPECIFICATIONS.

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>11 1/4' BEND</th>
<th>22 1/2' BEND</th>
<th>45' BEND</th>
<th>90' BEND</th>
<th>TEE</th>
<th>END CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>1'-6''</td>
<td>0'-9''</td>
<td>1'-8''</td>
<td>0'-9''</td>
<td>2'-4''</td>
<td>1'-0''</td>
</tr>
<tr>
<td>6&quot;</td>
<td>1'-9''</td>
<td>1'-0''</td>
<td>2'-6''</td>
<td>1'-3''</td>
<td>3'-6''</td>
<td>1'-6''</td>
</tr>
<tr>
<td>8&quot;</td>
<td>2'-4''</td>
<td>1'-0''</td>
<td>3'-4''</td>
<td>1'-6''</td>
<td>4'-8''</td>
<td>2'-0''</td>
</tr>
<tr>
<td>10&quot;</td>
<td>3'-0''</td>
<td>1'-4''</td>
<td>4'-3''</td>
<td>1'-9''</td>
<td>5'-9''</td>
<td>2'-6''</td>
</tr>
<tr>
<td>12&quot;</td>
<td>3'-6''</td>
<td>2'-0''</td>
<td>5'-0''</td>
<td>2'-3''</td>
<td>6'-10''</td>
<td>3'-0''</td>
</tr>
</tbody>
</table>

VERTICAL DEAD LOAD (MIN. CUBIC YARDS)

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>11 1/4' BEND</th>
<th>22 1/2' BEND</th>
<th>45' BEND</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>0.3</td>
<td>0.5</td>
<td>0.9</td>
</tr>
<tr>
<td>6&quot;</td>
<td>0.5</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>8&quot;</td>
<td>0.9</td>
<td>1.8</td>
<td>3.5</td>
</tr>
<tr>
<td>10&quot;</td>
<td>1.4</td>
<td>2.8</td>
<td>5.5</td>
</tr>
<tr>
<td>12&quot;</td>
<td>2.0</td>
<td>4.0</td>
<td>7.8</td>
</tr>
</tbody>
</table>
NOTE:
TRANSVERSE TRENCHES SHALL BE BACKFILLED WITH 150-E-100 CONCRETE SLURRY PER PUBLIC WORKS STANDARD PLAN NO. 125, EXCEPT WITHIN PIPE ZONE.
AIR-VAC PER STD OWD-302, LOCATION PER ENGINEER

PROPOSED PVC PIPE (NO JOINTS BETWEEN FITTINGS)

SLURRY OVER SAND BED

30" MINIMUM, UNLESS OTHERWISE APPROVED BY ENGINEER.

EXIST. FINISHED SURFACE

PROPOSED PVC PIPE (NO JOINTS BETWEEN FITTINGS)

PROPOSED PVC PIPE (TYP)

THRUST BLOCK PER STD OWD-109SP (VERTICAL DEAD LOAD)

22.5° MJ BENDS (RESTRAINED)

BACKFILL TRENCH WITH 1-1/2 SACK SLURRY.

PROFILE (TYPICAL FOR ALL UTILITY CONFLICTS) NOT TO SCALE

*NOTE CONTRACTOR TO POTHOLE AND VERIFY ALL UTILITY CONFLICTS IN THE FIELD.

CITY OF ORANGE WATER STANDARDS STANDARD
OFFSET JOINT DETAIL (TYPICAL INVERTED SIPHON)

OWD-111SP

04/30/18 04/30/18 04/30/18
AIR-VAC REQUIRED IF HIGH POINT IS CREATED. SEE NOTE NO. 3.

EXIST. FINISHED SURFACE

22.5° MJ BENDS (RESTRAINED)

PROPOSED PVC PIPE (TYP)

EXIST. UTILITY

MIN (TYP)
SEE NOTE NO. 2

22° MIN

10' MAX.
SEE NOTE 4

42" COVER (MIN)

PROPOSED PVC PIPE (NO JOINTS BETWEEN FITTINGS) (TYP)

THRUST BLOCK PER STD OWD-109SP (VERTICAL DEAD LOAD) (TYP)

PROFILE (TYPICAL FOR ALL UTILITY CONFLICTS)
NOT TO SCALE

NOTES:
1. CONTRACTOR TO POTHOLE AND VERIFY ALL UTILITY CONFLICTS IN THE FIELD.
2. FOR STORM DRAINS, NO JOINTS IN THE WATER MAIN FOR A MINIMUM OF 8 FEET FROM THE O.D. OF THE STORM DRAIN. SEE SEPARATION REQUIREMENTS STD OWD-113.
3. CONSTRUCT AIR-VAC PER STD OWD-302 IF A HIGH POINT IS CREATED. LOCATION PER ENGINEER.
4. PVC PIPE IS ACCEPTABLE FOR COVER UP TO 10 FEET. FOR COVER GREATER THAN 10 FEET, THE PIPE MATERIAL FOR THE SIPHON WILL NEED TO BE DETERMINED AND APPROVED BY THE WATER DIVISION ON A CASE BY CASE BASIS.
GENERAL 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.

FIGURE 1 – PARALLEL CONSTRUCTION

<table>
<thead>
<tr>
<th>REVISION</th>
<th>DRAWN</th>
<th>APP'D</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPROVED</td>
<td></td>
<td></td>
<td>04/30/18</td>
</tr>
</tbody>
</table>

CITY OF ORANGE WATER STANDARDS

STANDARD

SEPARATION OF WATERMAINS, SANITARY SEWERS AND STORM DRAINS

CITY WATER MANAGER DATE

04/30/18

CITY ENGINEER DATE

04/30/18

PUBLIC WORKS DIRECTOR DATE

04/30/18

DATE: APRIL 2018

STANDARD NUMBER

OWD-113SP

SHEET 1 OF 3
GENERAL NOTES:

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.

3. 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.

FIGURE 2 – CROSSINGS
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 (UPDATED FEBRUARY 2008) 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 PIPE MATERIAL (PVC C900 PIPE – DR14)
INSTALLATION RECOMMENDATIONS

Each pipe bell joint within casing shall be restrained and supported with a Ford Meter Box Company URPCS 1390 Restraining Casing Spacer. Additionally, manufacturer recommends a URPCS 1300 be installed every ten (10) feet 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 URPCS 1300 and eight (8) on the URPCS 1390. For 10” and 12” carrier pipe, runners shall be installed on tie rod ears. Total of four (4) for URPCS 1300 and eight (8) for URPCS 1390.

NOTES:

1. Casing shall be installed by the bore, jack and/or tunnel method.
2. Restrained casing spacers shall be installed as noted above.
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 as noted above.
7. Unless otherwise noted on the plans, the annular space within the casing shall be filled with air blown sand.
ALL HOT TAPS SHALL BE PERFORMED PER SECTION 306-1.8, WATER DIVISION STANDARD SPECIFICATIONS.

ITEM | MATERIALS
--- | ---
1 | SERVICE SADDLE FOR P.V.C. PIPE WITH CS/TAPPERED THREAD OUTLET PER SECTIONS 209-4.4 AND 209-7.4 OF WATER DIVISION STANDARD SPECIFICATIONS.
2 | BRASS CORPORATION STOP, CS THREAD x COMPRESSION COUPLING.
3 | COPPER SERVICE PIPE, TYPE "K" WITH PE WRAP.
4 | TYPE 316 STAINLESS STEEL SADDLE BOLTS AND NUTS.

NOTES:
1. SADDLE CONNECTIONS MAY BE USED ON PVC PIPE SIZES UP TO AND INCLUDING 12".
2. 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.
TEE WITH MAIN VALVE(S) MAY BE REQUIRED AND METER TYPE AS DETERMINED BY OWD.

NOTES:

1. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD OWD–213
2. HARDWARE USED ON FLANGED FITTINGS PER SPECIFICATIONS 209–2.3
3. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE.
TEE WITH MAIN VALVE(S) MAY BE REQUIRED AND METER TYPE AS DETERMINED BY OWD.

NOTES:
1. APPROVED REMOTE READ METERS REQUIRED FOR NEW DEVELOPMENTS PER STD OWD-213
2. HARDWARE USED ON FLANGED FITTINGS PER SPECIFICATIONS 209-2.3
3. CONTRACTOR IS RESPONSIBLE FOR CONNECTING SERVICE TO THE CUSTOMER SIDE.

4" SERVICE

4" PVC PIPE
2" COPPER TUBING, TYPE K WITH PE WRAP
TAPPING SLEEVE & 4" TAPPING VALVE
4" M.J. x FLG. ADAPTER
4" x 4" FLG x FLG TEE
4"-90° FLG x FLG BEND
4" FLG x FLG DIP SPOOL
4" BLIND FLANGE WITH 2" TAP
2" ANGLE STOP
2" DISC METER (SEE NOTE 1)
2" MIP x COMP
VALVE METER BOX & EXTENSION PIPE
METER BOX - PER SPECIFICATIONS 209-7.5

CITY OF ORANGE WATER STANDARDS

STANDARD

4" SERVICE INSTALLATION
- PVC LATERAL - 4 - 2" METERS

CITY WATER MANAGER
04/30/18

CITY ENGINEER
04/30/18

PUBLIC WORKS DIRECTOR
04/30/18

STANDARD DRAWING NUMBER
OWD-208SP

DATE: APRIL 2018
TEE WITH MAIN VALVE(S) MAY BE REQUIRED AND METER TYPE AS DETERMINED BY OWD.

1 TAPPING SLEEVE PER STD OWD-107SP 1 EA.
2 4" TAPPING VALVE (FLG x FLG) 1 EA.
3 4" PVC PIPE
4 4" M.J. x FLG. CONNECTING PIECE 2 EA.
5 4" x 4" TEE – FLG. 1 EA.
6 4" x 3" REDUCER 90° BEND – FLG. 2 EA.
7 3" GATE VALVE – FLG. 2 EA.
8 3" – 90° BEND – FLG. 4 EA.
9 3" x (Y – 29") D.I.P. SPOOL (FLG) 2 EA.
10 VARIATES 10 3" BRASS STRAINER 2 EA.
11 3" CMPD. METER REMOTE READ 2 EA.
12 MJ RESTRAINED JOINT 2 EA.
13 VALVE BOX W/ EXTENSION PIPE 3 EA.
14 CONC VAULT AND STEEL OR ALUMINUM LID RATED FOR OCCASSIONAL VEH. TRAFFIC LOADING 1 EA.

NOTE:
ALL D.I. FITTINGS SHALL BE LINED AND COATED WITH FUSION BONDED EPOXY

CITY OF ORANGE WATER STANDARDS
STANDARD

4" SERVICE INSTALLATION
- PVC LATERAL - 2 - 3" METERS

CITY WATER MANAGER
CITY ENGINEER
PUBLIC WORKS DIRECTOR

DATE: APRIL 2018
STANDARD DRAWING NUMBER
OWD-209SP
TEE WITH MAIN VALVE(S) MAY BE REQUIRED AND METER TYPE AS DETERMINED BY OWD.

3" SERVICE

1. TAPPING SLEEVE PER STD OWD-107SP
2. 4" TAPPING VALVE (FLG×FLG)
3. 4" PVC PIPE
4. 4" M.J. x FLG. CONNECTION PIECE
5. 4" x 3" REDUCER 90° BEND - FLG.
6. 3" x (Y - 29") D.I.P. SPOOL (FLG)
7. 3" - 90° BEND - FLG.
8. 3" BRASS STRAINER
9. 3" TURBINE METER
   (RADIO READ R900i WITH ANTENNA)
10. METER BOX & COVER
    (PER SPECIFICATIONS 209–7.5)
11. VALVE BOX W/ EXT. PIPE

4" SERVICE

1. TAPPING SLEEVE PER STD OWD-107SP
2. 4" TAPPING VALVE (FLG×FLG)
3. 4" PVC PIPE
4. 4" M.J. x FLG. CONNECTION PIECE
5. 4" 90° BEND - FLG
6. 4" x (Y - 27") D.I.P. SPOOL (FLG)
7. 4" 90° BEND - FLG
8. 4" BRASS STRAINER
9. 4" TURBINE METER
   (RADIO READ R900i WITH ANTENNA)
10. METER BOX & COVER
    (PER SPECIFICATIONS 209–7.5)
11. VALVE BOX COMPLETE
12. MJ RESTRAINED JOINT

NOTE:
ALL D.I. FITTINGS SHALL BE LINED AND COATED WITH FUSION BONDED EPOXY

CITY OF ORANGE WATER STANDARDS
STANDARD
3" & 4" IRRIGATION SERVICE INSTALLATION

CITY WATER MANAGER
DATE: 04/30/18
CITY ENGINEER
DATE: 04/30/18
PUBLIC WORKS DIRECTOR
DATE: 04/30/18

G. Tauri 04/30/18

DATE: APRIL 2018

OWD-210SP
TEE WITH MAIN VALVE(S) MAY BE REQUIRED AND METER TYPE AS DETERMINED BY OWD.

HOT TAP CONNECTION PER STD OWD-107SP

THRUST BLOCK PER STD OWD-109SP

TO BE DETERMINED BY CITY INSPECTOR BASED ON SITE CONDITIONS

APPROVED BACKFLOW DEVICE ASSEMBLY PER STD OWD-305

CURB & GUTTER

8’ TYP.

FIRE HYDRANT ASSEMBLY PER STD OWD-102SP

---

1. TAPPING SLEEVE (SIZE VARIES) 1 EA.
2. TAPPING VALVE – FLG. X FLG. (SIZE VARIES) 1 EA.
3. PVC PIPE (SIZE VARIES) VARIES
4. MJ RESTRAINED JOINT VARIES
5. TEE – FLG. (SIZE VARIES) 1 EA.
6. _” X 6” REDUCER – FLG. (VARIES) IF NECESSARY
7. VALVE BOX WITH EXT. PIPE 3 EA.
8. RESILIENT WEDGE VALVE – FLG. OR FLG. X MJ. (SIZE VARIES) 1 EA.
9. M.J. X FLG. ADAPTOR (RESTRAINED) AS NEEDED
10. 90’ BEND – M.J. (SIZE VARIES) 1 EA.

NOTES:
1. SIZE OF LATERAL TO MATCH SIZE OF DOUBLE CHECK DETECTOR (DCDA)/RPDA ASSEMBLY
2. ALL D.I. FITTINGS SHALL BE LINED AND COATED WITH FUSION BONDED EPOXY

---

CITY OF ORANGE WATER STANDARDS
STANDARD
COMBINATION FIRE HYDRANT &
APPROVED BACKFLOW DEVICE ASSEMBLY
FOR LONG SIDE STREET CROSSING

CITY WATER MANAGER 04/30/18
CITY ENGINEER 04/30/18
PUBLIC WORKS DIRECTOR 04/30/18

DATE: APRIL 2018
STANDARD DRAWING NUMBER OWD-303SP