



CITY OF RIVERSIDE

**PUBLIC UTILITIES DEPARTMENT
WATER DIVISION**

SPECIFICATION NO. 205

**FOR THE DESIGN AND INSTALLATION
OF POTABLE WATER DISTRIBUTION SYSTEMS**

October 2009

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**CITY OF RIVERSIDE - PUBLIC UTILITIES DEPARTMENT
WATER DIVISION**

**WATER DISTRIBUTION SYSTEM
SPECIFICATION NO. 205**

SPECIAL PROVISIONS

The following revisions and additions supplement, modify and take precedence over the Standard Specifications for Public Works Construction (Latest Edition and any adopted supplements) applying to private contracts for Public Improvement.
(Refer Subsection 2-5.1 of Part I)

**PART I
GENERAL PROVISIONS**

SECTION 1 - TERMS, DEFINITIONS, ABBREVIATIONS AND SYMBOLS

1-2 DEFINITIONS

- Agency - The City of Riverside
- Base Course - The layers of a two or more course pavement placed between the surface course and the sub-grade.
- Board - The Board of Public Utilities of the City of Riverside.
- City - The City of Riverside.
- Contractor - The Individual, Partnership, Corporation, Joint Venture, or other legal entity having a contract with the Developer to perform the work.
- Developer - The Individual, Partnership, Corporation, Joint Venture, or other legal entity under a permit issued by the Agency.
- Engineer - The Principal Engineer – Water Contract Administrator of the Public Utilities Department, Construction Division, or Engineer’s authorized representative.
- House Connection Sewers - Sewer lateral.
- Inspector - The representative of the Engineer who is assigned to inspect conformance of the work in accordance with the Plans and Specifications.

- Open Graded A.C. - A thin layer of special asphalt concrete placed on a surface course or existing pavement to improve the surface conformation and friction factor. Open Graded A.C. shall conform to State of California Division of Highways Standard Specifications.

- Overlay - A supplemental surface course placed on an existing pavement to improve its surface conformation.

- Owner's Representative - The person or firm authorized by the Owner to represent it during the performance of the work by the Contractor.

- Private Engineer - The Registered Civil Engineer who prepared and signed the Plans.

- Roadbed - That portion of the street included between the outside lines of curbs or paving.

- Soils Engineer - The Soils Engineer as referred to in the Grading Ordinance.

- Standard Plans - Standard Detail Drawings of the Engineering Section of the Public Utilities Department, Water Division, of the City of Riverside, which drawings are also referred to as Standard Drawings.

- Surface Course - The top layer of pavement (exclusive of open graded A.C.), designed to provide structural values and a surface resistant to traffic abrasion.

- Traveled Way - That portion of the roadway reserved for the movement of vehicles for the general public, exclusive of shoulders and auxiliary lanes. Where traffic has been diverted or restricted to certain lanes, with the approval of the Traffic Engineer, these diversions or restricted lanes become the traveled way.

- Right-of-Way - Includes City of Riverside Public Right-of-Way and City of Riverside Public Easements.

1-3 ABBREVIATIONS

1-3.2 Common Usage

- AV Air Valve
- B/B Bell by Bell
- BFV Butterfly Valve
- Bk Back

BO	Blow Off
B/S	Bell by Spigot
C	Caulked
Cad	Cadmium
CC	Corporation Cock
CML&C	Cement-mortar lined and coated
Cplg	Coupling
CT	Compound Turbine
CTF	Cut to Fit
DIP	Ductile Iron Pipe
DIPRA	Ductile Iron Pipe Research Association
Elec	Electrical
EII	Elbow
F/B	Flange by Bell
F/F	Flange by Flange
Flg	Flange or Flanged
FPT	Female Pipe Thread
F/S	Flange by Spigot
G	Gas line or service
gpm	Gallons per minute
GV	Gate Valve
HPI	Horizontal Point of Intersection
IPF	Iron Pipe Female
IPM	Iron Pipe Male
IPT	Iron Pipe Thread
LD	Loop Detector
MHT	Male Hose Threads
ML&C	Mortar Lined and Coated
NPDES	National Pollutant Discharge Elimination System
NRS	Non-Rising Stem
OO	Out to Out
OSY	Outside Screw and Yoke
Perp	Perpendicular
ppm	Parts Per Million
PT	Pipe Threads
RWGV	Resilient Wedge Gate Valve
S	Sewer main or house lateral
St Lt	Street Light
SW	Sweat Weld
SWP	Standard Working Pressure
t	Thick
UG	Underground
VPI	Vertical Point of Intersection
w/	With
W	Water Main or Service
WO	Work Order

1-3.3 Institutions

CDPH – California Department of Public Health
CRSI Concrete Reinforcing Steel Institute
CWD City Water Division
PWD Public Works Department
SSPWC Standard Specifications for Public Works Construction

All institution publications shall be the latest edition unless otherwise shown on the construction drawings, standard drawings, or these specifications.

1-4 SYMBOLS

Symbols shown on Plans, Water Division Standard Drawings, and Public Works Department Standard Drawings also apply.

SECTION 2 - SCOPE AND CONTROL OF THE WORK

2-1 and 2-2 DELETED

2-5 PLANS AND SPECIFICATIONS

2-5.1 General

The work embraced herein shall be done in accordance with the provisions of the “Greenbook” STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (Latest Edition and all supplements), prepared by Public Works Standards, Inc. (Published by BNI Publications, Inc.), insofar as the same may apply, which specifications are hereinafter referred to as the Standard Specifications, and as provided herein.

Should any discrepancy or apparent error occur in Plans and Specifications, or should any work of others affect this work, the Contractor shall notify the Private Engineer at once. If the Contractor proceeds with the work affected without instructions from the Private Engineer, he/she shall correct any resultant damage or defect.

2-5.2 Precedence of Plans and Specifications

In the event of any discrepancy between any drawing and the figures written thereon, the figures shall be taken as correct. Detailed drawings shall prevail over general drawings.

2-5.3 Shop Drawings

Shop drawings need not be reproducible. A minimum of two copies shall be submitted to the Engineer for approval.

2-5.4 Plans

Plans shall be submitted for approval by City, and shall bear the signature and seal of the Private Engineer, with expiration date. The project location, nature, size, extent, form and detail of its various features shall be shown on the Plans prepared by the Private Engineer.

2-5.5 Certification

Written original letters of compliance from the manufacturer and/or supplier on valves, pipe or mechanical equipment shall be submitted to the City at the preconstruction conference. Maintenance manuals, parts list and related drawings shall be submitted prior to acceptance by City.

2-9 SURVEYING

2-9.5 Line and Grade

Flagged stations and elevations shown on the Plan shall be staked by the Private Engineer. Survey staking shall only be required for alignment, flowline of pipe, and stationing of fittings, valves and other appurtenances. Contractor shall lay pipe and appurtenances to all points shown on the grade sheet. Grade stakes shall be set at minimum 25-foot intervals. Grade stakes will also be required where profile details are shown on the plans with stations and flowline elevations.

2-9.6 Grade Sheets

The Private Engineer shall issue grade sheets after obtaining approval from the City. No grade sheet shall be issued until Contractor has obtained and paid for all construction permits. (See Section 7-5.) In addition, inspection will be scheduled only when grade sheets have been received by the inspector.

Where proposed improvements are entirely or partially located in a newly constructed fill, the Private Engineer shall issue grade sheets only after compaction of fill has been completed as verified by the Soils Engineer. Survey staking shall be done by the Private Engineer.

2-11 INSPECTION

A City Inspector will be required on the job site at all times as deemed necessary by the City. The Contractor is also obligated to arrange inspection by other agencies as required by State or local laws. All work carried out by the Contractor without the Inspectors knowledge will be required to be repeated at no cost to the City. Inspection of the work shall not relieve the contractor of the obligation to fulfill all conditions of the contract.

2-11.1 Overtime Inspection

Payment for inspection during overtime hours, beyond a normal eight hour, Saturdays, Sundays and City Holidays will be deducted from the Contractors payment at the rate of

one and one-half the Inspectors hourly pay rate plus overhead. Time from midnight to 7:00 a.m. will be deducted at two times the Inspectors pay rate plus overhead.

2-11.2 City Holidays

CITY HOLIDAYS WILL BE OBSERVED ON THE FOLLOWING DAYS:

January 1st New Years Day
Third Monday in January Martin Luther King Jr's Birthday
Third Monday in February President's Day
Last Monday In May Memorial Day
July 4th Independence Day
First Monday in September..... Labor Day
Second Monday in October Columbus Day
November 11 Veteran's Day
Fourth Thursday in November Thanksgiving Day
The day following Thanksgiving Day
December 25 Christmas Day

If a holiday falls on a Saturday, it will be observed on the preceding Friday. If a holiday falls on a Sunday, it will be observed on the following Monday.

SECTION 4 - CONTROL OF MATERIALS

4-0 GENERAL

All affidavits of compliance and certifications referenced herein shall be addressed to the City of Riverside, identify the items supplied, and specify the project or plan number for which the material is being supplied.

4-1 MATERIALS AND WORKMANSHIP

4-1.2.1 Property Rights in Material

After the Contractor has the material attached or affixed to the work or the soil, and after RPU accepts the system, it shall become the property of the City.

4-1.4 Tests of Materials

The following conditions and materials will be tested by a private laboratory at the expense of the Contractor and submitted to the City, in addition to the required manufacturer's or other tests specified: structural concrete, bedding materials and relative compaction. Tests may be required by the City at the expense of the Contractor in such number and at such locations as deemed necessary by the Engineer to insure compliance with Specifications.

SECTION 5 - UTILITIES

5-2 PROTECTION

Sewer laterals which are accidentally broken while working on a trench shall be repaired by the Contractor at Contractor's expense. Construction to be in accordance with City of Riverside Public Works Department Standard Drawing No. 554. The Contractor shall call Underground Service Alert (DIG ALERT) at 1-800-227-2600, two working days before proceeding with any excavation work.

SECTION 6 - PROSECUTION, PROGRESS AND ACCEPTANCE OF THE WORK

6-3 SUSPENSION OF WORK

6-3.3 Suspension of Work Due to a Stage III Smog Episode

No work shall be done on a day for which a Stage III smog episode is forecast as defined by the Air Quality Management District (AQMD). Such a suspension will be without any liability to the City. When the AQMD predicts that a Stage III episode level will be reached the following day, an announcement containing the specifics will generally be provided by 2:00 p.m. on the day the prediction is made.

6-8 COMPLETION AND ACCEPTANCE

6-8.1 One-Year Guarantee

The Contractor shall be responsible for and guarantee the maintenance of all workmanship and materials for a period of one year following the completion and final acceptance by the City. Any defective labor and materials furnished in the performance of the work shall be repaired or replaced immediately. The Engineer may elect to repair or replace the defective work by the use of City forces or any other methods, at the Contractor's expense, if Public Safety is endangered.

SECTION 7 - RESPONSIBILITIES OF THE CONTRACTOR IN THE CONDUCT OF HIS WORK

7-3 LIABILITY INSURANCE

The liability insurance shall be issued by an insurance company or companies authorized to transact liability insurance business in the State of California, shall cover comprehensive general and automobile liability for both bodily injury (including death) and property damage, and shall contain the following provisions:

1. Comprehensive General Liability Coverage
2. Premises - Operations Coverage

3. Independent Contractor
4. Underground Hazard Coverage
5. Coverage for owned and non-owned automobiles.
6. Manufacturers and Contractors liability.
7. Broad form property damage in any case where the Contractor has any property belonging to the City in Contractor's care, custody or control.
8. Owners and Contractors protective liability.
9. Blanket contractual liability.
10. Products and completed operations coverage.
11. Coverage for collapse, explosion, and excavation.
12. An endorsement containing the following provisions:
"Solely as respects work done by or on behalf of the named insured for the City of Riverside, it is agreed that the City of Riverside and its officers and employees are added as additional insureds under this policy. It is further agreed that the other insurance conditions of the policy are amended to conform herewith."
13. An endorsement or rider providing that in the event of expiration, material change, or proposed cancellation of such policy or policies for any reason whatsoever, the City shall be notified by registered or certified mail not less than 30 days before such expiration, material change or cancellation is effective.

7-5 PERMITS

No work shall be started within the right-of-way or Public Utilities easement until the Contractor has obtained all necessary permits. The Contractor shall submit to the City at the Preconstruction Conference a copy of the required City Public Works Department, Street Opening Permit, or Riverside County Encroachment Permit, and a State Excavation Permit, if applicable. Contractor shall be licensed in accordance with the California Business and Professions Code. Contractor shall have an active Class A (General Engineering) or Class C-34 (Pipeline) Contractors license. The Contractor shall obtain and pay for all permits and fees and give all notices necessary and incidental to the due and lawful prosecution of the work and to the preservation of the Public Health and Safety.

7-5.1 Licenses

The Contractor shall obtain at Contractor's expense all licenses necessitated by Contractor's operations. Prior to starting any work, the Contractor shall be required to have a City of Riverside Business Tax Registration valid for the life of the contract. Contractor's

subcontractors shall also have registrations valid for the time they are engaged in the work.

7-10 PUBLIC CONVENIENCE AND SAFETY

The Contractor shall obtain written approval from the City Traffic Engineer for variances from the traffic provisions of this section.

7-10.1 Traffic and Access

In general, the following traffic and access control measures will be required:

- (a) The Contractor is responsible to provide and deploy traffic control and traffic access measures in compliance with the standards and requirements of the City of Riverside, or County of Riverside, Traffic Divisions.
- (b) The Contractor shall avoid starting a new project on a Friday, or before a holiday, if the work will restrict traffic flow.

7-10.2 Storage of Equipment and Materials in Public Streets

Approval must be obtained from the local governing agencies to store equipment or materials within or along side the public right-of-way.

7-10.3 Street Closures, Detours, Barricades

The Contractor will be required to get approval for signing and barricading from the local governing agencies' Traffic Engineer prior to starting any operation which will interfere with the normal flow of traffic. For convenience to the Contractor in complying with the other provisions of this section, refer to the telephone numbers located in Section 10-1 of this Specification.

If the telephone numbers in Section 10-1, are changed, or if project location is within another governing agencies' jurisdiction, the Contractor is not relieved of the responsibility of notifying the various departments.

Construction signs, barricades, and their applications shall conform with the most current issues of the State of California Business and Transportation Agency, Department of Transportation, Division of Operations "Uniform Sign Chart" and the "Manual of Traffic Controls" for Construction and Maintenance Work Zones and the City of Riverside Public Works Department Standard Drawing No. 658.

7-10.4.2 Use of Explosives

Blasting permits shall be obtained from the Fire Department or other local agencies if outside City limits.

7-10.4.4 Public Safety During Non-Working Hours

Notwithstanding the Contractor's primary responsibility for safety on the job site, when the Contractor is not present, the Engineer at his option after attempting to contact the Contractor may direct City forces to perform any functions Contractor may deem necessary to ensure public safety at or in the vicinity of the job site. If such procedure is implemented the Contractor will bear all expenses incurred by the City. In all cases the judgment of the Engineer shall be final in determining whether or not an unsafe situation exists.

7-16 FLOOD HAZARDS AND DRY WEATHER FLOW

Special attention is directed to possible flood hazards and/or nuisance water such as irrigation and other runoff. The Contractor shall be responsible for all injuries or damages to any portion of the work occasioned by the above causes and Contractor shall make good such injuries or damages at no cost to the City prior to the completion and acceptance of the work.

7-17 UNSAFE WORKING CONDITIONS

If the Engineer or his representative is of the opinion that an unsafe working condition exists, Engineer shall immediately notify the Contractor and the appropriate agency for a determination. If in the opinion of the Engineer the unsafe working condition is not corrected immediately and satisfactorily, a written Notice to Stop Work will be given to the Contractor. Work will not commence until the unsafe condition has been corrected.

SECTION 8 - FACILITIES FOR AGENCY PERSONNEL

8-1 GENERAL

Facilities for agency personnel will not be required.

SECTION 10 - TELEPHONE

10-1 TELEPHONE

The Contractor shall maintain a telephone where the Contractor or Contractor's responsible agent may be reached at all hours during the day or night for emergencies. The number shall be given to the Water Inspector, Police, Public Works Department, City Traffic Engineer and any other necessary parties. For convenience to the Contractor in complying with the other provisions of this section, the following telephone numbers are listed:

Police Department	826-5700
Fire Department	826-5321
Traffic Engineering Division	826-5366
Traffic Signal Maintenance	351-6096
Street Light Repair	351-6005
Street Superintendent	351-6127

Electric	782-0330
Water	782-0330
American Medical Response	
Ambulance Service	684-5520
RTA	684-0850
Riverside Schools	509-0838 (for bus lines)
Special Services Transportation	687-8080 (for bus lines)
Alvord Schools	509-5095 (for bus lines)
AT&T (Emergency)	1-800-288-2020
So. Cal Gas (Emergency)	1-800-427-2200

PART 2 - CONSTRUCTION MATERIALS

All as provided in Part 2 of the Standard Specifications for Public Works Construction, except as modified herein.

Material lists may be modified from time to time by addendum insertions.

200.01 GENERAL

All material shall comply with the Standard Specifications for Public Works Construction (Greenbook), latest adopted edition, with Amendments, except as modified herein.

200.02 MATERIAL AFFIDAVITS AND CERTIFICATIONS

All pipe, fittings, valves and appurtenances shall be supplied with the manufacturer's affidavit of compliance or certification of compliance stating that the furnished material has been sampled, tested and inspected in accordance with the reference requirements and that the results thereof comply with the requirements of the specifications. Certifications shall be wet signed originals and addressed to the City of Riverside and shall identify the item supplied, specify the project and plan number for which the material is being supplied.

SECTION 200 – ROCK MATERIALS

200-2 UNTREATED BASE MATERIALS

200-2.1 General

Crushed slag base is deleted as an option to crushed aggregate base.

SECTION 201 - CONCRETE, MORTAR, AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE

201-1.1.2 Concrete Used

Concrete used for this project shall be in accordance with the Standards Specifications. Concrete for thrust blocks shall be Class 450-C-2000, Type II Cement. Concrete for curb, gutter, sidewalk, and driveway replacement shall be Class 520-C-2500, Type II Cement.

201-1.1.3 Concrete Specified by Compressive Strength

Mix designs with more than 45% of fine and coarse aggregate shall not be permitted.

201-1.2.1.1 Prepackaged Cement-aggregate Mix

Prepackaged cement-aggregate mix shall not be allowed.

201-1.4 Mixing

Hand mixed concrete shall not be allowed.

201-5 CEMENT MORTAR

201-5.1 General

Hand mixed mortar shall not be allowed. Cement mortar shall be used within 45 minutes after mixing with water.

SECTION 203 - BITUMINOUS MATERIALS

203-6 ASPHALT CONCRETE

Where dense graded asphalt is being constructed in two layers or more, the Asphalt Concrete pavement for the base course shall be B-PG-64-10. When dense graded asphalt is being constructed in a single layer and for a finishing course or Asphalt Concrete overlay, the Asphalt Concrete pavement shall be C2-PG-64-10.

203-6.1 Asphalt Types for Various Uses. The materials listed below shall be used. Blast furnace or steel slag is not acceptable as an aggregate in asphalt concrete.

TYPE	USE
B-PG-64-10	Base course for streets
C2-PG-64-10	Base course for trench resurfacing
C2-PG-64-10	Surface course for streets and trenches
D2-PG-70-10	Type 1 asphalt concrete berm
D2-PG-64-10	Overlay less than 1-inch thick

203-6.6 Mixing. Automatic batch mixing is required.

203-11 ASPHALT RUBBER HOT MIX (ARHM) WET PROCESS.

203-11.2.3 Crumb Rubber Modifier (CRM). The Contractor shall certify that all crumb rubber used in the project is derived from California used and waste tires.

203-11.3 Composition and Grading. The Contractor shall use ARHM-GG-C with type I binder.

SECTION 207 - PIPE

The following Sections shall be used in the construction of the water main and appurtenances.

All affidavits of compliance and certifications referenced herein shall be addressed to the City of Riverside, identifying the item supplied, and specifying the project or plan number for which the material is being supplied. Wet signed originals are required.

Written Certification from the pipe manufacturer indicating that all supplied pipe materials have been manufactured, sampled, and tested according to these Specifications, must be submitted by the Contractor and approved by the Engineer prior to construction.

The manufacturer shall also supply copies of the certified physical test results, identifiable to the class and size of pipe, shift period, the date of test, and the purchase order number.

Pipe furnished for this Contract shall be in accordance with the Standard Specifications unless otherwise specified herein.

The pipe manufacturer shall submit shop drawings covering all pipe manufacturing specifications and fabrication details, along with a layout sheet showing the physical placement of each piece of pipe for City approval before starting the manufacturing of pipe. The layout sheet shall include the invert elevation at the end of section of pipe (only required when the construction drawings include a pipeline profile).

The pipe manufacturer shall provide pipe specials and fitting drawings showing all pertinent details and dimensions of elbows, reducers, connections, outlets, tees, crosses, bulkheads, closures and their required items.

The Engineer / the inspector or his designee shall reserve the right to reject pipe on his own discretion.

207-9 DUCTILE IRON PIPE AND FITTINGS

207-9.1 General. This section applies only to ductile iron pipe (D.I.P.) and fittings for water distribution mains. All ductile iron pipe shall be Class 350 D.I.P., per A.N.S.I. A21.51/A.W.W.A. C-151. Fittings and appurtenances shall have a minimum pressure rating of 250 psi and shall be manufactured in accordance with A.N.S.I. A21.10/A.W.W.A. C-110 and/or A.N.S.I. A21.11/A.W.W.A. C-111. Ductile iron compact fittings shall have a minimum pressure rating of 350 psi and shall be manufactured in accordance with A.N.S.I. A21.53/A.W.W.A. C-153.

Ductile Iron Pipe installed shall be pressure class 350.

Inspection within the manufacturing plant shall be provided by the manufacturer. Copies of all test reports shall be submitted to the Water Division.

All Ductile Iron Pipe used for below ground installations shall be push on or mechanical joint type and encased in a polyethylene sleeve and cement lined as specified herein, unless otherwise indicated on the Plans or in these Specifications.

Fittings and appurtenances shall consist of, but not be limited to, bends, tees, crosses, etc.

207-9.2.1.1 Certification by Manufacturer

The manufacturer shall submit a wet signed original sworn statement that the pipe furnished has been sampled, tested and inspected in accordance with these Specifications and that the results thereof comply with the requirements of this Specification.

207-9.2.2 Pipe Joints

Ductile Iron Pipe and fittings shall have one of the following joint types as shown on the Plans or Standard Drawings. Unless otherwise specified, all DIP shall have restrained joints.

- (1) Mechanical joint ANSI A21.11/AWWA C111
- (2) Flanged joint - ANSI A21.10/AWWA C110
- (3) Restrained joint - ANSI A21.10/AWWA C110. "Field-LOK" Gaskets, for use with "Tyton" joint pipe only, as manufactured by U.S. Pipe and Foundry Company, or "Fast-Grip" Gaskets, for use with "Fastite" joint pipe only, as manufactured by American Cast Iron Pipe Company, or "Grip Ring", as manufactured by Romac Industries, Inc., or "Lok-Ring" as manufactured by American Cast Iron Pipe Company, are accepted for joint restraint. EBBA Iron Megalugs are acceptable on 14-inch water mains and larger, Gripper Gaskets by the Gripper Gasket Company are not permitted. **Any restrained joint gasket must be inspected, by the City Inspector, before use.**

207-9.2.3 Fittings. This section covers all fittings required for closures, bends, tees, crosses, reducers, plugs, caps, blowoffs, fire hydrant buries, and connections to mainline valves shown on the Plans. All fittings shall be restrained mechanical joint.

All fittings shall have a minimum pressure rating of 250 psi and shall be manufactured per ANSI A21.10/AWWA C110 and/or ANSI A21.11/AWWA C111. Ductile Iron compact fittings shall have a minimum pressure rating of 350 psi and shall be manufactured per ANSI A21.53/AWWA C153.

207-9.2.4 Lining and Coating. Ductile Iron Pipe and fittings shall be lined with cement mortar per ANSI A21.4/AWWA C104. The coating shall be a bituminous coating with a minimum thickness of one (1) mil.

207-9.2.5 Inspection and Certification. The manufacturer shall submit a sworn statement that the pipe furnished has been sampled, tested and inspected in accordance with these Specifications and that the results thereof comply with the requirements of this Specification.

207-9.4 Inspection and Testing. Inspection in the plant shall be by the manufacturer. Copies of all test reports shall be submitted to the Engineer.

207-9.5 Approved Pipe Manufacturers.

- a. Pacific States Cast Iron Pipe Company
- b. United States Pipe and Foundry Company
- c. American Cast Iron Pipe Company
- d. Griffin Pipe Products Company

207-9.6 Approved Fittings Manufacturers.

- a. Pacific States Cast Iron Pipe Company
- b. United States Pipe and Foundry
- c. Star
- d. Sigma/Nappco
- e. Union
- f. Reliable
- g. American Ductile Iron Pipe
- h. Griffin Pipe Products Company

207-10 STEEL PIPE

207-10.2.1.1 General. The Grade of steel used, for the steel cylinders, with thickness less than 0.230-inches, shall be per ASTM A1011, SS Grade 36 (formerly ASTM A570). For thickness greater than or equal to 0.230-inches, shall be per ASTM A1018, SS Grade 36 (formerly ASTM A907), as referenced in AWWA C200, Standard for Steel.

This section applies to cement-mortar lined and coated steel pipe for water distribution mains. All CML&C steel pipe used on a project shall be manufactured under one roof, by one company. This provision is to confine the manufacturing process of the pipe and pipe specials to one manufacturer. For welded steel pipe, this will include the milling of steel plate or coil into the pipe cylinder, lining and coating operations, the fabrication of fittings

and pressure testing. Welded steel pipe may be manufactured by a Water Division approved subcontractor of the pipe supplier, with the supplier providing for fabrication of all fittings and appurtenances. However, the supplier shall provide the quality control inspection of the pipe manufacturing process.

Pipe supplied by the Contractor shall be engineered and designed by the pipe manufacturer. This shall include all engineering calculations called for in the applicable A.W.W.A. or ASTM standards and any other calculations required to design the pipe in accordance with sound engineering practices. The pipe manufacturer shall submit shop drawings covering all pipe manufacturing specifications and fabrication details.

Inspection within the plant shall be provided by the manufacturer. Testing to insure compliance with the requirements shall be made in accordance with A.N.S.I./A.W.W.A. C-200 and C-205 within the Continental United States at the last point of loading on rubber tired vehicles before delivery to the job site.

207-10.2.1.2 Design Criteria. CML&C steel pipe shall be designed to meet the following requirements:

- A. A working water pressure of 150 psi.
- B. Water hammer pressure at 45 psi.
- C. Design pressure of 150 psi.
- D. Traffic loading to be AASHTO H-20, S-16, with an impact factor of 1.5 for depths to 4.0 feet.
- E. Deflection limit of 2 percent of pipe I.D.
- F. Water hammer stress + static pressure stress shall not exceed 0.75 yield stress.
- G. Weight of soil to be 140 lbs. per cubic foot (4 foot minimum), and a K_u of 0.150.
- H. The cross-sectional area of steel in the pipe wall shall be based on $\frac{1}{2}$ of the yield point of the steel used, but not to exceed 16,500 psi. Minimum wall thickness shall be 12 gauge (0.105-inch).

The manufacturer's specifications for fabrication, handling, installation, rubber gaskets and joint lubricant shall be submitted to the Water Division.

207-10.2.1.3 Fabricated Steel Pipe. Fabricated steel pipe shall consist of straight butt seam or spiral butt seam electrical welded steel cylinders, shop fabricated from plates or sheets, manufactured and tested in accordance with A.W.W.A. C-200 and Federal Specification SS-P-385a. In addition, for water pipe 6-inches and larger, ASTM A-570, Grade 36, as referenced in A.W.W.A. C-200, shall be used.

207-10.2.1.4 Bonding Jumpers. Bonding jumpers are required at all pipe joints. Bonding jumpers shall be the type as indicated in the Standard Drawing CWD-924 and shall be sized to limit the resistance of the jumpers divided by the resistance of the cylinder to a maximum of 0.30 ohm to a minimum of 0.10 ohm. Bonding jumpers will be required for steel pipe unless indicated otherwise on the plans or in these Specifications. Bonding jumpers are not required for ductile iron pipe.

207-10.4.2.1 Cement Mortar Lining and Coating. All steel pipe furnished shall be cement mortar lined and coated in accordance with AWWA C205 and Sub-section 207-10 except that Table 1, AWWA C205 is revised as follows:

Pipe Diameter (inches) *Pipe ID	Lining		Coating	
	Thickness (inches)	Tolerance (inches)	Thickness (inches)	Tolerance (in.) (No minus tolerance)
4 thru 12	5/16	±1/16	3/4	+1/4
14 thru 18	3/8	±1/16	3/4	+1/4
20 and Larger	1/2	±1/16	3/4	+1/4

*Pipe ID shall be greater than the nominal size specified in the plan; and Pipe ID shall be measured from the inside face of lining to inside face of lining.

Type II Cement shall be used for the lining and Type II cement shall be used for the coating.

The pipe manufacturer shall provide internal bracing for all pipe sizes 10-inches and larger. Bracing shall remain in the pipe until installation, bedding, and backfill materials operations have been completed. Ten-inch thru 36-inch pipe shall be braced with 4pt, 2 places 12-inches from each end. Bracing to be 2" x 4" with wedges.

These bracing requirements shall be considered as a minimum. The Contractor shall provide additional internal bracing and take the necessary precautions as required to ensure that the pipe will not deflect more than 2 percent.

207-10.4.2.2 Approved Pipe and Fittings Manufacturers.

- (a) Ameron Pipe Products Group
- (b) Northwest Pipe and Casting Company
- (c) Kelly Pipe Company
- (d) West Coast Pipe Linings Inc.
- (e) Southland Pipe Corp.
- (f) Imperial Pipe Services, LLC

207-25 MISCELLANEOUS PIPE

207-25.1 General

These Specifications apply to miscellaneous piping used for appurtenant construction and water services. All miscellaneous piping shall conform to these Specifications unless shown otherwise on the Plans or Standard Drawings.

207-25.1.1 Copper Tubing or Pipe

Copper tubing or pipe used for service connections, air valves or blow-offs shall be Type "K" soft copper conforming to ASTM B-88. Hard drawn copper shall be used for air valve and blow-off risers. When wrought copper solder type fittings are shown on the Plans or Standard Drawings the joints shall be soldered using a lead free, tin based alloy solder meeting Federal requirements for lead free solders mandated by the Federal Safe Drinking Water Act, with a flux specifically designed for the solder alloy. Use J. W. Harris Co., Stay Safe 50, Stay Safe Bridget, or City approved equal.

1" Copper- no sweat fittings are permitted.

2" Copper – full 20 feet sticks are to be used keeping solder couplings with provision to keep them to a minimum.

207-25.2 Red Brass Pipe

Red brass pipe used for service connections, air valves or blow-offs shall conform to ASTM B-43.

207-25.3 Steel Pipe

Steel pipe used in 4 inch and larger fire or domestic services and guard posts shall conform to ASTM A-120, Schedule 40.

207-25.4 Brass Pipe

Brass to be used as 2-inch service bypasses shall conform to appropriate ASTM specification.

207-25.5 Gate Box Material

The respective minimum thicknesses of steel pipe used for 8-inch and 10-inch gate boxes shall be 14 and 12 ga. Pipe shall be seamless steel, conforming with the requirements of ANSI/AWWA C-200. Material shall be factory dipped in Trumble Asphalt Dip, or an approved equal.

SECTION 210 - PAINT AND PROTECTIVE COATINGS

210-1.5 Paint Systems

210-1.6 PAINT AND PROTECTIVE COATINGS

4.06.1 Painting Schedule. All paint and protective coatings shall be holiday free. The following paint schedule shall apply to Water Division facilities:

- a. Gate Box Caps & Rims - 1 coat Rust-Oleum #1069 Primer and 2 coats of no marking paint, traffic blue, # 6703, or City approved equal.
- b. Air Valves - 1 coat Rust-Oleum #1069 Primer and 2 coats of Rust-Oleum #7638, Forest Green, Fuller O'Brien #312-81, Shutter Green, or Pervo #2428, Industrial Green.
- c. Fire Hydrants - 1 coat Rust-Oleum #1069 Primer and 2 coats of either Fire Hydrant Pervo #2420, Rust-Oleum #7644 Federal Safety Yellow or Fuller O'Brien #312-74 Hi-Way Yellow.
- d. Guard Posts: 1 coat of Rust-Oleum #1069, Primer and 2 coats of: Fuller O'Brien #312-81, Shutter Green, or Rust-Oleum #7638, Forest Green, or Pervo #2428, Industrial Green
- e. Vault Covers: 1 coat of Rust-Oleum #1069, Primer and 2 coats of: Rust-Oleum #473, Industrial Aluminum, or Pervo #2404, Aluminum
- f. Above Grade Piping: 1 coat of Dunn Edwards #43-5, Alkyd Primer and 2 coats of: Dunn Edwards, Syn-Lustro 10 Series, San Tan
- g. Fire Hydrants: 1 coat of Rust-Oleum #1069, Primer and 2 coats of: Fuller O'Brien #312-74, Hi-Way Yellow, or Rust-Oleum #7644, Federal Safety Yellow, or Pervo #2420, Fire Hydrant Yellow
- h. Blowoff Hydrants - 1 coat of Rust-Oleum #1060 Primer and 2 coats Rustoleum #7644, Federal Safety Yellow, Pervo #2420, or Fuller O'Brien #312-74, Hi-Way Yellow. (Top of Hydrant) Fuller

- O'Brien #312-80, National Blue Paint.
- i. Valves and Piping - Koppers #50, or City approved equal.
 - j. Curb Marking - Traffic Blue #6703, Vista Paint or City approved equal.
 - k. Miscellaneous Appurtenances - "Tnemec" Pota-Pox Plus series 140F epoxy coating, or City approved equal.
 - l. All paint and protective coatings shall be holiday free.
 - m. Suppliers
 - (1) Pervo Paint, Los Angeles - (213) 758-1147
 - (2) Fuller O'Brien, Fullerton - (714) 992-0720
 - (3) Vista Paint, Riverside - (951) 689-2501
 - (4) Decratrend, San Bernardino - (909) 888-3211

All the above paints, with the exception of red and black primer shall be **industrial strength**. A minimum thickness of 5 mils shall be attained after the final paint coat has dried.

SECTION 250 - VALVING, APPURTENANCES AND MISCELLANEOUS MATERIALS

250-1 NUTS AND BOLTS.

Where nuts and bolts are to be furnished for fastening flanged joints, they shall be hexagonal head machine bolts and hexagonal nuts. Steel Standard ASTM A-307 Grade B; dimensions of bolts and nuts, ANSI B-18.2.1; threads of bolts and nuts, ANSI B1.1 coarse thread series, Class 2A fit on bolts and Class 2B fit on the nuts; nuts and bolts shall be cadmium plated conforming to ASTM A-165, type TS; electroplated zinc per ASTM B-633, SC 1; or hot-dip galvanized per ASTM A-153, Class C. Minimum bolt lengths shall be three or four threads showing after completely tightened. Break-off bolts shall have a hole drilled in the shank with the dimensions of 1 1/32-inch (for 5/8-inch bolts) and 13/32-inch (for 3/4-inch bolts) and 2 3/8-inch deep and shall be supplied filled with silicone.

250-1.1 Check Valves. Check valves 2 ½-inch and larger shall conform to the following:

1. Valves shall be of a swing type with grooved ends complying with A.W.W.A. C-508. Valve bodies for valves up to 4-inches shall be bronze. Valve bodies for valves 6-inches to 12-inches shall be ductile iron.
2. Valves shall be designed for a working pressure of 175 psi.

3. The valves shall be supplied with an external lever arm, external spring, and a no-flow micro switch.
4. Check valves shall be operable in both the vertical and horizontal positions.
5. The disc arm, pin, and spring material shall be constructed of stainless steel in conformance with ASTM A276, Type 316. The valve seat shall be bronze.

Check valves made by Victaulic, Series 317 C-040 (060) have been approved by the Water Division.

250-2 GASKETS.

Where gaskets are to be furnished, they shall be 1/8" minimum thickness, micro finish, full face, red rubber style 150 by "Active Packing" or City approved equal.

250-3 INSULATION GASKETS.

Unless otherwise specified, insulation gaskets shall conform to the following:

1. The insulation gasket shall fit between the class of flanges as specified, with a pressure rating equal to or greater than the flange pressure rating.
2. Insulation gaskets shall be full pattern, fabric-reinforced phenolic, neoprene face, 1/8-inch thick.
3. The gaskets shall have the following assembly minimum physical characteristics:
 - a. Compression strength.....24,000 psi
 - b. Dielectric strength 500 V/Mil
 - c. Operating temperature.....up to 175° F
 - d. Water absorption 1.6%
4. A one-piece Acetal Resin sleeve and Washer shall be used in combination with a single phenolic washer on each bolt. A steel washer designed to be used with the insulating washer shall be used, one each side of the flange bolts.
 - a. One-piece sleeve washer shall have the following physical characteristics:
 - (1) Sleeve thickness1/32-inch
 - (2) Washer thickness5/32-inch

- (3) Dielectric strength..... 1200 V/Mil
- (4) Operating temperatureup to 175° F
- (5) Water absorption 0.22% Max.

b. Single phenolic washers shall have the following physical characteristics:

- (1) Thickness1/8-inch
- (2) Dielectric strength..... 500 V/Mil
- (3) Compressive strength.....26,000 psi
- (4) Operating temperatureup to 300° F
- (5) Water absorption 1% Max.

c. Flange Insulation kits shall be:

- (1) PSI Products, Inc., Burbank, California
- (2) Central Plastics Company, Shawnee, Oklahoma
- (3) CALPICO Inc., San Francisco, California

250-4 BUTTERFLY VALVES.

Butterfly valves shall conform to the latest revision of AWWA C504 and the following:

1. Butterfly valves and operators shall be class 150B, constructed for direct burial and have flanged ends.
2. Butterfly valves shall be furnished with operators of the traveling nut or worm gear type, self-locking in any position, and sealed (with gaskets), and lubricated to withstand a submersion in water to 10 psi. The valve shall open by counter-clockwise rotation of a 2-inch square AWWA operating nut.
3. The operator shall be capable of meeting the torque requirements for opening and closing the valve against:
 - a. 150 psi upstream and 0 psi downstream pressure.
 - b. Maximum inlet-outlet velocity of 12 feet per second, normal velocity of 6 feet per second, and shall be provided with AWWA stops capable of absorbing up to 300 foot-pounds of input torque without damage to the valve or operator.

4. Butterfly valves shall have Buna N seat bonded or mechanically retained without use of metal retainers or other devices located in the flow stream, to the body and have a disc seating edge of ni-chrome or stainless steel. All internal mountings or working parts shall be stainless steel. All internal nuts and bolts, excepting the operating nut shall be of stainless steel.

Butterfly valves shall have the shaft V-type self-adjusting packing. The shaft shall not be exposed between the valve body and the operator.

5. The use of a stop or lug cast integrally with or mechanically secured to the body for the purpose of limiting disc travel by means of direct contact or interference with the valve disc in either the open or closed position and which utilizes a ferrous metal bearing surface in direct rubbing contact with an opposing ferrous metal surface, will not be acceptable.
6. Butterfly valves shall be furnished with records of tests specified in AWWA C504, Section 2.3 and Section 5. Butterfly valve seats shall be tested and certified for a 150 psi working pressure. The certificate shall be attached to the Butterfly valve. All valves shall be furnished with certified drawings and parts list of the valve and operator. An affidavit of compliance to AWWA C504 shall be furnished for all valves. Five sets of the above information shall be furnished to the City.
7. Butterfly valves shall have their internal and external surfaces epoxy coated, except flange faces and stainless steel and rubber surfaces, with a minimum of 8 mils of "Ameron" Amercoat 400 epoxy coating, Holiday Free, or City approved equal. "Ameron" Amercoat 400 epoxy coating shall be applied at the manufacturer's plant or approved manufacturer's representative's plant in accordance with the manufacturer's application specifications.

250-4.1.1 Approved Manufacturers:

- a. Pratt - Groundhog, Triton XR-70.
- b. Mueller – Lineseal III or City approved equal.
- c. Dezurik

250-5 GATE VALVES.

250-5.1 1/4-inch to 3-inch Gate Valves. Unless otherwise specified, bronze gate valves 1/4-inch through 3-inch shall conform to Specification MSS SP-80, and the following:

- a. Gate valves shall be 300 psi WOG, 150 psi SWP non-rising stem, union bonnet, solid wedge disc and screw ends.
- b. Gate valves used in 2-inch air valve, 2-inch blowoff or 2-inch service installations shall have the handwheel replaced with a 1-inch square x 1/2-inch

cast iron operator nut.

c. 2" Bronze gate valves shall be:

(1) Milwaukee Valve, Co. 1141

250-5.2 Resilient Seat Gate Valves.

250-5.2.1 General. This section of the Specification covers resilient-seated gate valves for use in the water distribution system.

Resilient-seated gate valves shall conform to the latest revision of AWWA C509 and the following:

- (1) Resilient-seated gate valves shall be iron bodied with all bronze internal mountings and working parts. Valve stems shall contain no more than 5% zinc and 2% aluminum.
- (2) Resilient-seated gate valves shall have non-rising stems, "O"-ring sealed with two "O"-rings above the thrust collar, with a 2-inch square operating nut, opening counter-clockwise, and shall be designed for 200 psi water working pressure.
- (3) Resilient-seated gate valves shall have sizes and type of valve ends as shown on the plans or Standard Drawings.
- (4) Resilient-seated gate valve suppliers shall furnish the City with an affidavit of compliance to AWWA C509.
- (5) Resilient-seated gate valves shall have their internal and external surface epoxy coated, Holiday Free, except stainless steel and rubber surface with epoxy applied by the manufacturer of the valve.

250-5.2.2 Resilient Seat Gate Valves - Tapping. Tapping gate valves shall conform to all requirements of Subsection 250-5.2.1 and the following:

- (1) Tapping valves shall have a Class 125, ANSI B16.1 flanged inlet and an outlet as shown on the construction plans.
- (2) Tapping valves shall be compatible with the tapping sleeve and the tapping machine utilized for wet tapping the water main.

250-5.2.3 Approved Manufacturers.

- (1) American Flow Control Series 2500
- (2) Clow Series 6100

- (3) AVK Series 25
- (4) Mueller Model A2360
- (5) M & H Style 4067 NRS

250-5.3 Tapping Sleeves.

- a. Tapping sleeves shall be:
 - (1) Ductile Iron body construction, with mechanical type joints on both sleeve ends, and a class 125 ANSI B16.1 flanged outlet.
 - (2) ASTM A-276, type 304 or 304L stainless steel body construction, with full circumference gasket, and flange outlets meeting the requirements of Section 250-9. Flanges materials may include ASTM A-276, type 304 or 304L stainless steel.
- b. Sleeves shall be compatible with the tapping gate valves.
- c. Sleeves shall be designed for a working pressure of 200 psi and be supplied with a 1/2" or 3/4" IPF coupling or tap and corporation stop for pressure testing sleeve.

250-5.3.1 Approved Manufacturers.

Stainless Steel Sleeve

- (1) Smith-Blair 662 and 663
- (2) Romac SST or Romac FTS 420
- (3) Powerseal 3490-AS

Mechanical Type Joint

- (1) Mueller-Mechanical Joint Tapping Sleeve
- (2) Clow-Mechanical Joint Tapping Sleeve
- (3) American Flow Control - Mechanical Joint Tapping Sleeve

250-5.4 Abandoning Existing Valves. All existing valves shall be abandoned by Contractor unless otherwise noted on the plans. After pipelines have been tested and disinfected by Contractor, and accepted by City, and after City has completed all service connections and waterline connections, Contractor shall remove valve cans a minimum of 12" below finish grade, remove operating nut extensions, and fill valve cans with concrete. Thereafter, Contractor shall sawcut existing asphalt concrete pavement (2' square section)

or concrete (at construction joints) around existing valve boxes, remove said asphalt concrete pavement or concrete and dispose of same at a legal disposal site, and place concrete or asphalt concrete pavement over abandoned valve boxes.

250-6 VALVE BOX CAPS.

Where valve box caps are to be furnished; the valve box caps shall be composed of 8-inch or 10-inch valve boxes and shall consist of a cap of cast iron with the cap marked CWD with the City of Riverside pattern. The cap shall be supplied with two coats of paint thereon and one coat primer. See painting schedule, Section 210-1.5. Cap shall be manufactured by South Bay Foundry, San Diego, CA, or City approved equal.

250-7 AIR VALVES.

Unless otherwise specified, air valves, 2-inch and larger, shall conform to the following:

1. Air valves shall have their internal body casting epoxy coated with a minimum of 12 mils of "Ameron" Amercoat 370 epoxy coating, Holiday Free, or City approved equal. The "Ameron" Amercoat 370 epoxy coating shall be applied at the manufacturer's plant or approved manufacturer's representative's plant, in accordance with the manufacturer's application specifications.

2. Air valves shall be:

Crispin, 2-inch - UL20.1-Air and Vacuum Valve

250-7.1 Abandoning Existing Air Valves. See Abandoning Existing Valves (Section 250-5.4).

a. All existing air valves shall be abandoned by Contractor unless otherwise noted on the plans. After pipelines have been tested and disinfected by Contractor, and accepted by City, Contractor shall remove air valves and piping a minimum of 12" below finish grade and fill void and piping with concrete. Thereafter, Contractor shall saw cut existing concrete at construction joints around abandoned air valves, remove said concrete and dispose of same at a legal disposal site, and place concrete over abandoned air valve. If existing air valves are located in an area without concrete, Contractor shall remove and replace, in kind, the area around abandoned air valves.

b. Contractor shall restore landscaping and existing improvements around abandoned fire hydrants.

c. Air Valves shall be delivered to the City of Riverside, Utilities Operation Center. Call the Water Superintendent at (951) 351-6384.

250-8 BRASS AND BRONZE ITEMS.

Brass and bronze items cover corporation stops, angle ball meter valves, meter couplings and service fittings. All material used in the manufacture of this equipment shall be copper base alloy complying with ASTM B62 and AWWA C800. All compression fittings shall be pack joint type connection for use with tubing and should comply with the "Lead-Free" rule.

250-8.1 Service Fittings. All angle ball meter valves and corporation stops shall be constructed of the following: Heavy cast bronze body, double Buna-N rubber O-rings in stem, molded Buna-N rubber seat and supplied with lockwing.

250-8.1.1 Approved Manufacturers and Models.

<u>ITEM</u>	<u>FORD</u>	<u>JONES</u>	<u>A.Y. McDONALD</u>	<u>MUELLER</u>	<u>CAMBRIDGE BRASS</u>
1" Ball Corp. MIPT X MIPT	FB500-4	J-1943	3131B	B-20013	301-M4M4
1" Couplings FIPT X Pack Joint for CTS	C14-44G	J2607	4754-22	P-15451	
2" Ball Corp. MIPT x MIPT	FB-500-7	J-1943	3131B		301-M7M7
2" Corp. Stop CC x IPT	FB-400-7	J-1944	3128B		
1" Angle Ball Meter Stop	BA43- 444W	J-1963W	4602B-22	B-24258	210-H4T4
2" Angle Ball Meter Stop	BFA13- 777W	J-1974W	4604B		210-F7MF7
2" Coupling (MIPT x Comp.)	C84-77	J-2605			117-H7M7
1" x 3/4" Meter Adaptor	A34	J-128-H			440-N4R2
1" Meter Coupling	C38-44- 2.625	J-134	4620	H-10891	417-T4M4
3/4" Meter Coupling	C38-23- 2.5	J-134	4620	H-10891	417-T3M3

250-8.2 Service Saddles (Service Clamps). Saddles shall be all bronze double strap type, with neoprene seal ring gasket.

250-8.2.1 Approved Manufacturers and Models.

- (1) Mueller Cat. No. BR 2 B 0474 IP, BR 2 B 0684 IP, BR 2 B 0899 IP, BR 2 B 1104 IP, BR 2 B 1314 IP
- (2) Smith-Blair Cat. No. 323-0510 thru 323-1426
- (3) R.H. Baker Cat. No. 183-413 TAP thru 183-1426 TAP
- (4) Jones Cat. No. J-979
- (5) McDonald No. 3826
- (6) Ford - 202B
- (7) Cambridge Cat. No. 810

250-8.3 Water Sampler Fittings. All angle ball meter valves and corporation stops shall be constructed of the following: Heavy cast bronze body, double Buna-N rubber O-rings in stem, molded Buna-N rubber seat and supplied with lockwing.

250-8.3.1 Approved Manufacturers and Models.

<u>ITEM</u>	<u>FORD</u>	<u>JONES</u>
1" Corp. Stop IPT x Compression	1"-F-1100	1"-J-3403
1" Corp. Stop IPT x 1 PT	1"-F-500	1"-J-41
1" Angle Ball Meter Stop	BA43-444W	1"-J-1963W
1" x 3/4" Meter Adaptor	A34	1" x 1-1/4", J-128-H

250-9 FLANGES.

Unless otherwise specified, flanges shall conform to the following:

1. All steel flange sizes 4-inch through 12-inch shall be Class "D" and shall comply with AWWA C207, Section 1.1, 175 psi primary service rating. All steel flange sizes greater than 12-inches in diameter shall be Class "E" and shall comply with AWWA C207, Section 1.1, 275 psi primary service rating. All ductile iron flanges shall conform with the requirements of AWWA C115.
2. Steel flange sizes 4-inch through 20-inch shall be furnished in the slip-on welding type.
3. Flanges shall be faced smooth or may have a serrated finish of approximately 32 serrations per inch, approximately 1/64-inch deep. Serrations may be spiral or concentric.

4. Plate or blind flanges shall have all flange faces machined flat and shall be center drilled and tapped, 1-inch IPT, 4-inch through 10-inch; 2-inch IPT 12-inch and larger; and furnished with a standard square head pipe plug.
5. Final machining on the contact faces of all flanges shall be done prior to being welded to the full length adjacent steel-plate section. Flange faces shall be checked with a straight edge and shall be perpendicular to the pipeline. All warped flanges will be returned to the pipe company for adjustment. The Contractor is responsible for all additional expenses and delays.
6. For 1-1/2 inch and 2-inch water service installations, a 2-inch brass screw meter flange shall be used, conforming with Section 4.4 of AWWA C701.

250-10 FIRE HYDRANTS/BLOWOFF ASSEMBLIES.

Unless otherwise specified, fire hydrants and blow off hydrants shall conform to the latest revision of AWWA C503 and the following:

1. Hydrants shall have 6- inch flanged inlet connection with 6-3/4 inch holes drilled on a 9-3/8 inch bolt circle.
2. Hydrants shall have outlet nozzles of the quantity and size specified with National Standard Hose Thread.
3. Hydrants shall be furnished with 1-3/4 inch pentagon spanner nuts on operator stems and nozzle caps. Nozzle caps shall be constructed of cast iron.
4. Hydrants from Clow Corporation shall be supplied with Type B carrier valves. Valve rubber shall be 5/8-inch thick for 2-1/2 inch outlets and 3/4-inch thick for 4- inch outlets.
5. Hydrant valves shall be slow opening.
6. Hydrant stems shall have "O" ring packing and be constructed of ASTM B-62 (85% copper, 5% tin, 5% lead, 5% zinc).
7. Hydrants shall be painted per AWWA C503. Exterior color shall be fire hydrant yellow.
8. Hydrant supplier shall furnish an affidavit of compliance to AWWA C503.
9. Hydrant (1 - 2-1/2" and 1 - 4" Outlets), Super Hydrant (2 - 2-1/2" and 1 - 4" Outlets)

250-10.1 Approved Manufacturers and Models.

a. Regular Hydrant:

CLOW CORP., Corona, California, Ranger, 900 Series, Model 950

JAMES JONES COMPANY, El Monte, California, Model J-4040-C

AMERICAN AVK CO., Fresno, California, Model 24/70

b. Super Hydrant:

CLOW CORP., Corona, California, Ranger, 900 Series, Model 960

JAMES JONES COMPANY, El Monte, California, Model J-4060-C

AMERICAN AVK CO., Fresno, California, Model 24/90

250-10.2 Abandoning Existing Fire Hydrants.

- a. All existing fire hydrants shall be abandoned by Contractor unless otherwise noted on the plans. After pipelines have been tested and disinfected by Contractor, and accepted by City, Contractor shall remove fire hydrants and fire hydrant burys a minimum of 12" below finish grade and fill fire hydrant burys with concrete. Thereafter, Contractor shall sawcut existing concrete at construction joints around abandoned fire hydrant burys, remove said concrete and dispose of same at a legal disposal site, and place concrete over abandoned fire hydrant burys. If existing fire hydrants are located in an area without concrete, Contractor shall remove and replace in kind area around abandoned fire hydrant burys.
- b. Contractor shall restore landscaping and existing improvements around abandoned fire hydrants.
- c. Contractor shall notify City Fire Department of the location of the fire hydrants that are out of service.
- d. Hydrants to be delivered to the City of Riverside, Utilities Operation Center. Call the Water Maintenance Superintendent at (951) 351-6384.

250-10.3 Abandoning Existing Blowoffs. See Abandoning Existing Fire Hydrants (Section 250-10.2) and Abandoning Existing Valves (Section 250-5.4).

250-11 BOLTED, SLEEVE-TYPE COUPLINGS.

Unless otherwise specified bolted, sleeve-type couplings shall conform to the latest revision of AWWA C219.

250-11.1 Flexible Couplings.

- a. Each coupling shall consist of one steel middle ring, two steel followers, gaskets, and sufficient numbers of steel bolts to compress the gasket without distorting the followers.
- b. The thickness of the middle ring shall be such that the stress in the steel shall not exceed 50 percent of the yield point when subjected to the hydrostatic test pressure of the pipe line. The middle ring thickness shall not be less than the thickness of the pipe jointed.
- c. Middle rings shall be cold expanded a minimum of 1 percent increase in diameter to test the weld and the size to the proper dimension.
- d. The middle rings shall be coated with "Ameron" Amercoat 370 epoxy coating, Holiday Free, or City approved coating to a minimum dry film thickness of 10 mils. Follower rings shall be coated with a compatible shop coat for field coating.
- e. Bolts shall be 5/8-inch diameter carriage bolts with hexagon nuts. Steel bolts shall have a minimum yield strength of 40,000 psi.
- f. Gaskets shall be composed of a crude or synthetic rubber base suitable for use in potable water supply systems.

250-11.1.1 Approved Manufacturers and Models.

- (1) Baker Series 200
- (2) Dresser Style 38
- (3) Smith-Blair 411 and 441
- (4) Romac Style 501
- (5) Ford Style FC1 and FC2

250-11.2 Flanged Coupling Adapters.

- a. Each adapter shall consist of an adapter flange body, follower flange, wedge gasket, and sufficient bolts to compress the gasket without distorting the follower.
- b. Adapter flange and follower shall be constructed of steel or ductile iron. Ductile iron adapters shall meet or exceed ASTM A536, grade 65-45-12. The flange bolt dimensions shall meet AWWA C207 for a Class "D" flange.
- c. Gasket shall be composed of a rubber base meeting, or exceeding, ASTM D2000 3 BA 715 and suitable for use in potable water supply systems.
- d. Nuts and bolts shall conform with requirements of AWWA C111, and the above flexible coupling requirements listed in 250-11.1.

- e. Adapter flange and follower shall be painted with a factory applied shop coat.

250-11.2.1 Approved Manufacturers and Models.

- (1) Baker Series 601
- (2) Smith-Blair 912, 913, and 914
- (3) Ford Style FFCA
- (4) Romac FCA 501

250-12 METER BOXES

Pre-cast concrete meter boxes shall be provided for 5/8-inch through 2-inch water meters. Meter boxes shall be furnished with a Polymer concrete cover and lid except where cast iron or steel traffic covers are specified. Where meter boxes are to be placed within a landscaped area, plastic boxes shall be used.

250-12.1 Approved Manufacturers and Models.

Meter boxes provided shall be one of the following models. Many other manufacturers are readily available. Any substitution must be approved by the Engineer and shall be of the same size and description as those specified below:

- a. 3/4" and 1" Meters:

<u>Manufacturer</u>	<u>Model</u>
Armorcast	No. 37 (Polymer Concrete Cover)
Carson Industries	1017 (Plastic Box and Cover with Reading Lid)

- b. 1-1/2" and 2" Meters:

<u>Manufacturer</u>	<u>Model</u>
Armorcast	No. 65 (Polymer Concrete Cover)

250-12.2 Terminal Housing Boxes

Meter boxes shall be provided for test lead terminal housing and water quality sampling station. The size shall be the same as for a 5/8-inch meter to 1-inch meter but shall be furnished with a cast iron traffic cover painted yellow.

250-12.3 Approved Manufacturers and Models. Terminal housing boxes provided shall be one of the following models. Many other manufacturers are readily available. Any substitution must be approved by the Engineer and shall be of the same size and description as those specified below:

<u>Manufacturer</u>	<u>Model</u>
Armorcast	No. 37 (Polymer Concrete Cover)

250-13 JOINT LUBRICANT

Joint lubricant used on ductile iron and steel pipe joints where there is no internal sealing of the space between the pipe sections shall contain an effective preservative per U.S. Pharmacopeia, 1975, 19th Edition. The supplier shall submit test reports from an independent laboratory for approval.

250-14 POLYETHYLENE ENCASEMENT

Polyethylene encasement shall have a minimum thickness of 8 mil and conform with Section 4.1 of AWWA C105/ANSI A21.5.

Double wrap and tape all fittings.

Pipe should be wrapped and taped per Ductile Iron Pipe Research Association (DIPRA) recommended methods.

PART 3 - CONSTRUCTION METHODS

All as provided in Part 3 of Standard Specifications for Public Works Construction except as modified herein.

SECTION 306 - UNDERGROUND CONDUIT CONSTRUCTION

306-1 OPEN TRENCH OPERATIONS

306-1.1 Trench Excavation

306-1.1.3 Maximum and Minimum Width of Trench

For water pipelines, the minimum width of trench shall be the pipe O.D. plus 12 inches. The maximum trench width shall be the pipe O.D. plus 36-inches. Width shall be measured at the top of the pipe.

In the event of cave-ins of the trench sides where the maximum width is exceeded, the Engineer may, at the Contractor's discretion, require the Contractor to use special bedding per CWD-041.

306-1.1.5 Removal and Replacement of Surface Improvements

The cost of removal and replacement of existing improvements interfering with the Contractor's operations shall be included in the price bid for the item involved unless otherwise specified.

306-1.1.6 Bracing Excavations (Trench Shoring)

306-1.1.6.1 General. The lump sum bid for shoring, bracing or trench sloping, shall be full compensation for designing, providing, installing, maintaining, relocating and removing any shoring or trench sloping system in accordance with applicable State and Local Safety requirements and in compliance with Section 6500 and 6707 of the Labor Code, which reads substantially as follows:

Whenever the City issues a call for bids for the construction of a pipeline, sewer, sewage disposal system, boring and jacking pits, or similar trenches or open excavations, which are five feet or deeper, such call, shall specify that each bid submitted in response thereto shall contain as a bid item, adequate sheeting, shoring, and bracing or equivalent method for the protection of life or limb which shall conform to applicable safety orders. Nothing in this section shall be construed to impose tort liability on the body awarding the contract or any of its employees.

306-1.1.7 Minimum Cover and Clearance

The minimum depth of cover listed below shall be provided between the top of the main and the undisturbed subgrade or finished grade, whichever provides the greater cover, unless otherwise approved by the city.

	<u>Sub-Grade</u>	<u>Finished Grade</u>
(1) 6" & 8" diameter	2' - 0"	3' - 0"
10" & 12" diameter	3' - 0"	4' - 0"
(2) 6" Cover between the top of the valve stem and the ground surface at the time of construction.		

A minimum vertical clearance of 12 inches shall be maintained between all foreign structures or utilities unless shown on the Plans and approved by the Engineer.

306-1.2 INSTALLATION OF PIPE

306-1.2.1 Bedding

Bedding Material as defined in the Standard Specifications shall include the following:

- (1) The Contractor shall import sand bedding material and place the sand bedding material in accordance with CWD-040-1 & 2. The bedding material shall have a "sand equivalent" 30 or greater upon approval of the inspector or designee.
- (2) Where unstable soil consisting of loose, soft, spongy, or organic earth is encountered, it shall be removed from trench bottom to depth determined in the field by the Engineer and trench shall be refilled to proper grade with imported sand bedding material, tamped in place to 90% relative compaction minimum. Said imported bedding material shall have a sand equivalent 30 or greater. Trench bottom shall be graded flat and prepared to provide firm and uniform bearing for pipe.

Where unyielding soil consisting of rock, rocky earth, or cemented earth is encountered, it shall be removed from trench bottom to at least 6 inches below grade and trench shall be refilled to proper grade with imported sand bedding material, tamped in place to 90% relative compaction minimum. Said imported bedding material shall have a sand equivalent greater than 30. Trench bottom shall be graded flat and prepared to provide firm and uniform bearing for pipe.

- (3) Bell holes shall be dug from the bedding such that the pipe barrel when first laid, shall uniformly bear on the bedding. The bedding surrounding and twelve (12) inches above the pipe shall be compacted to 90% of relative density by hand or mechanical tamping or water jetting in uniform lifts unless

otherwise specified.

- (4) Initial backfilling shall be performed as soon as possible after pipe has been laid. Loose, moist bedding material shall be placed in trench simultaneously on each side of pipe to a depth not greater than pipe centerline (springline) or 12 inches (loose measurement), whichever is less, and it shall then be tamped under pipe so that all voids are eliminated and material is compacted to 90% relative compaction minimum.
- (5) Subsequent backfilling shall be performed immediately following initial backfilling. Loose, moist backfill material shall continue to be placed in trench simultaneously on each side of pipe in lifts not exceeding 12 inches in thickness (loose measurement), with each lift being tamped, until the pipe has been covered by at least 12 inches of well compacted material. Alternatively, backfill material may be densified by water settlement until the pipe has been covered by at least 12 inches of well densified material. Backfill material shall be tamped or settled to 90% relative compaction minimum.
- (6) Regardless of compaction or densification technique, care in backfilling shall be exercised to avoid any damage to pipe, fittings, and appurtenances, to avoid any damage to persons or property, and to achieve relative compaction of backfilled material of at least 90% minimum.
- (7) At the close of the construction day, the pipe end shall be closed with a watertight, rodent-proof plug and backfilled or plated traffic rated plate.
- (8) In the inspection of the water mains, no more than 300 feet of pipe shall be laid without being inspected.

Trench backfill material, above the pipe bedding material zone, shall not be placed until the compaction of the pipe bedding material zone complies with the specified compaction as shown on the Plans and Specifications.

Ductile iron pipe and CML&C steel pipe shall be placed on a 4-inch minimum layer of evenly graded sand bedding. Sand bedding is defined as native or import material free of rocks and other debris, and having a sand equivalent of 30 or greater.

In rocky ground the bedding shall be extended to 6 inches below the pipe.

306-1.2.6 Field Jointing of (Ductile) Iron Pipe

Ductile iron pipe and fittings shall be joined in accordance with the manufacturer's installation manual and AWWA C-600 unless otherwise indicated herein.

All joints shall have a raised bead by manufacture or by 1/4-inch brazed bead and Field-Lok Gaskets or approved equal.

(a) Cement Joints

Untarred jute or oakum gasket materials are not allowed. A gasket of clean paper twisted into a rope shall be used.

(b) Adjustment Pipe

The Contractor shall provide necessary cut-to-fits to place all valves, elbows, or outlets on the design station. All cut ends and rough edges shall be ground smooth and for push-on type joints, the cut end shall be beveled slightly.

(c) Joint Deflection

The Contractor may deflect the joints to "pull through" the vertical angle points or horizontal curves shown on the plans. The Contractor shall limit deflection of the joint to 80% of that listed by the manufacturer.

(d) Polyethylene Encasement

All ductile iron pipe shall be wrapped with 8 mil minimum thickness polyethylene encasement per Section 5-4 of AWWA C-105/ANSI A21.5-82. The Contractor shall use Method A, B, or C as shown in DIPRA manual for installing the polyethylene tube or sheet from DIPRA manual.

306-1.2.6.1 Flanged Joints (General)

In assembling a flanged joint, the Contractor shall align the flanges and draw up the flange bolts evenly so that no portion of the assembly will become prestressed.

All nut and bolt threads shall be lubricated with oil and graphite or "No-Ox-Id-Grease" prior to installation.

Flange joints shall be coated with Koppers #50 bitumastic or City approved equal after assembly.

Flange joints shall be wrapped with two layers of 8 mil polyethylene and shall be secured to the pipe and valve with 2-inch wide polyethylene adhesive tape, Scotchwrap #50, or City approved equal.

306-1.2.6.2 Flexible Couplings (All Pipe)

Flexible coupling joints shall be used only when shown on the Plans or Standard Drawings. Flexible coupling joints shall be installed in accordance with the manufacturer's recommendations.

When indicated on the Plans or Standard Drawings, special anchoring devices shall be provided to prevent joint failure.

Couplings shall be coated with Super Tank Solution, Koppers #50 bitumastic or a City approved equal coating and wrapped with 2 layers of 8 mil polyethylene. The polyethylene shall be secured to the pipe with 2 inch Scotchrap No. 50 or City approved equal polyethylene adhesive tape.

306-1.2.14 Welded Joints

All welding carried out by the Contractor shall be governed by AWWA C-206, Field Welding of Steel Water Pipe. All joints shall be arc welded and shall be welded to maximum strength in conformance with American Welding Society specifications unless otherwise specified by the Engineer. A minimum of two 1/8-inch passes are required at each external joint. Welders shall be currently certified.

306-1.2.15 Sanitary Precautions

The Contractor shall take necessary precautions to protect the pipe interior, fittings, and valves from contamination. Fabricated pipe will be delivered to the work site with temporary end seals. The Contractor shall leave these seals in place until the pipe is ready for use to minimize the entrance of dirt or foreign material.

When pipelaying is not in progress, or at the end of the days work, all openings in the pipeline shall be closed with water tight, rodent-proof plugs. The Contractor shall have an emergency plug at the pipe heading at all times during pipelaying for use in case of an accidental break of an adjacent or crossing facility. Should water, mud, or any other matter enter the pipe, the pipe shall be thoroughly cleaned and swabbed as necessary with a 5 percent hypochlorite disinfecting solution.

No contaminated material or material capable of supporting prolific growth of micro-organisms shall be used for sealing or lubricating joints. Packing material shall be handled in such a manner as to avoid contamination. Packing material for ductile iron pipe shall conform to AWWA C-600.

306-1.2.16 Construction Water

The Contractor shall not operate any gate valve on any existing main. All water must be measured through a hydrant meter backflow device which shall be assigned to a specific location and secured in place by a City of Riverside representative. To request installation or relocation of such device, Contractor can do so by contacting the Riverside Call Center at 951-782-0330 during normal business hours.

All construction equipment involving the filling, pumping, spraying and carrying of water, etc., shall be under cross-connection control regulations, of the City Water Division and shall be checked by the Backflow Administrator prior to using the equipment on the job site, (Phone 951-351-6320). A City appointed hydrant meter backflow device shall be used while filling, flushing, or chlorinating the mains. Valves at the system connections shall not be opened to supply water for any purpose until all testing is accepted by the Engineer.

NOTE: The Contractor shall pay all rental and deposit fees for the use of fire hydrant

meters or backflow devices. Before the fire “hydrant meters” and “backflow devices” are obtained, all rental deposits and water charges shall be paid by the Contractor, to the City’s Customer Resource Center (CRC) located at 3025 Madison Street.

Cross-connection, including non-permanent and all temporary sources of potable water that come in close proximity to other utilities are subject to strict fines up to and including imprisonment.

306-1.2.17 Pipe Installation

(1) Loading, Transporting, and Unloading

After the pipe has been tested, it shall be loaded on rubber-tired vehicles, and adequately supported and checked to prevent any damage during transportation, and delivered to the Work site. During loading, unloading, and stringing operations, pipe and fittings shall be moved with care to prevent damage thereto. Unloading shall be accomplished in a workmanlike manner as directed by the manufacturer. Under no circumstances are pipe and fittings to be dropped or bumped in handling.

(2) Defective or Damaged Material

Pipe and fittings shall be carefully inspected for defects. Any pipe found to be defective in workmanship or materials or so damaged as to make repair and use impossible shall be rejected and removed from the Work site.

In the event that pipe is damaged, damaged portions may be removed, as approved by the Engineer, and discarded. Contractor shall be responsible for any and all damage to material and he shall stand the expense of repairing or replacing same. Contractor shall take proper precautions to assure that rubber gaskets are protected from oxidation or undue deterioration.

(3) Installation

Pipe manufacturer, fitting manufacturer, and material supplier, in addition to the City's representative(s), shall have access to the Work during installation.

Contractor shall use assistance provided by either manufacturer or supplier where required for proper installation of pipe, fittings, or materials; however, Contractor shall limit role of either manufacturer or supplier to advisory service.

(4) Ductile Iron Pipe

All pipe shall be laid true to line and grade and at the locations shown by the construction drawings or as specified. Pipe shall be installed in accordance with applicable provisions of AWWA C600, latest, applicable provisions of Ductile Iron Pipe Research Association "Guide for the Installation of Ductile

Iron Pipe", latest, and manufacturer's directions. Bell ends shall be placed uphill unless otherwise permitted.

After pipe has been set in trench, exterior of spigot and interior of bell shall be thoroughly cleaned. Lubricant recommended by pipe manufacturer and as approved by the Engineer shall be applied to rubber gasket. Lubricant shall be water soluble, nontoxic, shall impart no objectionable taste or odor to the water, shall have no deteriorating effects on the rubber gaskets, and shall not support growth of bacteria. Excess lubricant shall be removed. Pipe ends shall be aligned, and spigot shall be pulled into bell with come-along devices, or hoists with chains and slings, unless permitted otherwise. If either the pry bar or the backhoe bucket method is permitted, a timber header shall be placed between the pipe and the pry bar or backhoe bucket before the spigot is pushed into bell.

Curved alignment by use of pulled joints will be permitted. Maximum joint deflection shall be 80% of the manufacturer's recommended joint deflection. For purposes of reducing angular deflections at pipe joints, Contractor may install pipe sections of less than standard length.

Whenever cutting of pipe is required, it shall be done with a special cutting tool specifically made for cutting and machining ductile iron pipe. Cut ends and rough edges shall be ground smooth and beveled for push-on joints.

As Work progresses, a pipe cleaning tool as approved by the Engineer shall be drawn through pipe to remove dirt, rocks, or other foreign material. At the end of each day's work, all openings in the pipeline shall be plugged with watertight expandable plugs or approved equal.

(5) Cement Mortar Lined and Coated Welded Steel Pipe

- (a) Pipe and fittings shall be laid to the lines and grades shown on the contract drawings except as amended and supplemented by the manufacturer's tabulated layout drawings as approved by the Engineer.
- (b) Prior to assembling the pipe joints, thoroughly clean the bell and spigot groove surfaces and rubber gasket, the initial 2-inches of the bell entry. The spigot groove and the rubber gasket shall be lubricated with a soft, vegetable soap compound. The gasket shall be positioned in the spigot groove so that the rubber is distributed uniformly around the circumference.
- (c) The position of the gasket shall be checked with a thin metal feeler gauge, around the entire circumference. If the gasket is out of position, then the pipe shall be withdrawn and the gasket checked to see that it is not cut or damaged, the pipe shall then be relaid and the gasket rechecked for position.

- (d) Pipe shall be joined together to provide the proper space between abutting pipe ends. To maintain the laying length shown on the contract drawings, the joint space width may be varied to compensate for the pipe length and field installation tolerances.
- (e) Inside joint recesses shall be filled with stiff cement mortar consisting of 1 part cement to 1-1/2 parts sand utilizing hand holes per City of Riverside Standard Drawing CWD-220. The grout shall be applied to provide a continuous surface between the pipe lining and the pipe joint. Cracks in the grout exceeding 1/16th -inch will not be accepted. Gaps between the pipe lining and the grout exceeding 1/16th -inch will not be acceptable.

(f) Exterior joint spaces shall be filled with cement mortar consisting of 1 part cement to 2 parts of sand. The mortar shall be poured into the opening of a polyethylene foam grout band which is centered over the pipe joint and is snugly strapped in the exterior wall. The mortar grout shall completely fill the outside annular space between pipe ends and around the complete circumference. After the spaces have been filled, the opening shall be closed and the mortar allowed to set before bedding and backfilling at the joint. The pipeline field test shall be planned so that no pipe section is hydrostatically tested to less than 150 psi.

306-1.3 BACKFILL AND DENSIFICATION

306-1.3.2 Mechanically Compacted Backfill

At the discretion of the Contractor, impact type pavement breakers (stompers) will be permitted over CML&C steel and ductile iron pipe. Damaged mains or appurtenances will be replaced at the Contractor's expense.

306-1.3.3.1 Water Densified Backfill

Floataction of Pipe

The Contractor shall at all times protect the pipe against floatation due to water entering the trench from any source, and shall assume full responsibility for any damage due to this cause, and shall at his own expense, restore and replace the pipe to its specified condition and grade. Flooding will not be permitted.

The Contractor shall provide for drainage of the trench when jetting the bedding or backfill.

306-1.4 Testing Pipelines

See Part 7 of this Specification. Testing and disinfection of Water Mains and Appurtenances.

306-1.5 TRENCH RESURFACING

Compaction and trench resurfacing in the public street right-of-way is performed under the

jurisdiction of the City Public Works Department. The Contractor must meet all requirements of that department as it relates to this portion of the Work. Final payment for trench resurfacing items will not be made until acceptance is received from the Public Works Director or his authorized representative.

306-1.5.1 Temporary Resurfacing

Except as otherwise provided by the Plans or approved by the Engineer, not more than 30 calendar days shall elapse at a specific location between the placement of temporary resurfacing and its removal and replacement with permanent resurfacing.

306-9 INSTALLATION OF APPURTENANCES

306-9.1 General

The installation of appurtenances shall be in accordance with the following sections and the Standard Drawings referred to therein. The Contractor shall provide a complete and operating improvement as delineated in the Plans and these Specifications. If the Engineer finds that an appurtenance is improperly installed, the appurtenance shall be adjusted or removed and reinstalled properly.

306-9.3 VALVE INSTALLATIONS

1. The Contractor shall install the valves at the locations shown on the Plans and Standard Drawings. The Plans shall indicate the station, size and type of all mainline valves. The Standard Drawings shall indicate such information for appurtenant installations.
2. Valves shall be installed in a level position with the operating stem vertical except where shown otherwise on the Plans.
3. After installation of the mainline pipe is completed, the Contractor shall apply one coat of Koppers #50, or City approved equal, bitumastic coating to damaged areas of buried valves and shall wrap the entire valve with two layers of 8 mil polyethylene and seal all seams with 2-inch wide #50 Scotchwrap tape.
4. Valves shall be stabilized and supported separately from the pipeline as shown on the Plans or on the Standard Drawings. Mainline valves shall be considered as a dead end for thrust block sizing.
5. Mainline and appurtenant valves shall be tested for leak-proof tightness after the main line pressure test, at the test pressure, as described in Part 7.
6. The Contractor shall install valve boxes at all valve locations except where shown otherwise on the Plans. All valves shall be installed in conformance with Appendix A of AWWA C-500.

7. Contractor shall show valve locations using "valve installation ties" per Section 306.9.11.

306-9.4 VALVE BOX INSTALLATIONS

1. The Contractor shall install valve box cap, sleeves, riser and valve operator extensions of the type indicated in the Standard Drawings at each valve location shown on the Plans.
2. Operator extensions and sleeves shall be centered and set plumb over the valve operator nut.
3. Shaft extension is required where the distance between the finished ground surface to the top of the valve operator nut is greater than 3.5 feet.
4. Operator extensions shall be fitted with an AWWA 2-inch square operating nut and a tapered socket end for the valve operating nut. The extension shaft shall extend from the valve nut to within 18-inches of the finished ground surface.
5. Operator extension shaft, nut, socket and centering guide shall be painted with one coat of red primer after fabrication.
6. The valve box caps shall be set flush to 1/4" above the finished pavement surface.
7. Where valve box installations are not within paved areas, a 3 foot square by 4-inch thick concrete pad shall be formed around the cap, set flush with finish elevation.
8. The valve box cap shall be painted per Section 310.
9. Valve box caps shall fit securely in the slip sleeves, to prevent displacement due to traffic loads.

306-9.4.1 Valve Box Adjustments

Valve boxes within an area to be paved will be set to the finished pavement grade by the Contractor after paving of the street. Repaving required as the result of adjusting the valve boxes to grade shall be the responsibility of the Contractor.

306-9.5 BLOW-OFF INSTALLATIONS

1. The Contractor shall install blow-off installations at the locations shown on the plans in accordance with Standard Drawings.
2. Temporary blow-offs may be used for pressure testing, flushing and disinfecting the main. City Forces will remove the temporary blow-off when making the tie-in to the existing City System. Temporary blow-off installation materials will be returned to the Contractor at the job site.

3. Should the Contractor use a concrete thrust block, he shall provide a suitable separation material (such as tar paper or wood blocking) so that Contractor may remove the thrust block without disturbing the end cap. The Contractor shall remove any temporary concrete thrust block prior to tie-in by City.

306-9.6 AIR VALVE INSTALLATIONS

1. The Contractor shall install air valve installations at the locations shown on the Plans or at high points in the main as directed by the Engineer in accordance with Standard Drawings.
2. The Plans shall indicate the outlet station, size, direction and location of the air valve assembly.
3. The piping between the outlet valve and the ell on the air valve riser shall be at a continuous upgrade of not less than 1/4-inch per foot.
4. On 1 and 2-inch air valves, all joints shall be sweat welded per Section 207-25.1.1, unless shown as a screwed fitting. The riser shall be hard drawn copper.
5. The long axis of the air valve shall be set parallel to the street.
6. The air valve and exposed riser shall be painted per Section 310. Air valves shall have their internal body casting epoxy coated with a minimum of 12 mils. holiday free City approved epoxy. Epoxy shall be applied at the manufacturer's plant or approved manufacturer's representative's plant in accordance with the manufacturer's application specification.
7. The number and position of guard posts will be shown on the Plans.

306-9.8 CONCRETE FOR THRUST BLOCKS, ANCHORS AND PIPE CRADLES

1. Concrete thrust blocks, anchors and pipe cradles shall be poured at the locations and with the dimensions shown on the Plans or Standard Drawings.
2. Portland Cement shall be Type II. Concrete shall be Class 450-C-2000, shall be poured against undisturbed soil and shall make positive contact with the pipe with a minimum thickness of 12 inches.
3. Sandbags may be used to form thrust blocks or anchors unless otherwise specified.
4. Concrete shall be placed such that bell ends of fittings shall be available for repairs. Concrete placed over joints shall be removed.
5. All ferrous metal fittings and joints (valves, couplings, flanges, etc.) in contact with the soil shall be coated with one coat of Koppers #50 bitumastic after assembly to the main-line pipe and shall be wrapped with two layers of 8 mil polyethylene which shall

be secured to the pipe with two-inch wide Scotchwrap #50 or City approved equal.

306-9.9 CURB MARKINGS

Location ties of all valves and blow-offs shall be marked by the Contractor with a 2" x 1/2" wide "+" using blue paint on the **top** of the closest curb from two (2) locations. One edge of the "+" in the direction of the tie shall be elongated 1" with the distance from tie to curb face shown in 2" high lettering. One set of the Plans shall be marked with the locations and dimensions and submitted to the Water Division Inspector. Where there is no curb a 4 x 4 treated witness post shall be installed at two opposite locations, painted white and the ties marked in blue.

The locations of all services shall be marked with a chiseled "+" on the **curb face**. The pipe line station and length of service from corporation stop to angle stop shall be "As Built" on the Plans and submitted to the Water Division Inspector. The "+" shall be chiseled in the curb by the Contractor at the time of construction. The chiseled "+" shall be 2" high by 2" wide and 1/8" deep.

306-9.11 WATER AND FIRE SERVICE WET TAP VALVE INSTALLATIONS

1. Valves shall be installed in conformance with Section 306-9.3.
2. Tapping tee and valve shall be disinfected per Section 700-5.
3. Contractor shall pressure test the tapping sleeve and gate valve per Section 700-2, prior to tapping main.
4. Contractor or subcontractor shall have a State of California Class A, C-34, or C-61 (Water Main Drilling) contractor's license and shall submit to the Engineer for approval, a minimum of three references from prior potable water wet tapping projects.

306-9.12 SERVICE INSTALLATIONS

1. The Contractor shall install water or fire services at the locations shown on the Plans in accordance with Standard Drawings.
2. The Plans shall indicate the water service station, size, direction and location of the meter box.
3. The Contractor shall place the service connection to the mainline within 18 inches of the desired location, and spaced a minimum of 2 feet on center.
4. The Contractor may open cut or "shoot-in" service laterals for copper services.
5. Splicing of copper tubing is not allowed, except where 2-inch copper services exceed 20 feet in length and then only the minimum number of joints. Two inch copper splices shall be made using a solder coupling.

6. Saddles shall be used for all service connections of 2-inches or less.
7. Where meter boxes are located in sidewalk areas, a meter spacer and meter coupling shall be installed and a sleeve of sufficient diameter shall be laid beyond the sidewalk prior to sidewalk installation.
8. Due to a change in the Driveway (D/W) Approach Standard 302 by the PW department to conform with ADA requirements, the placement of the meter boxes are revised as follows:

Where the meter box falls with a D/W approach and the sidewalk being installed is curb sidewalk, (this is Type Curb-I typical section), the front of the meter box needs to be placed 3 feet from the back of the curb. This will allow the box to fit in the flat sidewalk area of the D/W. The service run and angle ball meter stop will need to be set back accordingly. Ultimately, the Public Works inspector will need to make final acceptance of these installations.

306-9.13 PRECAST VAULT, MANHOLE & METER BOX INSTALLATIONS

1. The Contractor shall install precast vaults, manholes and meter boxes at the locations shown on the Plans or Standard Drawings.
2. The Plans or Standard Drawing shall indicate the station, location and size of the installation.
3. Cement for vault and manhole footings shall be Type II. Concrete shall be 480-B-2000, and poured against undisturbed or well compacted soil to the dimensions shown on the Plans or Standard Drawings.
4. All vaults and meter boxes located in sidewalk or paved areas shall be set flush with the existing surface.

306-9.14 CONNECTIONS TO EXISTING MAINS

The Water Division will make all wet-tap connections to existing mains (except large services installed by contractor) and make closures thereto unless otherwise shown on the Plans.

The Contractor shall verify the station, offset, and depth of the existing connection prior to laying the last 100 feet toward that station.

The Contractor shall make necessary cut-to-fit, adjusting line and grade as necessary.

After the chlorination and pressure tests have passed inspection, but prior to final paving, the system connection closures will be made by the City of Riverside Field Forces unless specified otherwise on the plans. **If City Forces have to make corrections to the line or**

grade to make the system connections then all labor and materials to perform the work shall be charged to the Contractor.

306-10 PROTECTIVE COATING

All ferrous metal fittings and joints (valves, couplings, flanges, etc.) in contact with the soil shall be coated with one coat of Koppers #50 bitumastic after assembly to the main-line pipe and shall be wrapped with two layers of 8 mil polyethylene which shall be secured to the pipe with two-inch wide Scotchwrap #50 or City approved equal.

306-11 FIRE HYDRANT INSTALLATIONS

1. The Contractor shall install fire hydrants at the locations shown on the Plans in accordance with Standard Drawings.
2. The Plans shall indicate the outlet station, type, direction and location of the fire hydrant assembly.
3. The lateral between the outlet valve and the Fire Hydrant bury shall be a continuous run of all ductile iron pipe with approved joints.
4. The Contractor shall use non-breakaway flanged spools to adjust the Fire Hydrant to proper grade.
5. Fire Hydrant shall be painted per Section 310.
6. The bolts used to attach the Fire Hydrant to bury shall be counterbore knock off bolt type. Bolts shall be installed with threads pointing up and pack the counter bore with no-oxide grease, silicon, or approved equal.
7. The number and position of guard posts will be shown on the plans.
8. Warf Head hydrants shall be installed only with the approval of the Engineer.
9. Contractor shall install hydrant markers in conformance with State of California, Department of Transportation State Standard Specifications, Section 85, and Standard Drawing No. C.W.D.-700.

310 PAINTING

310-1 General

310-1.5 Painting Schedule

<u>Item</u>	<u>Color (1)</u>	<u>No. of Coats</u>
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Gate Box Caps and Rims	Red (primer)	1
	Blue	2
Air Valves	Red (primer)	1
	Green	2
Air Valve Guard Posts	Red (primer)	1
	Green	2
Vault Covers (top)	Red (primer)	1
	Aluminum	2
Guard Posts	Red (primer)	1
	Yellow	2
Vault Covers (underside)	Black	2
Fire Hydrants	Red (primer)	1
	Yellow	2
Fire Hydrant Guard Posts	Red (primer)	1
	Yellow	2
Manhole Covers	Red (primer)	1
	Green	2
Meter Piping and Valves	Black	2
Witness Posts	Sealant	1
	White	2

(1) Refer to Section 210 for description of color designation, approved manufacturers, and thickness of final application.

310-5.6 Painting Traffic Striping, Pavement Markings and Curb Markings

Striping and pavement markings for temporary detours and pavement restoration, shall conform to the provision of Sections 210, "Paint and Protective Coatings". Pavement Markings and Curb Markings" of the Standard Specifications and these special provisions. Striping and marking shall be under the direction of the City of Riverside Public Works, Chief Construction Inspector, phone (951) 826-5346.

The Contractor shall provide for temporary or permanent striping on the same day the street is paved or resurfaced. Under no circumstances shall the traveled way be without lane delineation.

Permanent and/or temporary striping shall be placed on the pavement surface within 48 hours after notification by the Engineer. Pursuant to this requirement, the Contractor's attention is directed to Section 7-10 "Public Convenience And Safety" of the Standard Specifications.

As an option, reflective adhesive tape may be utilized for temporary striping. For dashed four (4) inch lane lines a minimum three (3) foot strip of tape shall be placed at twelve (12) foot intervals (gaps) regardless of the posted speed for the zone requiring temporary striping.

The Contractor shall be required to remove all reflective adhesive tape applied to the pavement surface.

Temporary striping shall also include the designation (paint or tape) of crosswalks at signalized intersections. Implementation shall be as directed by the Engineer.

If the job is suspended because of weather or for any other reason, the Contractor shall be responsible for applying temporary striping as specified herein, and to maintain (repaint/retape) the temporary striping as directed by the Engineer. Said Section 7-10.1 of the Standard Specifications will apply.

In addition to the requirements of Section 310-5.6.8 "Application of Paint" for bituminous seal coats, the Contractor shall apply two coats of paint to any new pavement surface. There shall be a minimum of 2 days between applications. This requirement shall not apply when painting over existing paint and/or existing untreated pavement surface. The two (2) applications requirement applies to permanent striping and pavement markings.

"Cat tracking" (premarking) for permanent and temporary striping shall consist of placing spots of paint not more than 3 inches in width and not more than 5 feet apart along the line established. Paint for "cat tracks" shall be the same as that used for the traffic stripe for which it is placed. If painting is scheduled on the same day as "cat tracking", the spray can method may be used in lieu of the requirements specified herein.

The Contractor is responsible for a straight layout with smooth long radius curves with no abrupt radius changes. Connecting curves shall be an appropriate radius to provide for smooth traffic flow at prevailing speeds. All transitions shall be approved by the Public Works Inspector prior to painting. Angle points and off-sets in the striping will not be allowed.

Striping details not shown on the plans or specified in Sec. 310-5.6.4 shall be done in conformance with the Traffic Manual as published by Caltrans.

All paint premarking ("cat tracking") for permanent striping is subject to the approval of the Public Works inspector prior to painting. The rope used for premarking shall have a minimum length of 500 feet of continuous fabrication, or longer if needed for smooth layout.

Drips, overspray or improper markings shall be immediately removed from the pavement surface by blast cleaning or methods approved by the Public Works Inspector at the Contractor's expense.

The lengths of the gaps and individual stripes that form broken traffic stripes shall not deviate more than 3 inches from the lengths shown on the plans.

The lengths of the gaps and individual stripes shall be of such uniformity throughout the entire length of each broken traffic stripe that a "suitable" striping machine will be able to repeat the pattern and superimpose additional coats of paint upon the traffic stripe being painted.

Where the traffic stripe is of such a nature, either due to configuration or location, as to render the striping machine unsuitable for use, traffic paint and glass spheres may be applied by other approved methods and equipment. The Public Works inspector will determine if the striping machine is unsuitable for a particular use.

All stencils and templates shall conform in configuration and size to the state of California, Department of Transportation "legends."

The Public Works Inspector has the discretion to require random testing and sampling of the items covered herein. 10 percent, or greater, failure of samples of items shall be cause for rejection.

310-5.7 Traffic Stripe and Pavement Marker Removal

Temporary construction zone traffic stripes and pavement markings shall be removed as directed by the Engineer.

Removal of traffic striping shall be accomplished through the method of wet "sandblasting" or other approved methods. The sandblasting operation shall be continued until all of the stripes, markers, debris or other materials are removed to the satisfaction of the Engineer. When sandblasting within 10 feet of a lane occupied by public traffic, the residue, including dust, shall be removed immediately after contact between the sand and the surface being treated. Striping equipment shall meet all applicable standards of the United States Environmental Protection Agency and the Riverside County Air Pollution Control District.

Areas of removed striping shall be feathered as not to leave a distinct shape of the removed painted item.

Measurement of the double yellow centerline shall be 0.667 square foot per linear foot.

Beach sand containing salt or excessive amounts of silt will not be allowed.

The development of a water supply and all water required for the striping work and its application shall be by a method approved by the Engineer. All equipment used for the application of water shall be equipped with a positive means of shutoff. If the Contractor elects to use water from the City water system, he shall make arrangements with the Public Utilities Department of the City of Riverside and pay for all water used and comply with NPDES requirements.

313 "AS BUILT" DRAWINGS

After construction has been completed, and before pressure test can be scheduled, "As Built" drawings shall be submitted by the contractor showing pipe size, material, class and/or pipe thickness, the actual locations (invert elevations) and stations of all valves, tees, and special fittings. Service connections to the main are stationed on pipeline stationing. The Contractor shall show lengths of installed services and stationing of service corp stops, and note any deviations from the original plans on the "As Built" drawings. "As Built" drawings shall be prepared on a clean print and shall be legibly marked in red ink.

The "As Built" drawings are required to be submitted to RPU Inspector for acceptance prior to scheduling hydrostatic tests.

PART 7 - TESTING & DISINFECTION OF WATER MAINS & APPURTENANCES

700-1 General

All water mains and appurtenances shall be tested for pressure and leakage and shall be cleaned and disinfected prior to acceptance by the City for domestic use.

Testing and disinfection of water mains and appurtenances shall be in accordance with the applicable AWWA Standards except as herein modified.

All testing and disinfection shall be made in the presence of the Engineer. The Contractor shall notify the Engineer not less than forty eight (48) hours in advance of the actual time of testing and/or disinfection so that the Engineer may observe the procedure.

When the pressure test, leakage test, chlorination or bacteriological and plate count tests fail to meet the requirement of the Specifications, the Contractor shall make necessary repairs, replacements or repetition of procedures to conform to the specified requirements at contractor's own expense.

Adequate backflow protection and proper metering of all potable water shall be provided by the Contractor and approved by the City of Riverside Public Utilities prior to commencement of any procedure(s) hereinafter.

700-2 Pressure Test

All water mains and appurtenances shall be tested as described herein. The pressure test shall not be performed until the following conditions have been met:

- (1) In areas where a pavement surfacing is to be constructed, the pressure test shall be made only after other utilities such as, storm sewers, and sanitary sewers have been installed;
- (2) Curbs and gutters have been installed and the subgrade materials portion of the pavement area have been constructed to proper grade and all compaction tests including for water trenches have been approved by the City;
- (3) All services, fire hydrants, meter boxes and other appurtenances have been installed and adjusted to final grade and location;
- (4) All concrete anchor and thrust blocks shall have cured at least three (3) days.
- (5) Submittal of as-built drawings and all affidavits and certificates of compliance to the Inspector.

- (6) A mechanical separation between the backflow device and pipe sections undergoing pressure test has been provided by means of a blind flange as to not allow any pressure to be exerted against the backflow device check valves or OS&Y/NRS valves.

The pressure test shall be maintained on the test section not less than two (2) hours. The Contractor shall conduct a preliminary pressure test after items (1) through (5) of this section (700-2) above are completed prior to the City's pressure test. The results of the preliminary test will not be considered by the City.

The test pressure shall be 200 psi as measured at the highest elevation of the water main under test, but not less than 150 psi at the highest point unless otherwise noted.

The length of water main footage to be tested at one time shall be determined by the Engineer or his designee.

Each section of the water main to be tested shall be slowly filled with water from the nearest source by a means approved by the Engineer. The pipelines shall be filled with water and placed under a slight pressure for at least twenty-four (24) hours before the pressure test.

All air shall be vented from high spots in the water main, fire hydrants and services before making and pressure test. If hydrants or other outlets are not available, taps shall be made at the high points to expel the air by the Contractor at Contractor's expense. The locations shall be reviewed and approved by RPU Inspector prior to installation. These taps shall be capped by the Contractor after testing.

The pressure test shall be applied by means of a pump connected to the pipeline in a manner approved by the Engineer. The pump, pipe connections, bulkheads, pressure gages and other equipment, labor and materials required to perform the test shall be furnished by the Contractor.

The Engineer may check the test pressure by installing City pressure gages in place of the Contractor's gage. In case of a difference in pressure readings between gages, the City's gage reading shall govern.

All appurtenant facilities shall be tested at the same pressure and for the same duration as the mainline pipe.

All valves shall be tested for leak-proof tightness after the mainline pressure test with the test pressure on one side of the valve and atmospheric pressure on the other side.

Wet tap valve sleeves shall be hydrostatically pressure tested for a period of 1 hour at a test pressure of pipe class plus 50 psi. During and at the end of test, a solution of soapy water shall be applied at all joints to test for leakage. No pressure loss or leakage will be permitted.

700-3 Allowable Leakage

All water mains and appurtenances shall be tested as described herein.

The test pressure applied to the water main for the leakage test shall be maintained as constant as possible for not less than two (2) hours. The leakage test shall be held concurrently with the pressure test. For C-900 PVC pipe (Class 150), the test pressure shall be 225 psi and the test duration shall be four (4) hours.

The length of fire hydrant laterals and service lines are not included in the overall length of pipe in determining the allowable leakage.

All noticeable leaks shall be stopped regardless of the results of the test and defective pipe, fittings, valves, and other appurtenances discovered during the test shall be removed and replaced. Repair clamps of any kind or type are not allowed. The Engineer is to be notified of any repair work performed. The test shall be repeated until satisfactory results are obtained. All gaskets to be used only once.

The allowable leakage volume shall not exceed the following:

- (1) C-900 Pipe
14.1 gal/in. dia/mile/24 hours
- (2) Ductile Iron Pipe and CML&C Steel Pipe
15 gal/in. dia./mile/24 hours
- (3) CML&C Welded Steel Pipe – no allowable.

It is the Contractor's responsibility for locating leaks and restoring the bedding and pipe zone material in accordance with the Standard Plans and these Specifications. Damage to pipe bedding and backfill resulting from leaks discovered during the pressure leakage test need to be restored in compliance with the specification.

The pump, pipe connection, measuring devices, gages and all other equipment, labor and materials necessary for performing the leakage test shall be furnished by Contractor. The Engineer may, however, use City's measuring device in place of Contractor's equipment. In case of a difference in the measured leakage rate between the measuring devices, the City's measured leakage shall govern.

700-4 Flushing

The new mains shall be flushed prior to chlorination. The flushing velocity to be obtained for pipes 12 inches and smaller in diameter shall not be less than 2.5 ft/sec. The Contractor shall make necessary arrangements to attain the minimum velocity. The Contractor shall take due precaution in providing for adequate drainage from the site. The minimum volume of water to be flushed, at required velocity, shall be not less than the 1.5 times the volume of the pipe line from the point of filling to the point of blow-off. The

Contractor should verify that proposed hydrants to be used have adequate pressure.

Flushing is no substitute for preventive measures. If, in the opinion of the Engineer, dirt which enters the pipe, the interior of the pipe shall be cleaned and swabbed as necessary with five (5) percent hypochlorite disinfecting solution and may require additional bacteria samples.

It is the responsibility of the Contractor to remove the flushing water or the chlorinated water from the project area. The Contractor is responsible for any damage as a result of flushing operations.

The flushed water shall have a residual chlorine content not to exceed 0.10 mg/L prior to discharging into the storm drain system. The flushing operation shall be in accordance with the California Regional Water Quality Control Board requirements.

The Contractor is hereby informed that hydrant meters and backflow devices rented from the City have the following limitations:

The Contractor is hereby informed that the hydrant backflow meter devices rented from the City have the following limitations:

3 inch meter / backflow devices: 450 gpm continuous
650 gpm max peak

There will no longer be separate meter/ and or Backflow devices available for rental use. New units are integrated combo units.

700-5 Disinfection

All newly laid water mains and appurtenances shall be disinfected in accordance with AWWA C-651, Disinfecting Water Mains, except as modified herein.

Disinfection shall be done after the pressure and leakage tests have been performed and accepted. Contractor must use a qualified company to chlorinate. Here is the list of the qualified companies who are licensed to perform chlorination the RPU approved: Mattchlor, Inc; Southwest Chlorination, Inc; Aqua Backflow; Spencor Inc; Morr-is Tested; Peirce Chlorine; If contractor wants to use a different company which is equal will need to get approval from RPU before using the company.

Chlorine used for disinfection must be a liquid chlorine solution by directly feeding hypo (sodium hypochlorite less than or equal 15%; typically 12.5%) or by mixing Cal-hypo (calcium hypochlorite 65-70%) granular or tablets into a liquid solution by pre-dissolving or using a feeder. Either product sodium hypo or calcium hypo shall be NSF 61 approved for potable water use. Tablets inserted (glued) inside each pipe length shall not be used. Safe handling practices contained in A.W.W.A. Manual M-20 shall be followed by the Contractor. The chlorine solution shall be applied by the continuous feed method as outlined in Sub-section 5.2 of AWWA C-651-05 except as may be modified by the Engineer. Contractor must keep Material Safety Data Sheet (MSDS) onsite.

The chlorine solution shall be applied at the beginning of the water main to be disinfected through a corporation stop installed for this purpose, through curb stop or through any other opening as may be allowed or required by the Engineer. Fire hydrants and air valves shall not be used for this purpose. However, an air valve riser pipe with the air valve removed may be an appropriate chlorine solution feed point.

Water used to convey the chlorine solution throughout the water main shall be obtained from the existing distribution system. The rate of flow shall be so controlled that water will flow slowly into the undisinfected main during the application of chlorine.

The end of the main being chlorinated shall be kept open and running during the application of chlorine and until the desired chlorine concentration is reached, after which each curb stop, fire hydrant, air valve line or any other connection to the water main shall be individually opened and flushed with the chlorine solution. After the water main and all appurtenances thereto have been loaded with chlorine to the proper concentration, the water source, chlorine feeder and all other openings to the water main shall be closed. The initial minimum concentration shall not be less than fifty (50) milligrams per liter (Mg/L) of chlorine, but not greater than 150 (Mg/L).

The chlorine solution shall remain in the water main for not less than twenty-four (24) hours after which the treated water through the length of the main shall contain not less than twenty-five (25) Mg/L of chlorine.

The chlorine content of the water shall be tested by the Engineer and if found to be less than twenty-five (25) Mg/L after twenty-four (24) hours contact, the water main and appurtenances shall be rechlorinated and held for another minimum twenty-four (24) hour period. No chlorination shall be started unless it can be completed by 2 p.m. on a Thursday.

During the period of chlorination, all main line valves and blow-off valves shall be operated to insure that the discs and seats are fully open to chlorinated water. Air valves, when removed, shall be chlorinated separately under the direction of the Engineer.

Upon approval of the chlorine residual at twenty-four (24) hours by the Engineer, the chlorine solution shall be flushed from the water main through each service, fire hydrant and blow-off. Flushing shall continue until the chlorine residual is not more than five-tenths (0.5) Mg/L as determined by the Engineer using a digital instrument.

In no case shall a chlorine solution of over five-tenths (0.5) Mg/L be held in the main or appurtenances for more than five (5) days from the initial injection to the final flushing.

It is the responsibility of the Contractor to dispose of the chlorinated water from the project area.

The chlorinated water shall have a residual chlorine content not to exceed 0.10 Mg/L prior to discharging into the storm drain system. The flushing operation shall be in accordance with the California Regional Water Quality Control Board requirements.

The Contractor has two options for disposing of the chlorinated water from the project site.

Option 1. The Contractor can treat the chlorinated water with chemicals. This treatment shall neutralize any chlorine residual from the water. After treatment the dechlorinated water can be discharged into the street storm drain system.

Option 2. The Contractor shall dispose of the chlorinated water at a State of California approved treatment disposal plant.

The Contractor is responsible for any damage as a result of the disinfection operation and shall provide adequate drainage from the project site.

700-6 Bacteriological Tests

A twenty-four (24) hour period between the final flushing and the taking of bacteriological samples is required. No flushing or any movement of water in pipe is allowed during sampling phase. Following the 24 hour period, the Contractor shall have a representative of employee of California Department of Public Health (CDPH) certified laboratory take water samples for bacteriological tests. All sampling shall be done in the presence of the Inspector. Contractor shall notify the Engineer 48 hours in advance of sampling procedures.

Samples will be taken in the field by a state certified laboratory technician using a digital colorimeter and transported to the laboratory for testing. Such tests shall meet CDPH requirements for drinking water standards. The number and location of such samples will be as directed by the Engineer; however, a minimum of one bacteriological test sample per 500 feet of main and a minimum of 2 samples per day, per test section, are required. **One set of samples are required for two consecutive days, 24 hours apart. All samples, each day, must indicate absent for total coliform and have a heterotrophic plate count (HPC) of less than 200 CFU/mL. Failure of any sample will require complete retesting, under these procedures, for two consecutive days.** It is very important that all test results be submitted in writing to the Water Inspector as soon as available. Chain of Custody to be given to inspector at time samples are taken.

All laboratory testing shall be at the Contractor's expense. Original report of the test results shall be given directly to the Engineer. Emailing the results to the Engineer is preferable. It is the responsibility of the Contractor to accomplish this task. System connections cannot be scheduled until this report is submitted to the Engineer. All results must be submitted to RPU Engineer or his designee no later than three calendar days of sample date or risk resampling all samples.

Upon successful completion of bacteriological testing, the pipeline will be accepted for use in the City potable water system; however, standard policy is to accept the water mains for use upon the City giving written Notice of Final Acceptance.

700-7 Contractor's Responsibility for Testing and Disinfection

It is the sole responsibility of Contractor to construct a water main capable of passing the pressure and leakage test and to effect a disinfection of the water main. The fact that City provides inspection during the construction and testing of the water facilities and receives laboratory testing results does not relieve Contractor's responsibility in this regard.

It's the responsibility of Contractor to prevent the consumption of water for any and all uses from undisinfected mains whether by their workmen, subcontractors or any other person who may come in contact with the water from the undisinfected main.

Contractor shall indemnify and save the City harmless from any suits, claims, or actions brought by any person or persons for, or on account of, any sickness or death sustained or arising out of the consumption of water from the main until final acceptance by the City.

700-8 Connections to Existing City Water Lines

Under no circumstances shall a connection be made, permanent or otherwise, between any existing water main, hydrant or other source to any unapproved contractor installed water main regardless of size.

No permanent connection between any Contractor installed water main and existing water mains shall be made by the Contractor, except for wet tapped water services larger than 2 inches and fire services. All wet taps require full time City inspection.

Wet tapped connections with mechanical joint tapping sleeves shall be cleaned and disinfected in accordance with AWWA C-651, Sections 9 and 10. The Work shall include treating trench with a hypochlorite solution, as deemed necessary by the Engineer; thoroughly cleaning the main to be tapped, and the interiors of the sleeve and tapping gate; and swabbing the tapping sleeve interior with a 1 percent hypochlorite solution.

Water required for the initial filling, pressure testing, leakage testing, flushing and chlorination may be obtained from an existing City main or fire hydrant by use of a City hydrant backflow meter device.

All water must be measured through a City **hydrant backflow meter device**. If in a case where greater volume is required, the Contractor may use his own Approved Backflow Prevention Device of larger size, **however, the Contractor shall provide to the City of Riverside water inspector, a certificate of approval from the City of Riverside Backflow Program Specialist before use**. The Contractor shall not operate any gate valve on any existing main.

The Contractor shall pay all rental and deposit fees for hydrant backflow meter devices checked out from the City plus charges for water used.

APPENDIX I

DESIGN CRITERIA

APPENDIX I
DESIGN CRITERIA
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1.0 INTRODUCTION

The City of Riverside Public Utilities Water Division is a municipal utility with the mission of providing water supply and water resource management to the public in a safe, reliable, environmentally sensitive, and financially responsible manner.

1.01 PURPOSE

This manual was developed to guide Developers and their Engineers through the process of design and construction of new public water facilities. The included information is pertinent to tract development and commercial buildings. If, after utilizing this handbook, you have any questions or comments regarding the contents, please contact the Water Engineering Development Services at (951) 826-5285.

1.02 GENERAL

Within the Design Manual, the term “Water Division” means City of Riverside Public Utilities Water Division. “Developer’s Engineer” means a currently licensed Registered Civil Engineer retained by the Owner or Developer to perform engineering for water systems in conjunction with land division development. “City” means City of Riverside.

The Water Division provides water service to properties located within the City of Riverside service area. If customers are outside the existing service area, they may be able to obtain service by annexing into the City or by seeking service from other nearby Public or Private Utility. The Water Division should be consulted for advice regarding service in any of the above circumstances.

Water facilities that are necessary to deliver sufficient water at adequate volume and pressure to the development will be required to be installed by the Developer. These facilities can include: water pipelines and related appurtenances, booster stations, water storage reservoirs, and pressure regulating stations, some of which may be offsite.

If water service is desired within the existing service area, service can normally be provided if the Developer meets the following conditions:

1. Designs, constructs, and dedicates to Water Division the necessary facilities. The Water Division will review all plans, and may revise, modify or request the redesign of any concepts, plans or details submitted. All plans must be approved and signed by Water Division prior to the issuance of a Construction Permit.
2. Grants fee title parcels and/or easements to Water Division on City prepared deed forms for all facilities not located within public right-of-way. Water facility easements shall be a minimum of 30 feet in width unless otherwise approved by the Water Division.
3. Pays current applicable fees in addition to completing the requirements listed above. Fees may include: Plan Check Fees, Connection Charges, Inspection Fees, Added Facilities Charges, Elevation Fees, Backup Capacity Fees, Service

Connection Fees, Meter charges and Distribution System Fees. Water Division should be consulted for current and applicable fees.

The procedures for the development of water systems for Tract Map, Parcel Map, and Single Lot development differ only slightly. The design standards contained herein are primarily prepared for Tract Map development, but can be used for all three types within the City of Riverside. The applicable minimum requirements are as follows:

- Design required facilities to Water Division's standards.
- Prepare water plans. Water Division has the authority to waive this requirement for single lot developments.
- Water Division's staff reviews and approves plans.
- Dedicate right-of-way for all facilities to be owned and operated by Water Division.
- Pay all necessary fees.
- Post bonds with Water Division, retain a qualified licensed Contractor, and provide proof of insurance.
- Fund and obtain inspection services by Water Division.
- Obtain a written "Notice to Proceed" before construction begins.
- Have an engineer certify that the proposed final road grade (as shown on the plan and approved by the City of Riverside Public Works Department) over the pipeline alignment has been achieved. If the existing surface of the alignment is not to be changed, it will be necessary to so certify.
- Construct facilities to Water Division's standards.
- Water Division's staff provides final approval of facilities constructed.
- Submit "as-built" plans (field changes recorded on prints of approved Plan) to Water Division.

For Water Division facilities outside of the Riverside City Limits, the following additional requirements are required:

- Submit plans to the applicable Riverside County departments for their review and approval. Signature blocks to be added to the cover sheet.
- Agreement for Construction, between the Developer and Water Division, to be executed prior to plan approval.

All costs will be the responsibility of the Developer.

1.03 OTHER PUBLIC AGENCY REQUIREMENTS

The requirements for water plan design for public water facilities specified herein do not waive, nor are they intended to contradict any requirements of other legal governing public agencies.

Engineers designing water systems for inclusion in Water Division's system must be knowledgeable of and comply with the regulations of the State of California, the County of Riverside, the City of Riverside, or any other local agency having jurisdiction. These shall include Administrative Codes, Civil Codes, and Health Regulations.

1.04 WATER PLAN APPROVAL PROCESS

The Developer's Engineer must design the facilities and prepare the construction drawings (water plans) to Water Division's standards. Water Division will review all water plans and may revise, modify, or require redesign of the drawings, or details submitted. Once the water plans have been approved by the Water Division, the Developer has one year, from the approval date of the plans, to start construction. If more than one year has elapsed, the water plans will be voided and the project must go through a new plan check procedure before any construction can start. The steps required to obtain water plan approval are as follows:

1. Attend A Preliminary Planning Meeting.

This meeting is strongly suggested but is not a requirement. The Developer shall call the Water Division at 951-826-5438, to arrange a preliminary planning meeting to discuss the proposed project. At the preliminary planning meeting, submit a tentative tract map, or project site map with the preliminary water facilities shown. Upon review of the project, Water Division may require a preliminary hydraulic report and/or hydraulic network analysis.

Water Division will discuss the general location and size of required facilities as well as provide information on known existing Water Division facilities in the area. If available, Water Division will provide as-built plans for existing facilities.

2. Submit Preliminary Hydraulic Report and/or Hydraulic Network Analyses (if required).

If required, the preliminary hydraulic report and hydraulic network analyses must be submitted to Water Division for review and comments. The preliminary hydraulic report and/or hydraulic network analyses must be approved prior to submittal of any drawings for plan check. Once Water Division and the Developer's Engineer have agreed on a conceptual design, detailed plans may be prepared and submitted.

3. Submit first plan check with plan check fee.

The submittals for first plan check shall consist of the following:

1. Two copies of the water construction plan.

2. One copy of the street improvement plan.
3. One copy of the grading plan.
4. One copy of the storm drain plan.
5. One copy of the sewer plan.
6. Two copies of tentative Tract/Parcel Map.
7. One copy of Tract Phasing Map (including lot numbers and street names).
8. One copy of the Soil Report.

Submittals must be complete or they will be rejected. Each submittal shall include a transmittal listing all items submitted. Details regarding design criteria are included in Section 2.0. Details regarding preparation of plans are included in Section 3.0.

The Water Division's goal for the first plan check is 20 working days. The Water Division strives to meet these goals but the plan review time can vary depending on the number of plans in the review process, size of project, complexity of the plans, and the completeness of the plans. Water Division will provide comments on one set of the water plans and return them to Developer's Engineer for revisions. In addition, the Water Division will provide a copy of plan Check Required Item Checklist listing all required submittals.

After the first set of check prints are returned, no changes except those requested or approved by Water Division shall be made by the Developer's Engineer. If the Developer's Engineer wishes to make a change other than that requested by Water Division, a print marked with the proposed change in red pencil shall be submitted for approval. Only after written approval shall the original be changed. The authorized change shall be highlighted on the next recheck submittal. **Drawings that do not conform to CWD-010-1, CWD-010-2, and CWD-010-3, or other requirements contained in the Design Manual and/or that are unclear, misleading, or confusing will be subject to rejection without review.**

4. Submit subsequent plan checks.

For each subsequent plan check, Developer's Engineer must submit the following:

- All previous Water Division plan check sets.
- Two copies of the revised construction drawings.
- Any additional material requested.

Submittals must be complete or they will be rejected. If the drawings are not yet satisfactory, Water Division will make comments on one set of the drawings and

return same to Developer's Engineer for revisions. This procedure will be repeated as necessary until the drawings are acceptable. If Developer's Engineer does not return the previous Water Division plan check sets, the plan check procedure will start from the beginning.

Water Division's goal is to complete all subsequent plan checks within 10 working days of receipt of a complete submittal. Plan review time may vary depending on the number of plans in the review process, size of project, complexity of plans, and completeness of plans.

5. Submit final Plans for approval.

After all plan checks are completed and the plans are acceptable to the Water Division, the original mylars must be submitted to Water Division for signature. The Developer must pay all required fees prior to final approval of the construction drawings.

6. Water Division Signs Plans.

Once all submittals have been completed to Water Division's satisfaction, the mylars will be signed. The Developer's Engineer is required to obtain signatures from all other agencies and provide Water Division with the original mylars and 2 sets of prints. Original water plan mylars become the property of the Water Division. Water Division will furnish the Developer with the pre-construction requirements.

Once signed, the originals cannot be modified without written permission from Water Division's Principal Engineer. Any modification after signing shall be noted in the plan's revision block.

Plan checks resubmitted after one year, regardless of number of previous submittals, will be deemed "expired". "Expired" plan checks resubmitted will be subject to Water Division's current Water Division design requirements, including the plan check fee, and considered a "first plan check submittal".

2.0 DESIGN CRITERIA FOR WATER DISTRIBUTION SYSTEMS

Water system improvements proposed for inclusion into Water Division's service area shall be designed in accordance with all appropriate AWWA standards and the following criteria:

2.01 SYSTEM DEMAND CRITERIA

The Water Division reserves the right to determine criteria for each water system or sub-system based upon conditions that may exist for that particular location, anticipated level of development, planned use or other criteria.

Specific fire flow requirements shall be determined by the Water Division using the recommendations of the Fire Department. Fire flows for most areas will generally fall within the following limits:

Single Family Residence w/sprinklers	500 gpm @ a minimum 20 psi
Single Family Residence wo/sprinklers	1000 gpm @ a minimum 20 psi
Multiple Residential & Condominiums	1500 gpm @ a minimum 20 psi
Commercial	1750 - 8000 gpm @ a minimum 20 psi
Industrial	1750 - 8000 gpm @ a minimum 20 psi

Commercial and industrial development requirements shall be analyzed separately based on the specific proposed project.

Water distribution pipelines to all service areas shall be looped to provide dual direction supply and system flexibility. Dead end mains are undesirable, but can be considered on a case-by-case basis.

2.02 SYSTEM ANALYSIS

The proposed water system shall be analyzed, if requested by the Water Division, for the following three conditions:

1. Peak hour demands with booster pumping plants on.

For the peak hour demand flow analysis, the pressure at each node shall be a minimum of 40 psi and a maximum of 125 psi.

2. Maximum day demand plus fire flow with booster pumping plants off.

For the maximum day demand plus fire flow analysis, fire flow should be selected for the worst-case scenario (typically the hydrant furthest from the connection(s) to Water Division's distribution system, at the highest system elevation) and as directed by Water Division's staff. The pressure at each node shall be a minimum of 20 psi and the maximum velocity in the pipelines shall be 10 feet per second.

3. Minimum hour demands with wells and boosters on.

For the minimum hour demand analysis, the maximum velocity in the pipelines shall be 6.0 feet per second and the maximum pressure at each node shall be 125 psi.

The Developer's Engineer will be required to submit an analysis of anticipated flow demands; average, maximum hour flow, and maximum day plus fire flow. Water Division shall accept or modify the submitted analysis.

2.03 WATER PIPELINE SIZING CRITERIA

In residential zones, an 8-inch (I.D.) diameter D.I.P. line shall be the minimum standard size for water mains. A 4-inch D.I.P. may be used in single family residential cul-de-sac streets, not requiring fire hydrants and serving not more than 10 services.

For commercial and industrial zones, the minimum standard pipeline size shall be a 12-inch (I.D.) D.I.P. Larger size pipelines may be required to meet Fire Department flow requirements and/or high development flows. The zoning designations, per the City of Riverside Planning Department, for commercial districts are RO, CO, C-1, C-1-A, CL, C-2 and C-3. The zoning designations for industrial districts are MP, M-1, M-2, WC, RWY and AIR.

Water Division reserves the right to specify sizing of any water pipeline. Due to master planning, Water Division may require a larger size pipeline than normally required for a particular project to satisfy Water Division's design standards for system distribution requirement purposes. Water Division's Board of Public Utilities may authorize participation and payment of increased cost of such water pipeline in accordance with Water Division's criteria.

2.04 PIPELINE STRENGTH

All water mains 12-inches and under shall be Class 350 D.I.P. per A.W.W.A. C-151. For pipes over 12-inches, contact the Water Division.

Contact the Water Engineering Development Group (951) 826-5285 for anticipated pressures in the proposed development area.

External loads shall be designed to withstand the weight of the earth cover plus live loads based on the application of an H-20 truckload, using appropriate impact factors, which recognize depth of pipe, plus a safety factor of 1.5.

2.05 WATER PIPELINE LOCATION

Unless otherwise approved by Water Division, all water pipelines shall be located on the southerly or westerly side of the street, with the centerline of the pipe 8 feet from the street centerline. The location shall not interfere with other existing or planned utilities or proposed street improvements.

The cover over the water pipeline shall be sufficient to provide protection to the pipeline and for the operation of the appurtenances. The depth for 8-inch diameter and under pipelines shall be 3.0 feet from the ground surface (pavement, graded travel way, or open ground) to the top of the pipeline. For pipelines 12-inches and larger, the depth shall be 4.0 feet to the top of the pipeline. These depths may be increased or decreased by the Water Division, as necessary, to cover non-standard conditions. Minimum slope of water pipelines shall be 0.2 percent unless otherwise authorized by Water Division.

A minimum of 3 ½ feet clearance shall be provided between centerline of pipe and face of curb at straight sections. When curb curves, 4 feet clearance shall be provided. Water mains shall not be designed to run under planters, medians, islands, or parking spaces.

Water main separations shall be governed by CWD-015 and the following rules:

1. Installation of sewer pipe and water mains shall **not** be located within the same trench.
2. Water mains shall be installed with a minimum horizontal separation of 10 feet outside of pipe to the outside of pipe (hereafter shown as (O.O.)) from, and with a minimum vertical separation of 1 foot (O.O.) above, any parallel pipeline conveying:
 - (a) Untreated sewage,
 - (b) Primary or secondary treated sewage,
 - (c) Disinfected secondary – 2.2 recycled water (defined in Title 22 CA Code of Regulations, Section 60301.220),
 - (d) Disinfected secondary – 23 recycled water (defined in Title 22 CA Code of Regulations, Section 60301.225), and
 - (e) Hazardous fluids such as fuels, industrial wastes and wastewater sludge.
3. Horizontal separation of less than 10 feet (O.O.), but greater than 5 feet (O.O.), requires the approval of the Water Division and the use of special construction methods outlined herein. Horizontal separation of less than 5 feet (O.O.) for gravity sewers and 10 feet (O.O.) for sewer force mains is prohibited.
4. Water mains shall be installed with a minimum horizontal separation of 4 feet (O.O.) from, and with a minimum vertical separation of 1 foot (O.O.) above, any parallel pipeline conveying:

- (a) Disinfected tertiary recycled water (defined in Title 22 CA Code of Regulations, Section 60301.230), and
 - (b) Storm drainage.
5. If crossing a pipeline conveying a fluid listed in paragraph 2 or 4, above, a new water main shall be constructed perpendicular to and at least 1 foot above that pipeline. No connection joints shall be made in the water main within 8 horizontal feet of the fluid pipeline.
 6. The vertical separation specified in 2, 4 and 5 above is required only when the horizontal distance between the water main and a pipeline is 11 feet or less.
 7. All separations referred to herein are either horizontal or vertical distances, which are measured at right angles to the water main. Crossing at less than a 45-degree angle will not be permitted.
 8. Details of water main/sewer pipe conflicts involving special construction methods for greater than 12-inch diameter pipelines shall be shown on the Plans.
 9. Where sewer is referred to herein, it shall be interpreted as sewer main or sewer lateral. This also applies to Water Division Standard Drawings CWD-023-1 and CWD-023-2.
 10. When a new sewer force main crosses under an existing water main, all portions of the sewer force main within 10 feet horizontally of the water main, shall be enclosed in a continuous pipe casing, per Water Division Standard Drawing CWD-023-1 and -2.
 11. When a new water main crosses over an existing sewer force main, the water main shall be constructed of pipe materials with a minimum rated working pressure of 200 psi or an equivalent pressure rating.

2.06 ALTERNATIVE CRITERIA FOR PIPELINE CONSTRUCTION

When existing conditions dictate the installation of water mains, sanitary sewer mains, storm drain mains or other non-potable pipelines at separation distances less than that required above, alternative construction criteria may be approved by the Water Division. Water Division Standard Drawings CWD-015-1 and CWD-015-2 show alternative construction criteria for two different cases where the regulatory criteria cannot be met.

Case 1: New sanitary sewer main and a new or existing water main. Alternative construction criteria apply to the sanitary sewer main.

Case 2: New water main and an existing sanitary sewer main. Alternative construction criteria may apply to either or both the water main and sanitary sewer main.

Case 1 – New Sanitary Sewer Main Installation (CWD-015-1)

Zone Special Construction Required for Sanitary Sewer Main

- A Sanitary sewer mains parallel to water mains shall not be permitted in this zone without prior written approval from the Water Division.
- B If the water main paralleling the sanitary sewer main does not meet the Case 2, Zone B requirements, the sanitary sewer main should be constructed of one of the following:
1. Extra strength vitrified clay pipe with compression joints;
 2. Cast or ductile iron pipe with compression joints; or
 3. PVC sewer pipe with rubber ring joints (per ASTM D3034) or equivalent.
- C If the water main **crossing below the sanitary sewer main** does not meet the Case 2, Zone C requirements, the sanitary sewer main should have no joints within 10 feet from either side of the water main (in Zone C) and should be constructed of one of the following:
1. A continuous section of ductile iron pipe with hot dip bituminous coating;
or
 2. One of the Zone D options 2, 3, or 4 below.
- D If the water main **crossing above the sanitary sewer main** does not meet the Case 2, Zone D requirements, the sanitary sewer main should have no joints within 4 feet from either side of the water main (in Zone D) and should be constructed of one of the following:
1. Ductile iron pipe with hot dip bituminous coating and mechanical joints (gasketed, bolted joints);
 2. A continuous section of Class 200 (DR 14 per AWWA C900-97) PVC pipe or equivalent, centered over the pipe being crossed;
 3. A continuous section of reinforced concrete pressure pipe (per AWWA C302-95) centered over the pipe being crossed; or
 4. Any sanitary sewer main within a continuous sleeve.

Case 2 – New Water Main Installation (CWD-015-2)

Zone Special Construction Required for Water Main

- A No water mains parallel to sanitary sewer mains shall be constructed in this zone without prior written approval from the Water Division.
- B If the sanitary sewer main paralleling the water main does not meet the Case 1,

Zone B requirements, the water main should be constructed of one of the following:

1. Ductile iron pipe with hot dip bituminous coating; or
2. Dipped and wrapped ¼-inch thick welded steel pipe.

C If the sanitary sewer main **crossing above the water main** does not meet the Case 1, Zone C requirements, the water main should have no joints within 10 feet from either side of the sanitary sewer main (in Zone C) and should be constructed of one of the following:

1. Ductile iron pipe with hot dip bituminous coating; or
2. Dipped and wrapped ¼-inch thick welded steel pipe.

D If the sanitary sewer main **crossing below the water main** does not meet the Case 1, Zone D requirements, the water main should have no joints within 4 feet from either side of the sanitary sewer main (in Zone D) and should be constructed as for Zone C.

Water Mains and Pipelines Conveying Non-potable Fluids

When the basic separation criteria cannot be met between water mains and pipelines conveying non-potable fluids, the requirements described above for sanitary sewer mains should apply. This includes the requirements for selecting special construction materials and the separation requirements shown in Figures 1 and 2. Note that not all construction materials allowed for sanitary sewer mains will be appropriate for other non-potable fluid lines. For example, certain plastic lines may not be appropriate for the transport of some fuel products. The selection of compatible materials of construction for non-potable fluids is a decision to be made by the project engineer.

Water Mains and Sewage Force Mains

- Sewage force mains shall not be installed within ten feet (horizontally) of a water main.
- When a sewage force main must cross a water main, the crossing should be as close as practical to the perpendicular. The sewage force main should be at least one foot below the water main.
- When a new sewage force main crosses under an existing water main, and a one foot vertical separation cannot be provided, all portions of the sewage force main within eight feet (Horizontally) of the outside walls of the water main should be enclosed in a continuous sleeve. In these cases, a minimum vertical separation distance of 4 inches should be maintained between the outside edge of the bottom of the water main and the top of the continuous sleeve.

- When a new water main crosses over an existing sewage force main, the water main should be constructed of pipe materials with a minimum rated working pressure of 200 psig or the equivalent.

**CWD-015-1
INSTALLATION OF NEW SANITARY SEWER**

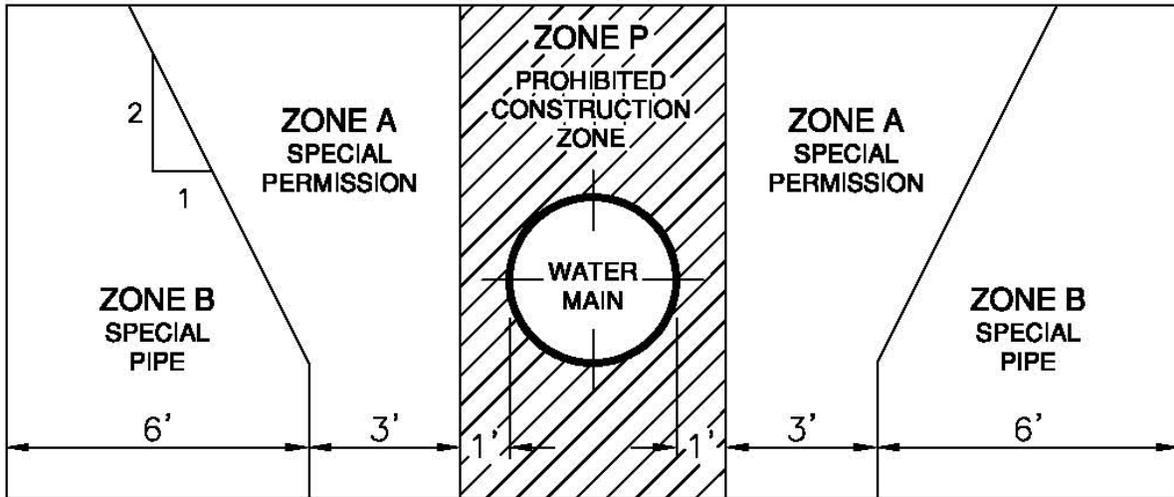


FIGURE 1 - PARALLEL CONSTRUCTION

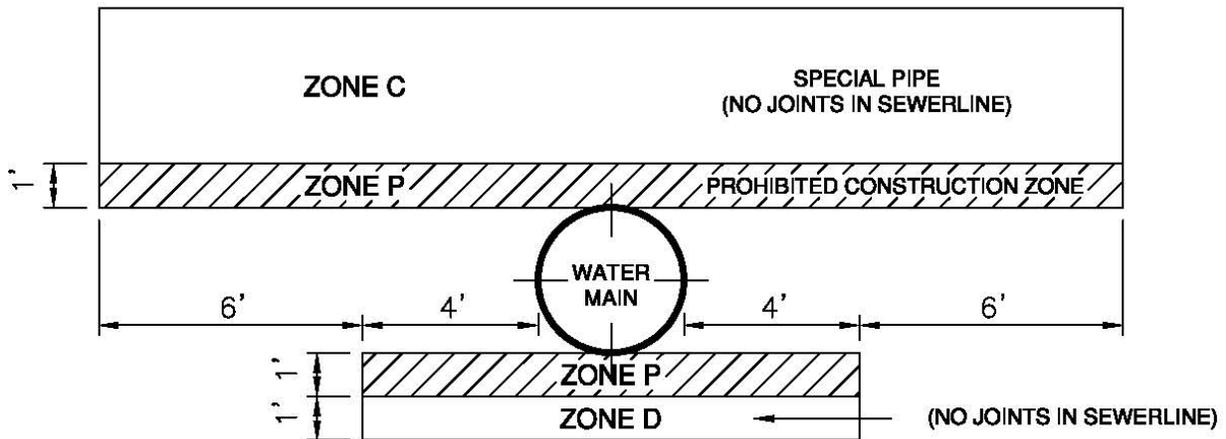


FIGURE 2 - CROSSINGS

**WATER MAIN AND SANITARY SEWER SEPARATION
CASE 1**

CWD-015-2
INSTALLATION OF NEW WATER MAIN

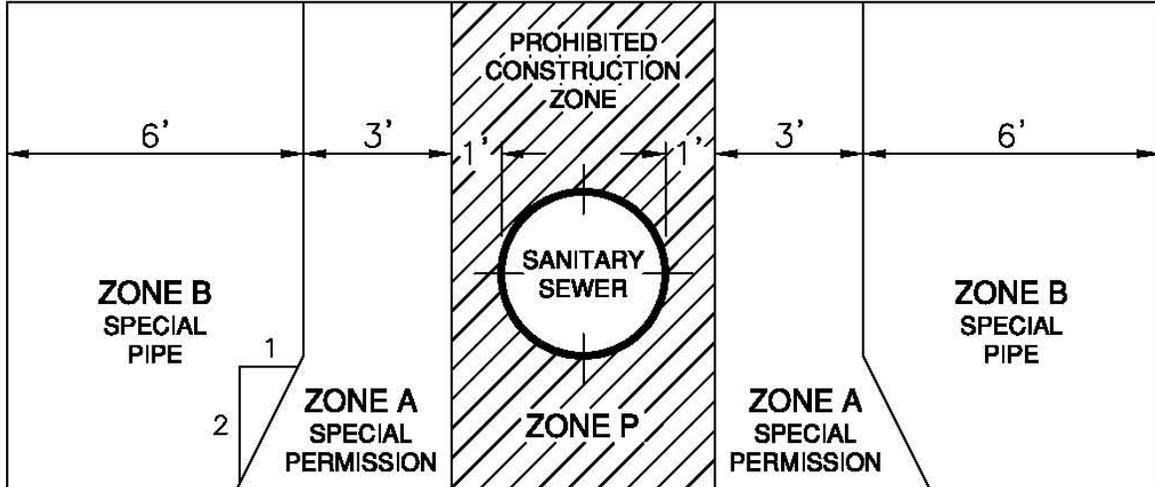


FIGURE 1 - PARALLEL CONSTRUCTION

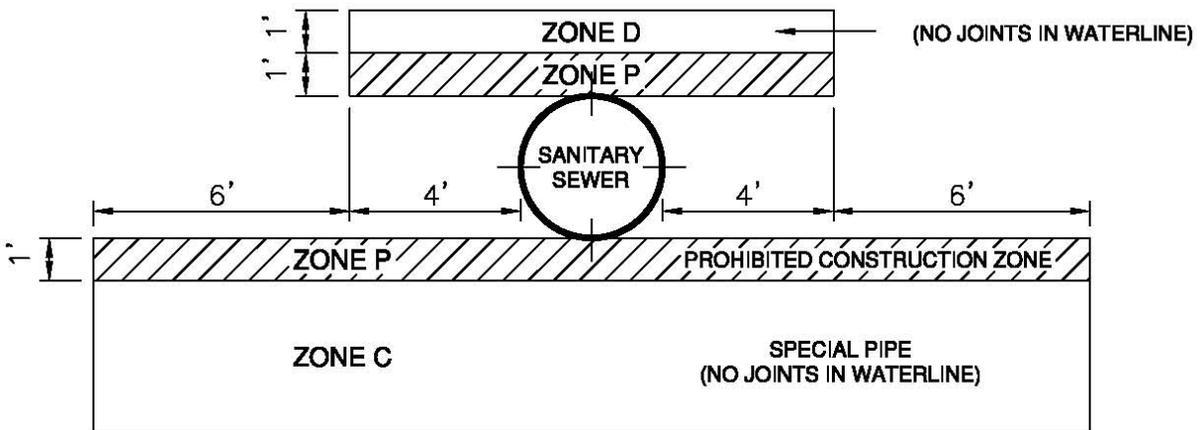


FIGURE 2 - CROSSINGS

WATER MAIN AND SANITARY SEWER SEPARATION
CASE 2

2.07 PIPELINE CURVE DATA

Pipeline joints for ductile iron pipe shall not be pulled more than 80 percent of the manufacturers' recommendations. When the pipe curve radius is greater than 241 feet, standard length pipe of 18 feet will pull the curve within the allowable joint deflection angle. When the pipe curve radius is less than 241 feet, the Engineer must calculate the required pipe length to be used with the following equation:

$$\text{Pipe Length} = R \times 2(\text{TAN } \Delta/2)$$

All sheets that incorporate curves in pipelines shall include a "Curve Data Table" per the standard plans.

2.08 STANDARD DRAWINGS

See CWD-010-1, CWD-010-2, and CWD-010-3 or Visit the Web site at <http://www.riversideca.gov/utilities/water-ugconstruction.asp>

2.09 PIPE JOINTS

All pipe joints shall be restrained with Romac Industries, Inc. "Grip Ring" gaskets, U.S. Pipe and Foundry Company "Field-LOK" gaskets or Water Division approved equal.

2.10 WATER PIPELINE MATERIALS

Unless otherwise authorized by Water Division's staff, all water pipelines 12" and under shall be ductile iron pipe, Class 350, per A.W.W.A. C-151. All water pipelines 14" and larger shall be either CML/CMC welded steel pipe and fittings in accordance with Water Division's standards or ductile iron pipe, Class 350, per A.W.W.A. C-151.

2.11 VALVES

Location:

- Water pipelines (12-inch diameter and smaller): To provide flexibility of operation, generally located on discharge side of pipeline connections; 3 at crosses, 2 at tees (Water Division may require 3 depending on the circumstances) and at beginning of dead end mains. Valves shall be spaced every 500 feet with no more than 2 fire hydrants between the valves.
- At all outlets, hydrants, blow-offs, air valves, and at service connections as shown on the Standard Drawings. Dead end valves placed for future extensions shall be suitably capped or plugged.
- If one of the options above does not apply, valves shall be spaced at 1,320-foot maximum intervals or as directed by Water Division.

Size:

- Full line size gate valves through 12-inch. For valves larger than 12-in, contact the Water Division. Maximum velocity through valves normally limited to 12 feet per second, never to exceed 20 feet per second.

Unless otherwise provided for, all valves shall be resilient seat gate or butterfly type valves conforming to AWWA Standards C509, C515, and C504.

Valves shall be installed with valve can and cover as shown on Water Division's Standard Drawing CWD-500.

Pressure class rating shall be the same as the water pipe on which the valve is being installed.

2.12 COMBINATION AIR VACUUM AND AIR RELEASE VALVES

Air valves shall be located at all high points of water pipelines; however, air valves shall not be installed at the end of cul-de-sacs unless the slope of the water pipeline is 5% or greater. Minimum size of air valves shall be 2" for all pipelines through 16-inches.

In phased tract development, air valves are often located at the end of the pipeline as dictated by the phasing plan. When additional phases are constructed, the air valve shall be removed unless it is required by one of the criteria listed above.

Provide 4-inch guard posts on either side per Water Division's Standard Drawing CWD-900.

2.13 BLOW-OFF VALVE ASSEMBLIES

Blowoff valve assemblies shall be installed in accordance with Water Division's Standard Drawings CWD-411-A or CWD-411-B. Blowoff valve assemblies shall be installed at the termination of all dead end mains. If special conditions so warrant, additional blow-off valve assemblies shall be installed at low points in the water main.

2.14 PUBLIC FIRE HYDRANTS

Hydrants shall be set so that they are easily accessible to fire department pumpers. Locations in depressions, cut outs or on embankments high above the street are **not** acceptable. Hydrant locations are subject to the review and approval of the Fire Marshal. A signature block for the Fire Department is required on the Plans.

Hydrants shall be 6-inch, wet barrel, type A.W.W.A. C-503, with one 4-inch outlet and one 2 1/2-inch outlet and a 6-inch ductile iron bury.

Super hydrants, for commercial and industrial districts, shall have two 2 1/2-inch outlets and one 4-inch outlet and a 6-inch ductile iron bury.

Spacing of fire hydrants in residential areas shall be 500 feet where the homes are equipped with fire suppression sprinklers and 350 feet when the homes are not equipped with fire sprinklers. For commercial and industrial areas, the hydrants shall be spaced every 350 feet. Design consideration shall be taken to locate hydrants at intersections wherever possible.

Fire hydrants shall be installed in accordance with Water Division's Standard Drawing CWD-700.

2.15 BACKFLOW PREVENTION

Where Water Division's Domestic Water System has the potential of becoming cross-connected to other water supplies or sources, an approved backflow prevention device is required by Title 17, Drinking Water Supplies, of the California Administrative Code, and shall be installed in accordance with Water Division's Standard Drawings CWD-616 & 617 and approved materials list. An approved backflow prevention device is required for all fire service connections. All non-residential water services shall have a Water Division approved backflow prevention device installed adjacent to meter unless otherwise approved by Water Division Backflow Administrator.

2.16 SERVICE INSTALLATIONS

Services shall be stationed and shown on the Plan at their proposed locations. The private engineer shall give due consideration to any proposed improvements by others (i.e., driveways, catch basins, pullboxes and sewer laterals).

Services and meters shall be sized in accordance with the provisions of Section 1009 of the Uniform Plumbing Code, using minimum pressures expected in the system. Minimum service pipe diameter shall be 1-inch with a minimum meter size of 3/4-inch.

All meters will be set by the Water Division.

The Contractor will be required to lay all services on new water main construction, including the meter stop, meter spacer and the meter couplings, and set the meter box in accordance with Water Division's Standard Drawings CWD-600, CWD-601, CWD-615, CWD-620, CWD-621 and CWD-622. Meter spacers will be provided by the Water Division. All pipe ends shall be suitably covered to prevent any entrance of foreign matter into the service lines.

2.17 METER VAULTS

All vaults for water services, 3-inches and greater, shall be shown in a separate detail on the Plans. The detail shall show location and distances to driveways, curbs, sidewalks, structures and utilities within 10 feet of the meter vault. Both sides of the vault shall be stationed in the detail. Structural calculations, stamped and signed by a registered civil engineer, shall be submitted for vaults located in traffic areas.

2.18 BOOSTER & PRESSURE REDUCING STATIONS

If the project requires a booster or pressure reducing station, contact the Water Division prior to starting design.

2.19 CORROSIVE SOIL

Where steel pipelines are to be constructed in corrosive soil conditions, as shown in the Preliminary Soil Report, the engineer shall contact the Water Division for direction.

3.0 PLAN FORMAT AND REQUIREMENTS

The Developer's engineer shall prepare water system improvement plans that are clear, concise, and meet Water Division's standards. A set of plans that meet all the requirements set forth herein, but are difficult to interpret, mislead the Contractor, confuse the reader, or do not address previous plan check comments, are unacceptable and will be subject to rejection without review.

3.01 SHEET FORMAT – GENERAL

Drawings shall be drawn in ink on D size (24" x 36") mylar (4 mil double matted) sheets with Water Division's standard title blocks as shown on the standard plans available online.

The improvement plans shall be professional quality especially prepared as WATER IMPROVEMENT PLANS. Work shall be of standard engineering practice and shall be well arranged, neat, legible and present the proposed construction without confusion. Applicable prints, submitted for checking, shall be clear, bright duplications. Profiles are not generally required for water mains under 12-inches in diameter. However, profiles will be required when the construction will involve numerous grade changes to avoid conflicts with other utilities or buried conflicts or when required by the Water Division. Profiles will also be required when the water main will be in an unimproved area, easements or areas without curb and gutter.

All drawings shall be drawn to scale using 1"= 40' on the horizontal scale. Profiles, when required, shall be drawn at an appropriate vertical scale that matches the plan data. Match lines and continuations from sheet to sheet shall be used and identified with applicable station points and cross-reference. Duplicate data, outside of the match lines, shall be fogged or shaded. Always indicate true north with a suitable north arrow. Indicate tract number and sheet number on all drawings. Each sheet shall have a title block with tract number, street name and stations appearing on that sheet. Stationing must conform to established stationing on approved City plans. Stationing on all sheets shall be from the left to right (even if this requires north to be "down"). No negative stationing. If there are any questions or problems on stationing, contact the Water Division prior to design.

For special assemblies, unusual and/or complex connections provide a detail schematic (preferably on the same sheet). The detail schematic shall be drawn to scale, show pipe size, and shall fully identify all the parts in the detail. Show and call out all special features and indicate scale.

The Engineer shall note on the plans, all connections to existing water facilities and note who is to construct them. Contractors are not authorized to make connections to existing water facilities. Contractors shall not operate any valve on any portion of Water Division's system that is under pressure.

3.02 COVER SHEET

As a minimum, the Cover Sheet shall show the following:

1. Water Division's standard title block.
2. General notes. See Section 3.05 herein.
3. Vicinity Map showing a north arrow, scale and project location.
4. Index Map at a 1" = 100' scale, showing the proposed improvements and plan sheet index. If there is a water line in an easement, show the easement limits.
5. Provide a City approved Bench Mark and Basis of Bearings.
6. Show legend per most current standard plans (available online).
7. Provide a "Bill of Materials" which should include the applicable Standard Drawing Number(s).
8. Provide a signature block for the Fire Department when the installation of fire hydrants are required or when existing fire hydrants are relocated.
9. Provide a signature block for Public Utilities Electrical Division.
10. Provide Underground Service Alert notification (this should be on each plan sheet).
11. The following note "NOTE: THIS SYSTEM SERVED BY _____ ZONE".

3.03 PLAN FORMAT

The plan sheets shall be drawn at a horizontal scale of 1" = 40'. As a minimum, the drawings shall show the following:

1. **Title Block** – Water Division's standard title block shall be used and shall include the City case or project number and street names.
2. **North Arrow** - North Arrow shall point either up or to the left to conform with stationing.

3. **Street Names** - All street names shall be shown.
4. **Lot Lines** - All lot lines or parcel lines, lot numbers, frontage distances and full pad elevations (i.e., 1020.5 not 20.5). All adjacent tracts shall be identified.
5. **Right-of-Way** - Existing and proposed right-of-way shall be identified with dimensions from street centerline.
6. **Utilities** - All existing and proposed utilities shall be shown including, but not be limited to, water (existing Water Division water pipelines shall be identified by Water Division Plan No.), sewer, gas, power, telephone, storm drain, irrigation, traffic, and cable television. Each utility shall be identified with a symbol and the size of the utility shall be shown. Dimensions from street centerline to centerline of each utility shall be shown.
7. **Existing and Proposed Improvements** - All existing surface improvements shall be shown including, but not limited to, curb and gutter, edge of pavement, power poles, driveways, sidewalks, and fences. Existing and/or proposed curbs shall be identified with dimensions from street centerline shown.
8. **Proposed Pipeline** - Proposed pipeline shall be indicated with a heavy line and dimensioned from the street centerline to the centerline of the pipeline.
9. **Stationing** - Stationing for pipelines shall be along the centerline of the improvement. Stationing shall increase from left to right. Stationing shall be identified with tick marks at 100 foot intervals.

For water pipelines with curves, stations for the beginning and end of each curve shall be shown. In addition, a curve data table shall be included showing the delta, curve radius, curve length, and tangent length for each curve.

10. **Match Lines** – Match lines for each end of the sheet shall be shown as follows:

Sta 15+00.00 Match Line
See Sheet 5

11. **Water pipelines** - Water pipelines and appurtenances (valves, fittings, fire hydrants, air valves, water services, and blowoffs) shall be identified by station and a numerical identification corresponding to a construction note as shown on the standard plans.

Only those construction notes that apply to each sheet shall be shown.

All connections to existing water system shall be identified by station and size. Details for connections shall be used where required. Each connection

shall have the following note, "System Connection by City Forces".

If a water main crosses a railroad track, the steel casing shall be shown with the beginning and ending stations. The casing shall be labeled with its size and thickness. Boring and receiving pits shall be shown, flagged and labeled. The engineer shall submit a copy of the permit issued by the railroad for the proposed pipeline crossing and the boring and jacking operation.

The engineer shall detail all water and sewage pipeline crossings and show the clearance between the two pipelines.

12. **Callout Notes** – All callout notes shall be oriented horizontally per CWD-010-2 and CWD-010-3.

3.04 PROFILE FORMAT REQUIREMENTS

Only the profile for the waterline shall be shown. All other utility profiles shall not be shown unless conflicting, or where crossing over or under (i.e. storm drain). All existing utilities in the area being profiled shall be shown with dashed and/or greyed out lines.

1. **Stationing** - Stations shall be shown along bottom of profile grid at 100 foot intervals. Profile stationing shall line up with plan stationing and shall be shown at the bottom of the profile grid.

Label and show stations and flowline elevations at the beginning of the pipeline, every 100 feet, at the B.C. and E.C. of curves, all appurtenances, and at the end of the pipeline.

2. **Datum Elevations** - Elevations shall be shown at even gridlines on both ends of the profile.
3. **Existing and Proposed Ground Surface** – Show the proposed surface over the proposed pipeline and flag the surface elevations every 100 feet. Note elevations to the nearest 0.1 feet.
4. **Match Lines** - Match lines for each end of sheet shall be shown as follows:

Sta 15+00.00 Match Line
See Sheet 5

5. **Water pipelines:** Show and label the connection to the existing water main. The label should show the existing station and elevation.

Pipelines under 12-inches in diameter shall be 36-inches below the top of the finished surface to the top of pipe. Pipelines 12-inches and over shall be 48-inches below the top of finished surface to the top of the pipe.

Show pipe size, pipe material, pressure class and pipe slope using S = 0.0000 format.

All fittings and services shall be shown and stationed in profile.

6. **Utility Crossings:** Both existing and proposed underground utility crossings shall be shown. Show all existing topo which impacts the proposed water pipeline.
7. **Railroad Crossings:** When the water main runs under a railroad track, show the size, thickness, material and limits of the casing. Stations and elevations shall be shown for each end of the casing along with the grade of the casing in the $S = 0.0000$ format.

3.05 GENERAL NOTES

All of the following General Notes shall be included on the cover sheet of the Water Improvement Plans.

SAMPLE GENERAL NOTES

1. All construction shall be in accordance with these Plans and in conformance with the City of Riverside Public Utilities Department, Water Division, Standard Specification No. 205 for Water Distribution Systems, latest revision; all applicable A.W.W.A. Standards and Specifications, except as noted; and the Standard Specifications for Public Works Construction (Greenbook), latest adopted edition and amendments.
2. All water mains 12 inch and under shall be Class 350 D.I.P. per A.W.W.A. C-151. All pipe joints shall be restrained with Romac Industries, Inc. "Grip Ring" gaskets, U.S. Pipe and Foundry Company "Field-LOK" gaskets or Water Division approved equal. All fittings shall be restrained mechanical joint type.
3. Approval of this Plan by the Water Division does not relieve the private engineer of the design responsibility thereof. The private engineer signing these plans is responsible for assuring the accuracy and acceptability of the work hereon. In the event of discrepancies arising during construction, the private engineer shall be responsible for determining an acceptable solution and revising the plans for approval by the City.
4. The developer shall be responsible for preserving or re-establishing and referencing survey monuments destroyed, disturbed or buried as a result of the construction shown hereon.
5. Water mains shall be laid to the line and grade shown on the Plan and per CWD-040.
 - A. The Developer's Engineer shall provide a construction off-set line and station all fittings and appurtenances. Cut sheets shall be provided for

pipelines on all streets.

- B. Minimum depth of cover over water mains under 12-inches in diameter shall be 3.0 feet, unless otherwise noted. All 12-inch and larger diameter water mains shall have 4.0 feet of cover.
6. The existence and location of any underground utility pipes, conduits, cables or structures shown on these Plans were obtained by a search of available records. To the best of our knowledge, there are no existing utilities except as shown on these Plans. The Contractor is required to take due precautionary measures to protect the utility lines shown, or any other lines not of record or not shown on these Plans.
 7. Proposed electrical underground and street light facilities are not shown on the Plan. The Contractor shall coordinate installation with the Developer and Public Utilities Department, Electrical Division, 951-826-5830, for locations of the proposed electrical and street light facilities.
 8. Pipe shall be handled so as to protect pipe at all times and shall be carefully bedded to provide continuous bearing and to prevent uneven settlement. Pipe shall be protected against flotation at all times. Open ends shall be sealed at all times when construction is not in progress.
 9. Unless otherwise approved, water mains and sewer mains shall not cross with less than 1.0 foot of vertical clearance. Water service lines and sewer laterals shall not be in the same trench, a minimum, horizontal clearance of 10 feet is required. Water mains shall clear all house sewer laterals by a minimum of 1.0 foot vertical clearance (per CWD-015 and CWD-023).
 10. Water meter boxes and fire hydrants shall be placed at curb site locations. The Contractor shall adjust the meter boxes to sidewalk grade after the sidewalks have been poured. Water meter boxes shall not be located in driveways.
 11. A material list, per Water Division Specification No. 205, Appendix I – Approved Material List and material certifications must be submitted for Water Division approval prior to installation.
 12. The Contractor may begin construction only after a preconstruction meeting is held with the Water Division Engineering staff. Contact Water Contract Administration at 951-826-5672, at least one week prior to the planned start of construction of the waterlines to arrange this meeting.
 13. The Contractor shall call in a location request to Underground Service Alert (USA), Dial 811, two working days before digging. No Street Opening Permit will be issued by the Public Works Department involving excavation for underground facilities unless the applicant has been provided an inquiry identification number by USA. All necessary permits shall be taken out by the construction Contractor. A Street Opening Permit, issued by the Public Works Department, or a Riverside

County Encroachment Permit, depending upon jurisdiction, is required prior to the start of construction.

14. The Contractor shall pothole existing utilities, prior to construction, to determine the depth of cover. The water main shall be installed with the required vertical clearance. If insufficient cover exists, the Contractor shall contact the private engineer who signed the plan to determine an acceptable solution.
15. The Contractor shall request Water Division inspection two working days prior to trenching. Plans and Specifications shall be on-site at all times.
16. Water mains shall be sand bedded in accordance with CWD-040 and per Part 3, Section 306-1.2.1 of the Specification 205.
17. The Contractor shall not backfill any trenches until Contractor has obtained as-built stationing on all fittings and appurtenances. Pressure testing will not be allowed until "As-Builts," submitted by the Contractor, have been approved by the Water Division.
18. The Contractor shall bulkhead mains, place and compact backfill, test, sterilize and pass bacteriological testing before any tie-ins are made to the City system. City forces will make the final system connections from the existing main. No connections will be made until all testing is complete and written passing bacteriological test results have been submitted to the Water Division.
 - A. Pressure testing shall be conducted after the trench backfill has passed the required compaction tests. Hydro test pressure shall be 200 psi for two hours. The leakage limit is 15 gallons per inch diameter per mile, per 24 hours for DIP pipe. No leakage is allowed for welded steel pipe.
 - B. Chlorination shall be performed per Part 7, Section 700-5 of Specification 205. Gas chlorination will not be allowed. After the minimum chlorination contact time, the Contractor shall dechlorinate the test water in accordance with the California Regional Water Quality Control Board, Santa Ana Region Order No. 98-67 and National Pollution Discharge Elimination System (NPDES) No. CAG998001.
 - C. A minimum of two bacteriological tests are required, per day. Approximately one sample shall be taken per 500 feet of main for two consecutive days.
19. Refer to City of Riverside Public Works Department drawings (list the R-, S-, and D- numbers) for project coordination.
20. Blue hydrant reflectors are required for each hydrant.
21. All curbs, gutters, sewer lines and storm drain lines must be installed prior to beginning any water line installation.

APPENDIX II

APPROVED MATERIAL LIST

APPENDIX II

APPROVED MATERIAL LIST- OCTOBER 2009

No.	Material Description	Approved Manufacturers
1	Ductile Iron Pipe	Pacific States Cast Iron Pipe Co. United States Pipe & Foundary American Cast Iron Pipe Company Griffin Pipe Products Company
	Fitting Manufacturers	Pacific States Cast Iron Pipe Co. United States Pipe & Foundary Star Sigma/Nappco Union Reliable American Ductile Iron Pipe Griffin Ductile
	Pipe Joint Type	Mechanical Joint - ANSI A21.11/AWWA C111 Rubber gasket - ANSI A21.11/AWWA C111 Flanged joint - ANSI A21.10/AWWA C110 Restrained joint - ANSI A21.10/AWWA C110. "Field-LOK" Gaskets, for use with "Tyton" joint pipe. Fast Grip Gaskets for use with "Fastite" joint pipe, as manufactured by American Cast Iron Pipe Company, or "Grip Ring", as manufactured by Romac Industries, Inc. or "Lok-Ring" as manufactured by American Cast Iron Pipe Company Sure Stop 350 Gasket by Pacific States Cast Iron Pipe Co.
2	Steel Pipe	Ameron International, Water transmission Group Northwest Pipe Company Kelly Pipe Company West Coast Pipe Linings Inc Southland Pipe Corp Imperial Pipe Services, LLC
2A	PVC Pipe	PVC for Recycled Water Projects only.
3	Paint Systems.	69 Primer and 2 coats of Aervoe-Pacific Co., Blue Marking Paint #203, or City approved equal. Air Valves - 1 coat Rust-Oleum #1069 Primer and 2 coats of Rust-Oleum #7638, Forest Green. See Sec. 210-1.5 (b) Fuller O'Brien, Pervd. Fire Hydrants - 1 coat Rust-Oleum #1069 Primer and 2 coats of either Fire Hydrant Pervo #2420, Rust-Oleum #7644 Federal Safety Yellow or Fuller O'Brien #312-74 Hi-Way Yellow Blowoff Hydrants - 1 coat of Rust-Oleum #1060 Primer and 2 coats Rustoleum #7644, Federal Safety Yellow, Pervo #2420, or Fuller O'Brien #312-74, Hi-Way Yellow. (Top of Hydrant) Fuller O'Brien #312-80, National Blue Paint Valves and Piping - Koppers #50, or City approved equal Curb Marking - Traffic Blue #6703, Vista Paint or City approved equal Miscellaneous Appurtenances - "Tnemec" Pota-Pox Plus series 140F epoxy coating, or City approved equal. All paint and protective coatings shall be holiday free
	Suppliers	Pervo Paint, Los Angeles - (213) 758-1147 Fuller O'Brien, Fullerton - (714) 992-0720 Vista Paint, Riverside - (951) 689-2501 Decratrend, San Bernardino - (909) 888-3211
4	NUTS AND BOLTS	hexagonal head machine bolts and hexagonal nuts, A-307 Grade B. Class 2A fit on bolts and Class 2B fit on the nuts, Plating, Bolt Length, Breakoff Bolts. (See 250-1)

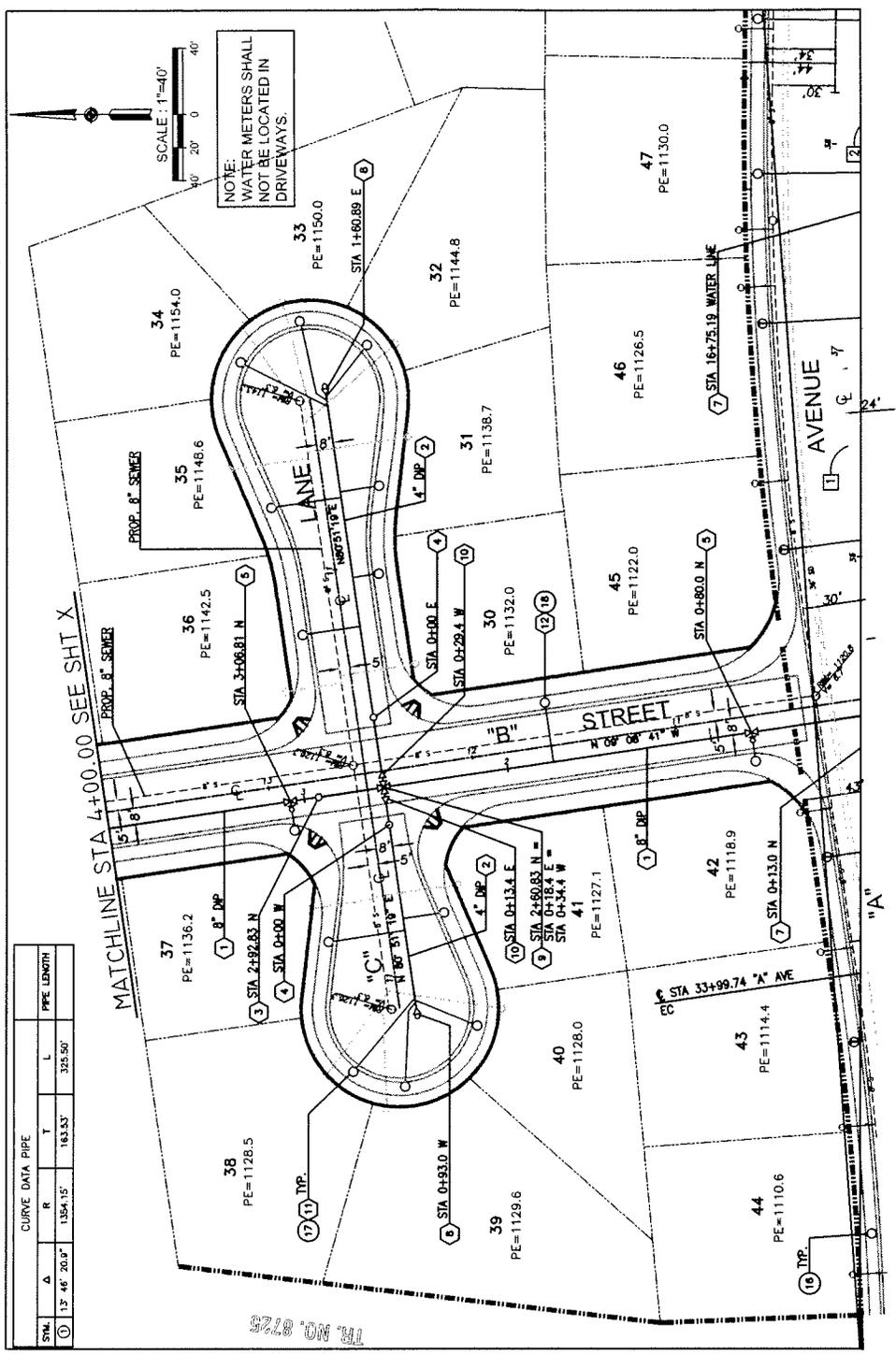
5 GASKETS.	1/8" minimum thickness, micro finish, full face, red rubber style 150 by "Active Packing" Gaskets.					
	shall meet Federal Specification HH-P-151.					
6 INSULATION GASKETS	PSI Products, Inc., Burbank, California					
	Central Plastics Company, Shawnee, Oklahoma					
	CALPICO Inc., San Francisco, California					
	Sure Stop 350 Gasket, by Pacific States Cast Iron Pipe Co.					
7 BUTTERFLY VALVES	Pratt - Groundhog, Triton XR-70					
DIP Body	Mueller - Lineseal III					
	DeZurick or City approved equal					
	Krispin K'-Flow Butterfly Valve- DI body - 500 series-3" to 20".					
8 GATE VALVES	Milwaukee Valve, Co. 1141- Change per Jim Henke comments- 2" nut.					
	1/4-inch to 3-inch Gate Valves					
9 Resilient Seat Gate Va	American Flow Control Series 2500					
	Clow Series 6100					
	AVK Series 25					
	Mueller Model A2360					
	M & H Style 4067 NRS					
10 Tapping Sleeves						
Stainless Steel Sleeves	Smith-Blair 662 and 663					
	Romac SST or-Romac FTS 420					
	Powerseal 3490-AS					
Mechanical Type Joint	Mueller-Mechanical Joint Tapping Sleeve					
	Clow-Mechanical Joint Tapping Sleeve					
	American Flow Control - Mechanical Joint Tapping Sleeve					
11 AIR VALVES	Crispin, 2-inch					
	C 21 Single Body Combination (Universal type Air Release Valve					
12 Resilient Wedge Gate						
Valves - Fire Services	American Flow Control Series 2500					
	Clow Series 6100					
	AVK Series 25					
	M&H Series 3067 (NRS) (3068 for OS & Y)					
	Mueller Model A2360					
13 BRASS AND BRONZE ITEMS	Models					
	Ford	Jones	McDonald	Mueller	Cambridge Brass	
14 Service Fittings						
ITEM						
	1" Ball Corp. MIPT X MIPT	FB500-4	J-1943	3131B	B-20013	301-M4M4
	1" Couplings FIPT X Pack Joint for CTS	C14-44G	J2607	4754-22	P-15451	
	2" Ball Corp MIPT X MIPT	FB-500-7	J-1943	3131B	B-2969	301-M7M7
	2" Corp Stop CC X IPT	FB-400-7	J-1944	3128B		
	1" Angle Ball Meter Stop	444W	BA43-J-1963W	4602B-22	B-24258	210-H4T4
	2" Angle Ball Meter Stop	777W	BF A13J-1974V	4604B	B-24276	210-F7MF7
	2" Couplings MIPT X Comp, CTS	C84-77	J-2605		H-15428	117-H7M7
	1" x 3/4" Meter Adaptor	A34	J-128-H			440-N4R2
	1" Meter Coupling	C38-44-2.625	J-134	4620	H-10891	417-T4M4
	3/4" Meter Coupling	C38-23-2.5	J-134	4620	H-10891	417-T3M3
15 Service Saddles	1. Mueller Cat. No. BR 2 B 0474 IP, BR2B0684 IP;BR2B0899IP; BR2B1104 IP; BR2B1314 IP					
(Service Clamps)	2. Smith-Blair Cat. No. 323-0510 thru 323-1426					
Bronze double strap type	3. R.H. Baker Cat. No. 183-413 TAP thru 183-1426 TAP					
with neoprene seal ring	4. Jones Cat. No. J-979					
gasket	5. McDonald No. 3826					
	6. Ford - 202B					
	7. Cambridge Cat. No. 810					
	8. Rockwell Cat. No. 323-0510 thru 323-1426 (not in CIP Projects)					

		MODELS	
16	Water Sampler Fittings	FORD	JONES
	1" Corp. Stop IPT x Compression	1"-F-1100	1"-J-3403
	1" Corp. Stop IPT x 1 PT	1"-F-500	1"-J-41
	1" Angle Ball Meter Stop	BA43-444W	1"-J-1963W
	1" x 3/4" Meter Adaptor	A34	1" x 1-1/4", J-128-H
17	FIRE HYDRANTS		
	Regular FH	Hydrant (1 - 2-1/2" and 1 - 4" Outlets	Clow copr. Corona, Ranger 900 series, Model 950
	6" wet barrel, 1-4" outlet and	JAMES JONES COMPANY, El Monte, California, Model J-4040-C	
	1-2-1/2" outlet and 6" DI bury	AMERICAN AVK CO., Fresno, California,	
	CWD-700	Model 2490 (250-10.1)	
	Super Hydrant	CLOW CORP., Corona, California, Ranger, 900 Series, Model 960	
	2-2-1/2" Outlets and 4" Outlet	JAMES JONES COMPANY, El Monte, California, Model J-4060-C	
	and 6" ductile Iron bury.	AMERICAN AVK CO., Fresno, California,	
		Model 24/70	
18	BOLTED, SLEEVE-TYPE COUPLINGS		
	Flexible Couplings	Baker Series 200	
		Dresser Style 38	
		Smith-Blair 411 and 441	
		Romac Style 501	
		Ford Style FC1 and FC2	
19	Flanged Coupling Adapters		
		Baker Series 601	
		Smith-Blair 912, 913, and 914	
		Ford Style FFCA	
		Romac Style FCA 501	
20	METER BOXES		
	3/4" and 1" Meters	Armorcast	No. 37 (Polymer Concrete Cover)
		Carson Industries	1017 (Plastic Box and Cover with Reading Lid)
		J x R Concrete	No. 4 1/2 (Polymer) Water Meter Box Series.
	1-1/2" and 2" Meters	Armorcast	No. 65 (Polymer Concrete Cover)
		J x R Concrete	No. 5 1/2 (Polymer) (250-12.1)
21	Meter Vault	J & R Concrete	
	Compound Meter 3", 4" & 6"		
	Water Service	10K, BOLTS: HEX S.S., RPM POLYMER	
	Per CWD-800-1/2; 801-1/2.	CONCRETE FRAME AND NON-SKID 3 PC COVER	
		WATER" LOGO ON COVER, WITH READING LID (HDG)	
		ON CENTER COVER, WITH 14" W X 22" H MOUSEHOLES	
		OFF CENTERED ON EACH END WALL),	
22	Locator Wire	Northtown-THHN/THWN 600v Solid and Stranded	
		8-gauge-ONE strand.	

APPENDIX III

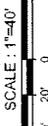
STANDARD DRAWINGS

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STA	Δ	R	T	L	PPE LENGTH
1	13' 46"	70.3'	134.15'	143.33'	325.50'

NOTE:
WATER METERS SHALL
NOT BE LOCATED IN
DRIVEWAYS.



NOTE: THIS SYSTEM SERVED BY _____ ZONE.

PROJECT NAME: WATER IMPROVEMENT PLANS

CITY OF RIVERSIDE
PUBLIC UTILITIES DEPARTMENT
WATER DIVISION

ENGINEERING COMPANY TITLE
BLOCK INCLUDE ENGINEER'S
SIGNATURE AND STAMP

APPROVED BY: _____ DATE: _____
INCLUDE THE CONTRACTOR'S
SIGNATURE AND DATE

APPROVED BY: _____ DATE: _____
INCLUDE THE CONTRACTOR'S
SIGNATURE AND DATE

UNDERGROUND SERVICE ALERT
CALL TOLL FREE
1-800-227-2600
TWO WORKING DAYS BEFORE DIGGING

DATE: 4/25/10

SCALE: AS SHOWN

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL PLAN LAYOUT

0	DRAWN	WEF	DATE	10-09	CHECK	APPROV.	1	DRAWN	DATE	CHECK	APPROV.	2	DRAWN	DATE	CHECK	APPROV.	3	DRAWN	DATE	CHECK	APPROV.
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NOTES AND DEFINITIONS

1. HEALTH AGENCY -- THE DEPARTMENT OF HEALTH SERVICES. FOR THOSE WATER SYSTEMS SUPPLYING FEWER THAN 200 SERVICE CONNECTIONS, THE LOCAL HEALTH OFFICER SHALL ACT FOR THE DEPARTMENT OF HEALTH SERVICES.
2. WATER SUPPLIER -- "PERSON OPERATING A PUBLIC WATER SYSTEM" OR "SUPPLIER OF WATER" MEANS ANY PERSON WHO OWNS OR OPERATES A PUBLIC WATER SYSTEM.
3. LOW HEAD WATER MAIN -- ANY WATER MAIN WHICH HAS A PRESSURE OF FIVE PSI (POUNDS PER SQUARE INCH) OR LESS AT ANY TIME AT ANY POINT IN THE MAIN.
4. DIMENSIONS ARE FROM THE OUTSIDE OF WATER MAIN TO THE OUTSIDE OF SANITARY SEWER LINE OR MANHOLE.
5. COMPRESSION JOINT -- A PUSH-ON JOINT THAT SEALS BY MEANS OF THE COMPRESSION OF A RUBBER RING OR GASKET BETWEEN THE PIPE AND A BELL OR COUPLING.
6. MECHANICAL JOINTS -- BOLTED JOINTS.
7. RATED WORKING WATER PRESSURE OR PRESSURE CLASS -- A PIPE CLASSIFICATION SYSTEM BASED UPON INTERNAL WORKING PRESSURE OF THE FLUID IN THE PIPE, TYPE OF PIPE MATERIAL, AND THE THICKNESS OF THE PIPE WALL.
8. FUSED JOINT -- THE JOINING OF SECTIONS OF PIPE USING THERMAL OR CHEMICAL BONDING PROCESSES.
9. SLEEVE -- A PROTECTIVE TUBE OF STEEL WITH A WALL THICKNESS OF NOT LESS THAN ONE-FOURTH INCH INTO WHICH A PIPE IS INSERTED.
10. GROUND WATER -- SUBSURFACE WATER FOUND IN THE PART OF THE GROUND THAT IS WHOLLY SATURATED.
11. HOUSE LATERAL -- A SANITARY SEWER CONNECTING THE HOUSE LATERAL DRAIN, BUILDING DRAIN, AND THE MAIN SANITARY SEWERLINE.

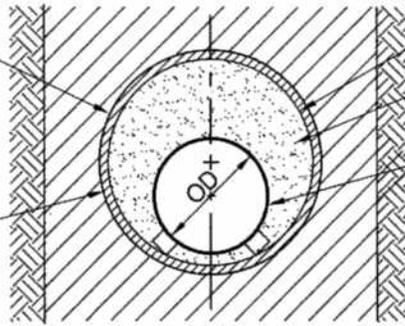
WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

WATER MAIN AND SANITARY SEWER
SEPARATION
NOTES

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DATE	DATE
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APPROV.	APPROV.
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DATE	DATE
DRAWN	DRAWN
2	2
APPROV.	APPROV.
CHECK	CHECK
DATE	DATE
DRAWN	DRAWN
1	1
APPROV.	APPROV.
CHECK	CHECK
DATE	DATE
DRAWN	DRAWN
0	0

1/4" MIN WELDED
STEEL CASING.

COMPACT EARTH
AROUND ENCASEMENT
AS REQUIRED ON
PLANS & DETAIL
SPECS



OD = OUTSIDE DIAMETER OF BELL,
COLLAR, OR COUPLING.

ID CASING = OD+6"

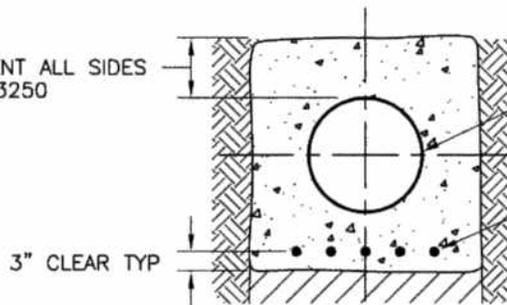
FILL ANNULAR SPACE WITH
PER PLAN NOTES.

SEWER PIPE OR WATER PIPE

NOTE: SUPPORT AT LEAST
2' OF EACH END OF CASING
ON UNDISTURBED EARTH.

TYPE A - PIPE CASING
SECTION A

6" TYP ENCASEMENT ALL SIDES
W/ PCC 560-C-3250

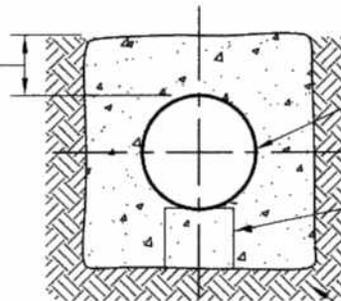


SEWER PIPE OR WATER PIPE

#5 @ 6" MAX CONTINUOUS
FOR LENGTH OF ENCASEMENT
SUPPORT AT LEAST 2' OF EACH
END OF ENCASEMENT ON
UNDISTURBED EARTH.
COMPACT EARTH AS REQUIRED
ON PLANS & DETAIL SPECS.

TYPE B - REINFORCED ENCASEMENT
SECTION B

6" TYP ENCASEMENT ALL SIDES
W/ PCC 520-C-2500



SEWER PIPE OR WATER PIPE
(PROTECT PIPE AGAINST FLOATATION)

SUPPORT ON CONCRETE BLOCKS

POUR AGAINST UNDISTURBED EARTH

TYPE C - PLAIN ENCASEMENT
SECTION C

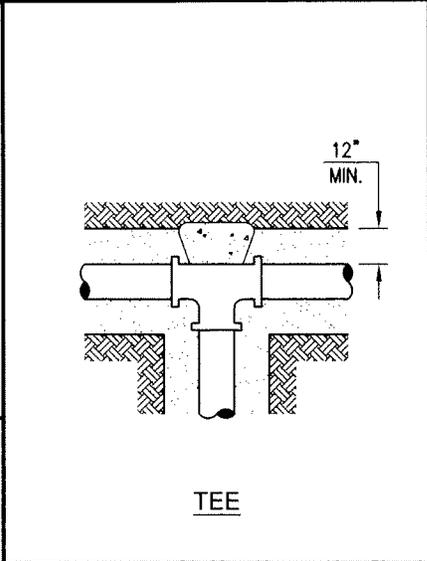
GENERAL NOTES

- 1.) ALL MATERIALS OF CONSTRUCTION SHALL CONFORM TO "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION"

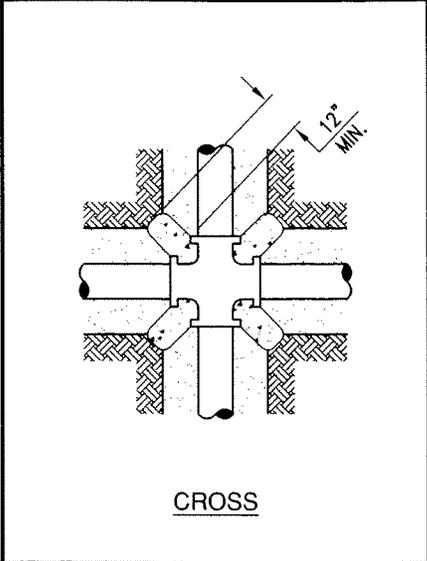
WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

STRUCTURE INTERFERENCE
ENCASEMENT SECTIONS

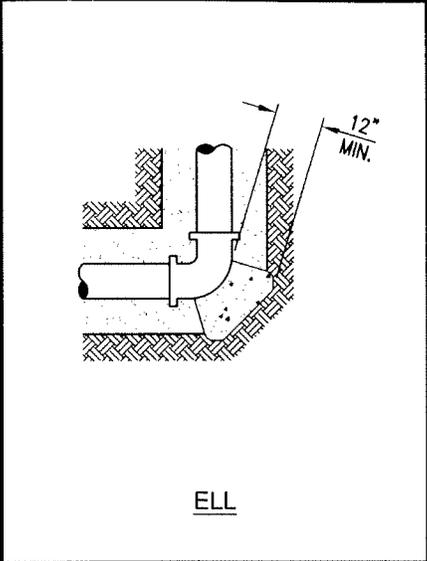
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APPROV.	CHECK	DATE	2
APPROV.	CHECK	DATE	2
APPROV.	CHECK	DATE	3
APPROV.	CHECK	DATE	3



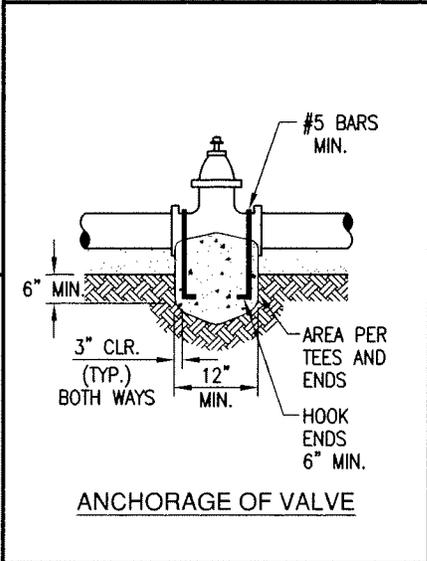
TEE



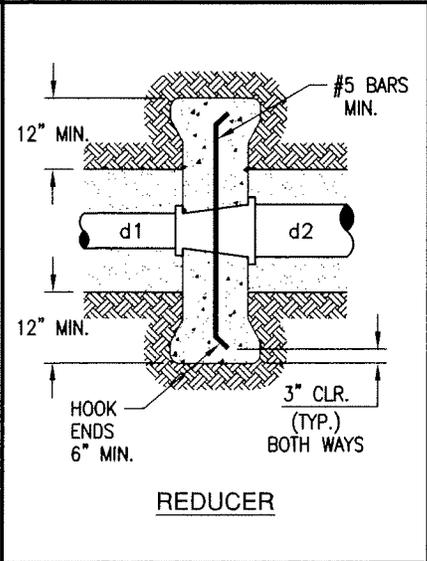
CROSS



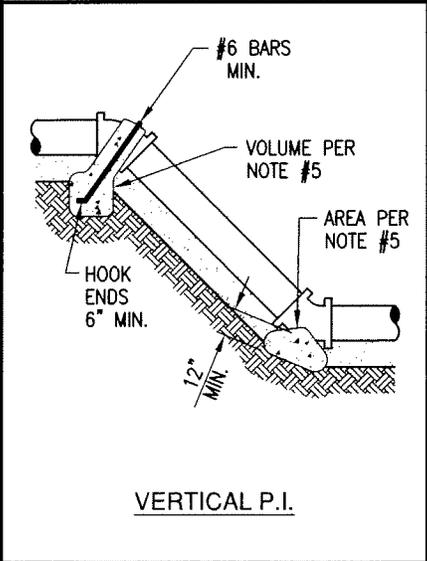
ELL



ANCHORAGE OF VALVE



REDUCER



VERTICAL P.I.

GUIDELINE

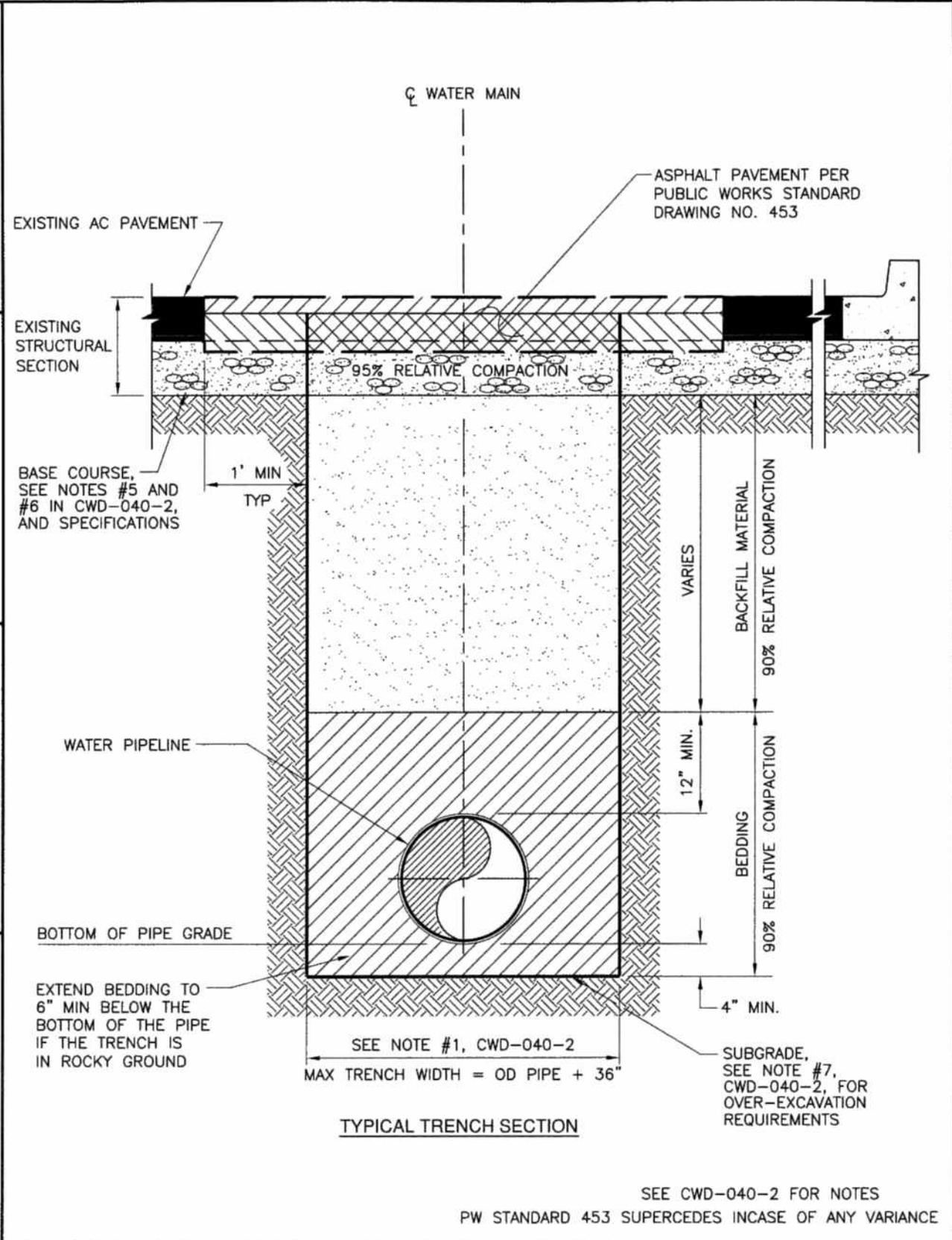
NOTES:

- 1.) ALL MATERIALS OF CONSTRUCTION SHALL CONFORM TO "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION".
- 2.) THRUST AND ANCHOR BLOCKS FOR D.I.P. AND M.L.&C. STEEL PIPE SHALL BE OF PCC 450-C-2000 CONCRETE AND SHALL BE POURED AGAINST UNDISTURBED SOIL. CONCRETE SHALL BE KEPT CLEAR OF THE BELL END OF FITTINGS FOR DUCTILE IRON PIPE.
- 3.) ENGINEERED-APPROVED RESTRAINED JOINTS MAY BE USED IN-LIEU OF THRUST BLOCKS.
- 4.) ANCHOR BLOCK FOR GATE VALVES SHALL BE KEYED A MINIMUM OF 12 INCHES INTO TRENCH WALL AND 6 INCHES INTO BOTTOM OF TRENCH.
- 5.) THE ENGINEER OF RECORD SHALL SIZE ALL THRUST BLOCKS ON THE BASIS OF THE SOIL PASSIVE PRESSURE.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

THRUST BLOCK DETAILS
TYPICAL

APPROV.	3
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DATE	
DRAWN	
APPROV.	2
CHECK	
DATE	
DRAWN	
APPROV.	1
CHECK	
DATE	
DRAWN	
APPROV.	0
CHECK	
DATE	10-09
DRAWN	KRELL



WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

**TYPICAL PIPE TRENCH,
BEDDING, BACKFILL AND PAVEMENT
REQUIREMENTS**

0	DRAWN RGM	DATE 10-09	CHECK	APPROV. <i>Ads</i>	1	DRAWN	DATE	CHECK	APPROV.	2	DRAWN	DATE	CHECK	APPROV.	3	DRAWN	DATE	CHECK	APPROV.
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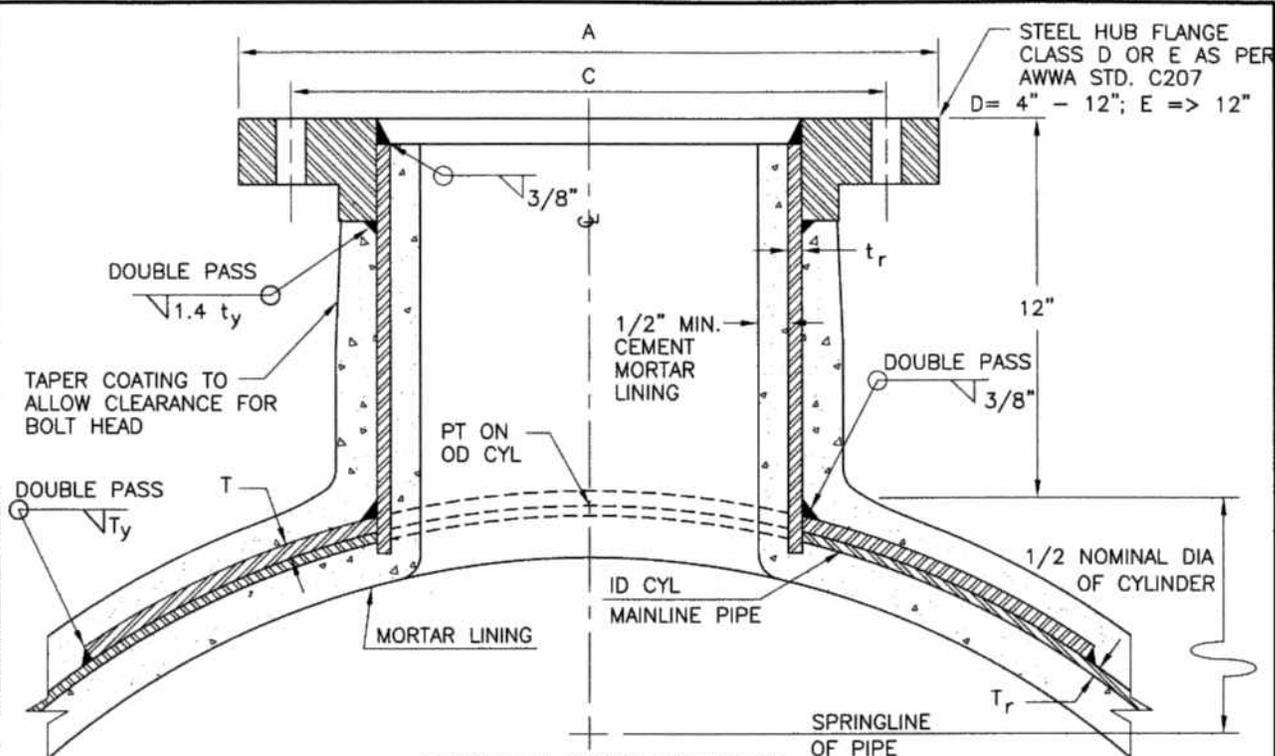
GENERAL NOTES:

- 1.) MINIMUM TRENCH WIDTH = O.D. + 12" FOR 4" TO 12" NOMINAL DIAMETER PIPE AND O.D. + 18" FOR GREATER THAN 12" NOMINAL DIAMETER PIPE.
- 2.) THE MATERIAL FOR BEDDING SHALL BE COHESIONLESS SANDY LOAM, SAND, OR SANDY GRAVEL MATERIAL OBTAINED FROM PROJECT EXCAVATION OR FROM APPROVED BORROW AREAS. THE BEDDING MATERIAL SHALL NOT CONTAIN ANY ROCKS OR OTHER MATERIAL DELETERIOUS TO THE PIPE.
- 3.) SAND BEDDING SHALL BE USED WHEN THE SAND EQUIVALENT OF THE NATIVE MATERIAL IS LESS THAN 30, PER ASTM D2419.
- 4.) FOR PAVED AND UNPAVED AREAS, THE COMPACTION OF BEDDING AND BACKFILL MATERIALS AND PAVEMENT REPLACEMENT SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION "GREEN BOOK" LATEST EDITION.
- 5.) COMPACTED BACKFILL MATERIAL IN THE UNPAVED AREAS SHALL COMPLY WITH THE SAME REQUIREMENTS AS THE BACKFILL MATERIAL COMPACTION IN THE STREETS.
- 6.) THE BASE COURSE MATERIAL SHALL BE CRUSHED AGGREGATE BASE MATERIAL AS SPECIFIED IN SECTION 200-2 "UNTREATED BASE MATERIALS" OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, LATEST EDITION.
- 7.) IF THE ENGINEER DETERMINES THAT THE SOIL UPON WHICH THE PIPE IS TO BE PLACED IS UNSTABLE, THE CONTRACTOR SHALL OVER-EXCAVATE THE BOTTOM OF THE TRENCH TO A DEPTH OF 12" OR AS DIRECTED BY THE ENGINEER AND PLACE A LAYER OF CRUSHED ROCK ON THE TRENCH SUBGRADE COMPACTED TO 90% RELATIVE COMPACTION.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL PIPE TRENCH,
BEDDING, BACKFILL AND PAVEMENT
REQUIREMENTS (GENERAL NOTES)

APPROV. CHECK DATE DRAWN 3 APPROV. CHECK DATE DRAWN 2 APPROV. CHECK DATE DRAWN 1 APPROV. CHECK DATE DRAWN 0



SECTIONAL DETAIL OF OUTLET

NOTE: ALL WELDS ARE FULL DOUBLE PASS WELDS.

NOMINAL OUTLET DIA (in.)	MINIMUM "t _r " (in.)	HUB FLANGE	
		"C" (in.)	A (in.)
4	0.237	7 1/2	9
6	0.280	9 1/2	11
8	0.322	11 3/4	13 1/2
10	0.366	14 1/4	16
12	0.375	17	19
14	0.375	18 3/4	21
16	0.375	21 1/4	23 1/2
18	0.375	22 3/4	25
20	0.375	25	27 1/2

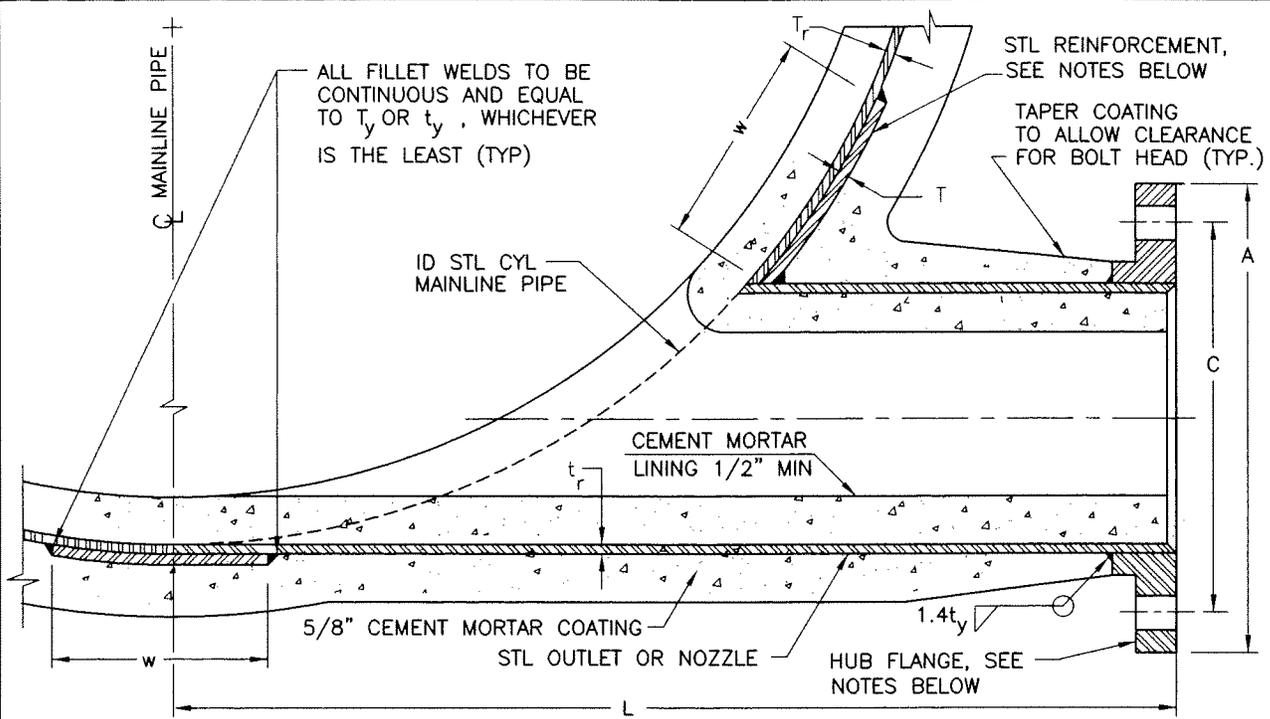
NOTES:

- 1.) SEE MAINLINE PIPING DRAWING FOR POSITION AND USE OF OUTLET.
- 2.) STEEL HUB FLANGE CLASS D, OR E AS PER AWWA STD C207- SEE ABOVE.
- 3.) SEE MAINLINE PIPE DRAWING FOR MINIMUM DESIGN THICKNESS "T_r".
- 4.) "w" AND "T", REINFORCEMENT PLATE DIMENSIONS FOR OUTLET JOINTS, TO BE DESIGNED PER AWWA M11, OR EQUAL TO MANUFACTURERS REINFORCING GUIDE.
- 5.) "T_y" = MAINLINE CYLINDER THICKNESS.
- 6.) "T_r" = REQUIRED MAINLINE CYLINDER THICKNESS.
- 7.) "t_y" = BRANCH CYLINDER THICKNESS.
- 8.) "t_r" = REQUIRED BRANCH CYLINDER THICKNESS.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL FLANGED OUTLET
4" THROUGH 20"

APPROV.	3
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APPROV.	1
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SECTIONAL DETAIL OF OUTLET

NOMINAL OUTLET DIA (in)	MINIMUM "t _r " (in)	HUB FLANGE	
		"C" (in)	"A" (in)
4	0.237	7 1/2	9
6	0.280	9 1/2	11
8	0.322	11 3/4	13 1/2
10	0.366	14 1/4	16
12	0.375	17	19

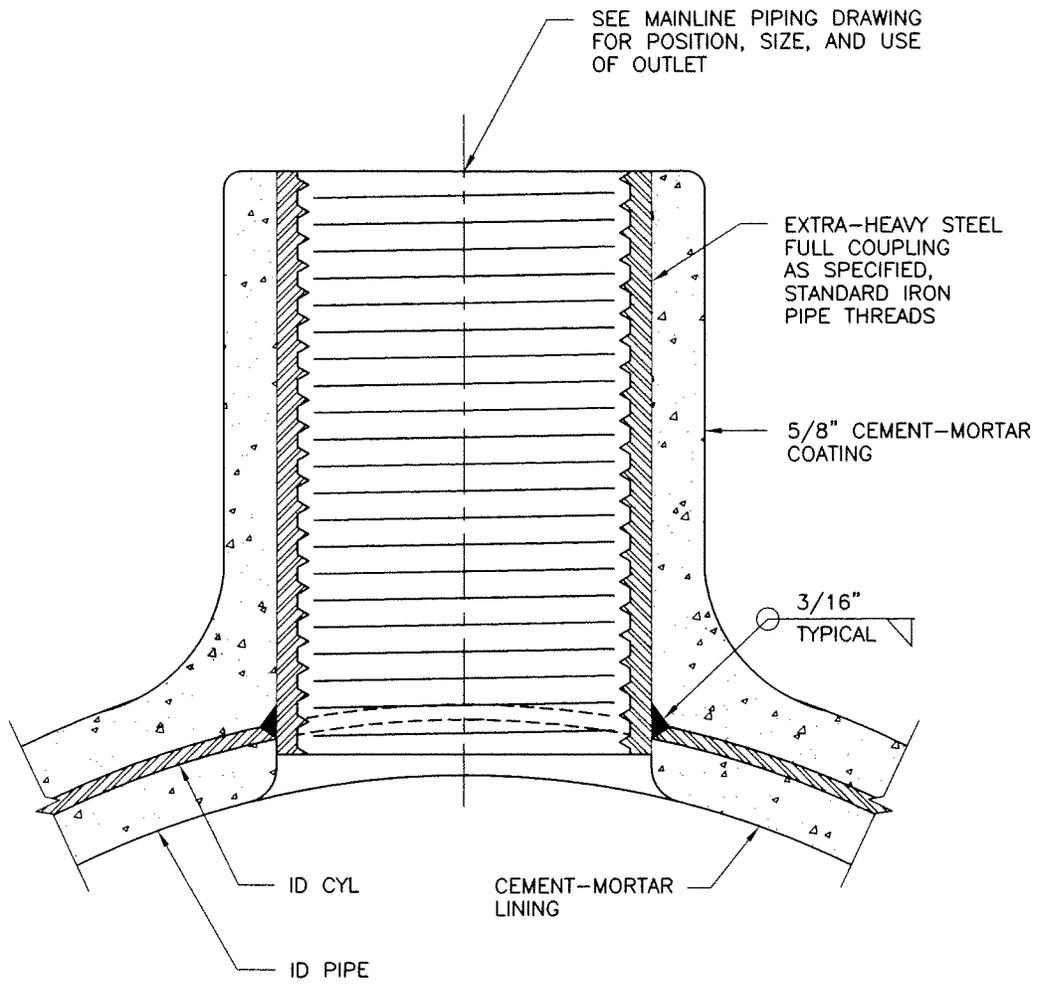
NOTES:

- 1.) SEE MAINLINE PIPING DRAWING FOR POSITION AND USE OF OUTLET.
- 2.) STEEL HUB FLANGE CLASS D AS PER AWWA STD. C207-86.
- 3.) SEE MAINLINE PIPING DRAWING FOR MINIMUM DESIGN THICKNESS "T_r".
- 4.) "w" AND "T", REINFORCEMENT PLATE DIMENSIONS FOR OUTLET JOINTS, TO BE DESIGNED PER AWWA MII, 13.3-13.6, OR EQUAL TO MANUFACTURERS REINFORCING GUIDE.
- 5.) "T_y" = MAINLINE CYLINDER THICKNESS.
- 6.) "T_r" = REQUIRED MAINLINE CYLINDER THICKNESS.
- 7.) "t_y" = BRANCH CYLINDER THICKNESS.
- 8.) "t_r" = REQUIRED BRANCH CYLINDER THICKNESS.
- 9.) "L" = $\frac{\text{NOMINAL DIA}}{2} + 12"$

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL FLANGED TANGENT OUTLET
4" THROUGH 12" DIAMETER

0	DRAWN WEF	DATE 10-09	CHECK	APPROV. <i>AS</i>	1	DRAWN	DATE	CHECK	APPROV.	2	DRAWN	DATE	CHECK	APPROV.	3	DRAWN	DATE	CHECK	APPROV.
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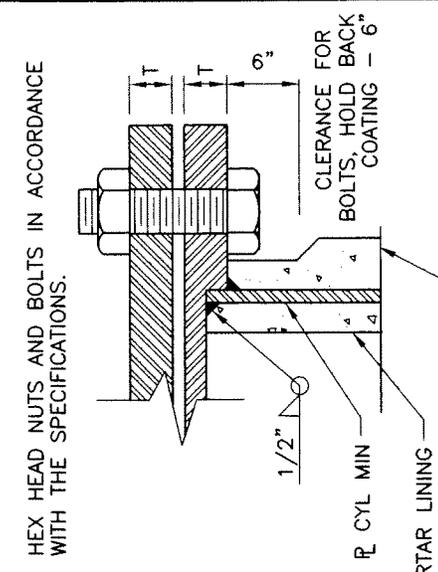
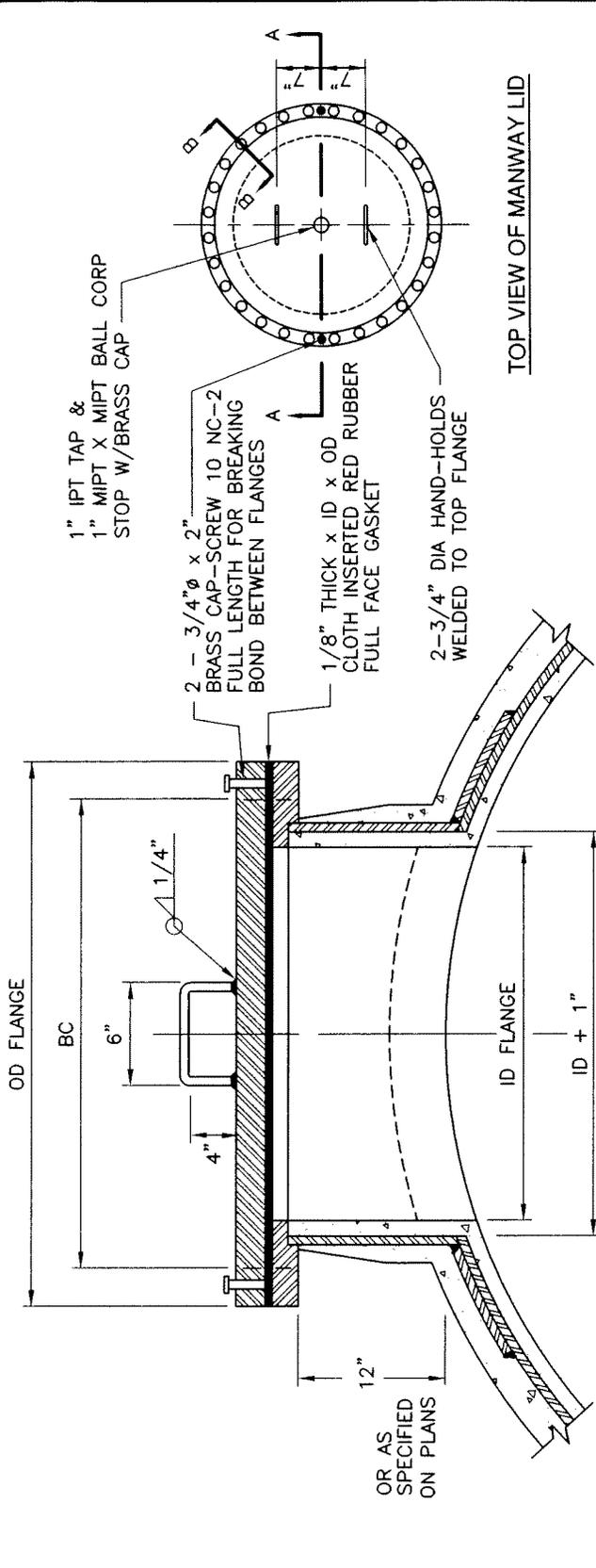
CROSS-SECTION OF OUTLET

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL THREADED OUTLET
1" THRU 2 1/2" DIAMETER



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NOTES:

- 1.) PAINT ALL EXPOSED INTERIOR & EXTERIOR METAL SURFACES OF FLANGES, EXCEPT GASKET SURFACE, PER SPECIFICATIONS.
- 2.) 150 LB. HUB FLANGES SHALL BE USED IF WORKING PRESSURE 175 PSI OR LESS, 300 LB. FLANGES SHALL BE USED IF WORKING PRESSURE OVER 175 PSI.
- 3.) REINFORCE MANWAY IN ACCORDANCE WITH AWWA M11 OR EQUAL, MANUFACTURER'S REINFORCING GUIDE.
- 4.) MANWAY STATIONS MAY BE VARIED IN ORDER TO LOCATE THE 24" DIA OPENING @ MIDPOINT IN INDIVIDUAL PIPE LENGTHS THUS PERMITTING THE MANUFACTURE OF A UNIVERSAL PIPE LENGTH.
- 5.) PAINT UNDERSIDE OF BLIND FLANGE WITH EPOXY PER SPECIFICATIONS.
- 6.) REINFORCEMENT PLATE DIMENSIONS FOR OUTLET JOINTS, TO BE DESIGNED PER AWWA M11, 13.3 - 13.6, OR EQUAL TO MANUFACTURERS R/F GUIDE. 1/2" CEMENT MORTAR LINING

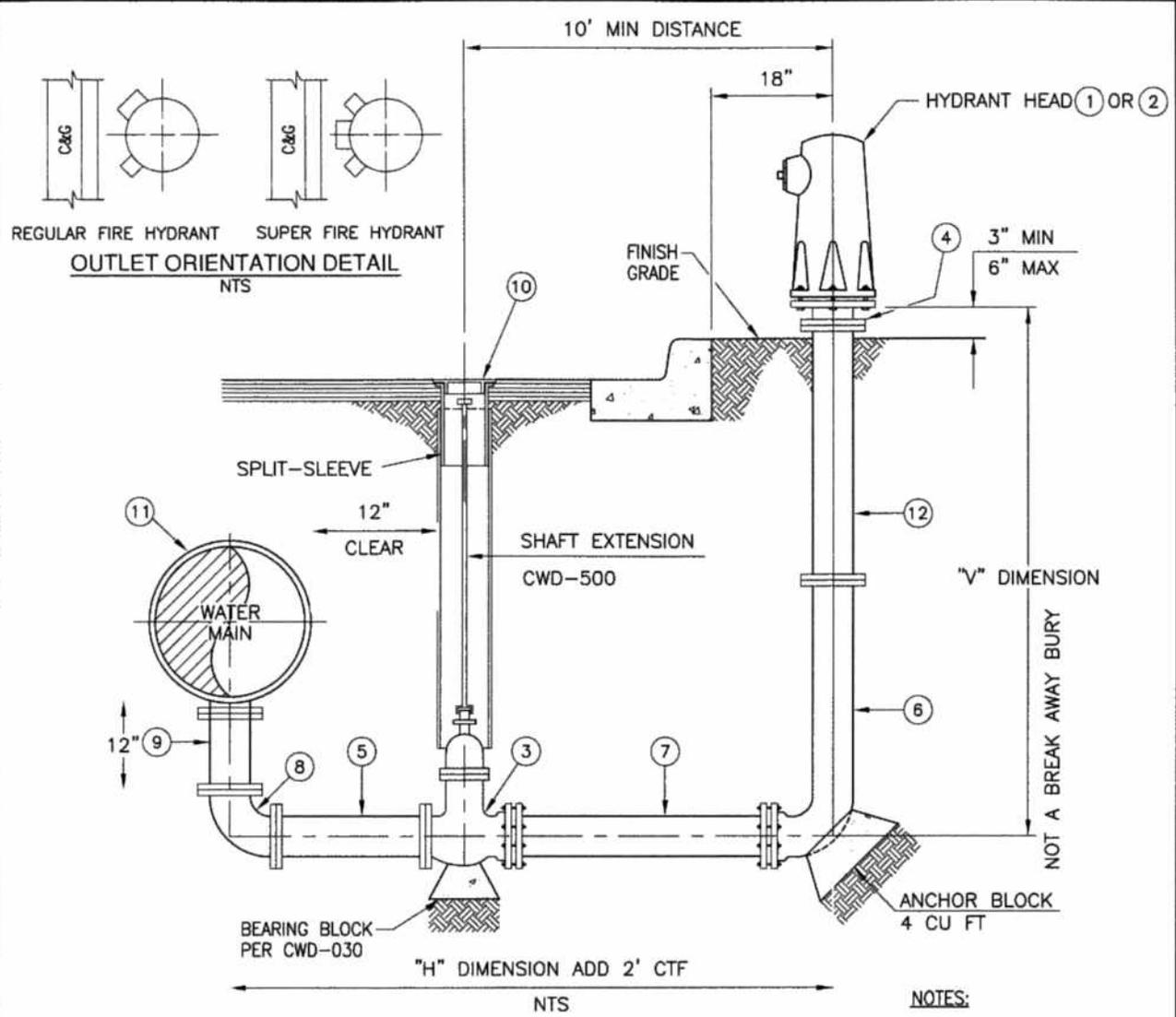
ID	FLANGE OD	BC	T	BOLT DIA	NO. BOLTS	PIPE SIZE
24"	32"	29 1/2"	1 1/4"	1 1/4"	20	24" TO 30"
30"	38 3/4"	36"	1 3/8"	1 1/4"	28	36" & LARGER

5/8" CEMENT MORTAR COATING
 CROSS SECTION OF BOLT ASSEMBLY B-B

WATER DISTRIBUTION & TRANSMISSION CONSTRUCTION METHODS

TYPICAL MANWAY FOR LARGE PIPELINES

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 DATE 10-09
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 CHECK
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 DRAWN 2
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 DRAWN 3
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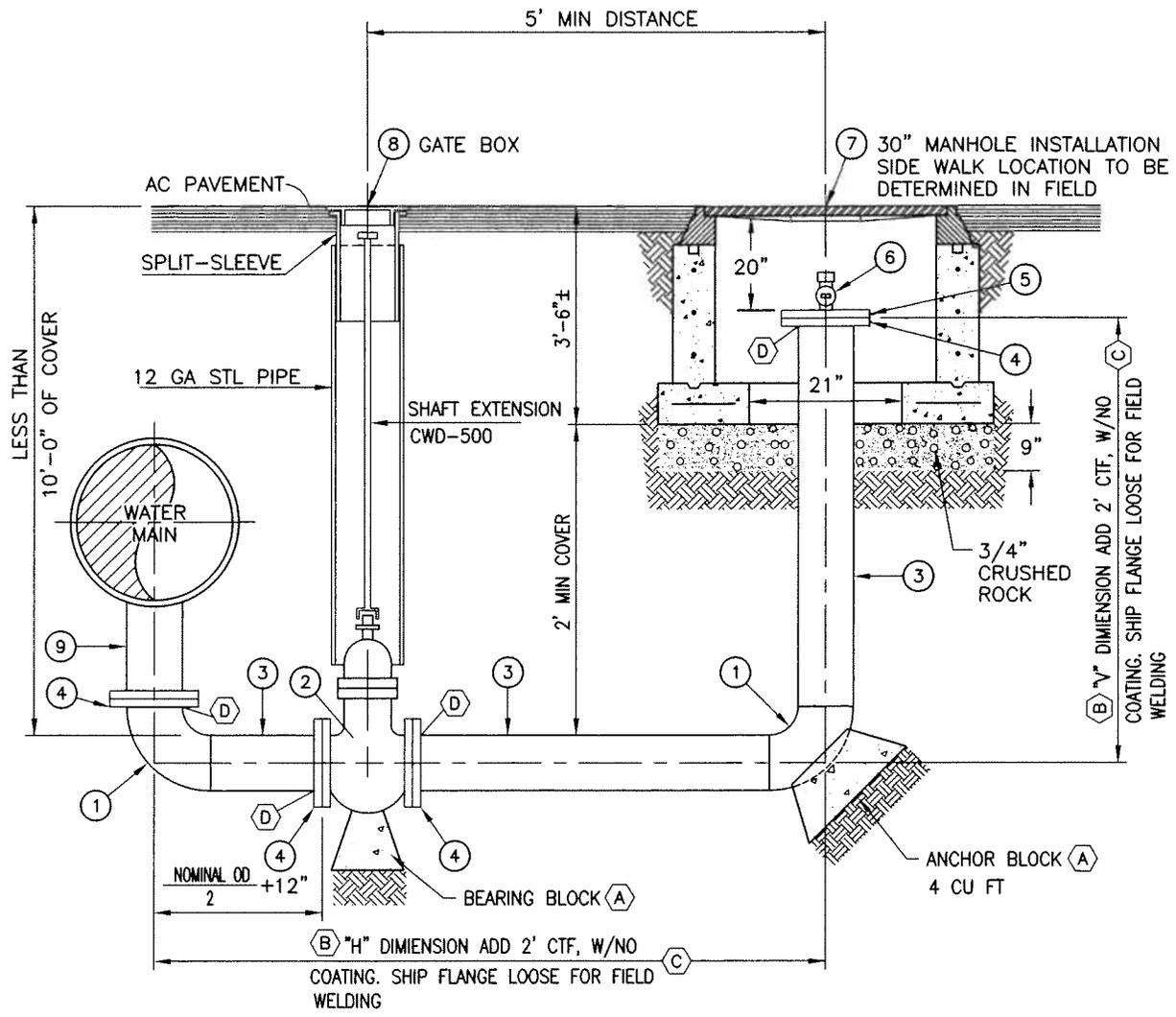
BILL OF MATERIALS		
ITEM	QUANTITY	REFERENCE
① STANDARD HYDRANT : 1 - 2 1/2", 1 - 4"	1	CWD-700
② SUPER HYDRANT : 2 - 2 1/2", 1 - 4"	1	CWD-700
③ 6" FLG x MJ RW GATE VALVE	1	CWD-500
④ 6" x 4" FLANGED ADAPTER, 8 HOLE TO 6 HOLE	1	
⑤ 6" x 18" DI SPOOL FLG x FLG AS REQUIRED		
⑥ 6" x 48" DI BURY FLG x MJ	1	
⑦ 6" DI PIPE AS REQUIRED (W/RESTRAINED MJ ADAPTORS)		
⑧ 6" DI FLANGED 90° ELL (LONG RADIUS)	1	
⑨ 6" x 12" DI SPOOL FLG x FLG AS REQUIRED		
⑩ 8" GATE BOX CAP, GALV SPLIT-SLEEVE, 12 GA STL PIPE	1	CWD-515
⑪ 6" FLANGED TEE; MAINLINE X 6" TEE W/FL	1	
⑫ 6" X REQUIRED DI PIPE FL X FL W/ APPROVED RESTRAINT SYSTEM FLANGE ADAPTOR	2	

- NOTES:**
- STANDARD OR SUPER HYDRANT PER PLANS AND SPECIFICATIONS.
 - BREAK-OFF BOLTS REQUIRED BETWEEN HYDRANT AND FLANGE. INSTALL PER SPECIFICATIONS.
 - HYDRANT HEAD OUTLETS SHALL FACE STREET.
 - TOP OF HYDRANT HEAD BLOW-OFF TO BE PAINTED BLUE #315-15 BY FULLER O'BRIEN CO. OR DEPARTMENT APPROVED EQUAL.
 - "H" AND "V" DIMENSION AS SHOWN ON PLAN.
 - BREAKAWAY SPOOLS OR BURY ARE NOT ALLOWED.

WATER
 DISTRIBUTION & TRANSMISSION
 CONSTRUCTION METHODS

**6" HYDRANT HEAD BLOW-OFF
 DI BURY
 24" MAIN AND SMALLER**

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DATE	10-09	DATE		DATE		DATE		DATE	
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APPROV.	ALS	APPROV.		APPROV.		APPROV.		APPROV.	



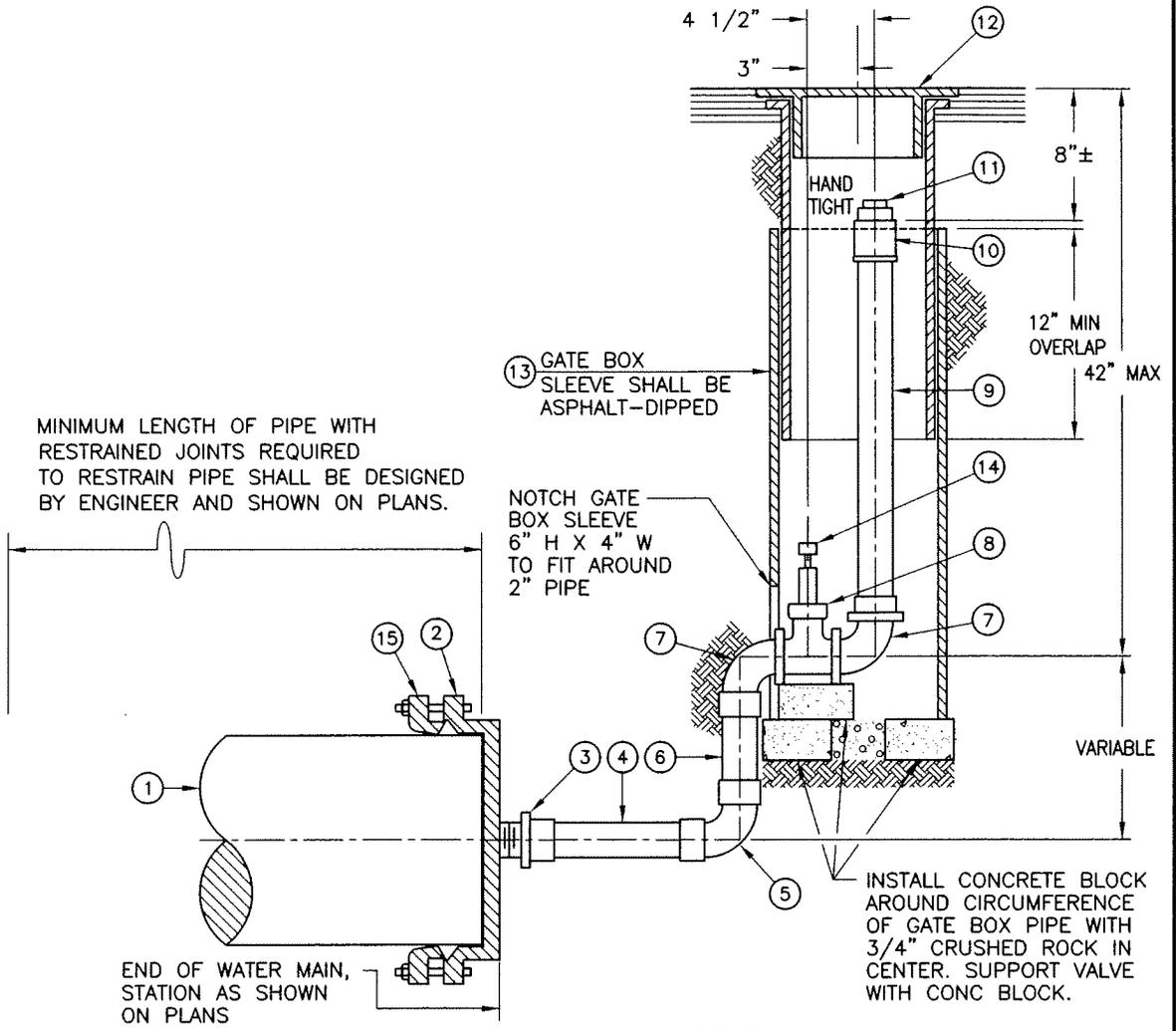
BILL OF MATERIALS		
ITEM	QUANTITY	REFERENCE
① 8" 90° ELL	2	
② 8" FLANGED RW GATE VALVE	1	CWD-500
③ 8" ML&C STL PIPE 10 GA, 8 5/8" OD 1/2" CML, 3/4" CMC	VARIES	
④ 8" SLIP-ON WELDED FLANGE	4	
⑤ 8" BLIND FLANGE W/ 1" IPT TAP	1	
⑥ 1" MIPT X MIPT BALL CORP STOP & 1" BRASS CAP	1	
⑦ 30" MANHOLE COVER & RIM 30" ID CONC MANHOLE SECTION	VARIES	CWD-811
⑧ 8" GATE BOX CAP, GALV SPLIT-SLEEVE, AND 12 GA STL PIPE	VARIES	CWD-515
⑨ 8" FLANGED OUTLET	1	CWD-300

- NOTES:**
- Ⓐ ANCHOR AND BEARING BLOCKS PER CWD-030
 - Ⓑ STATION, LOCATION, AND SPECIAL NOTES PER PLAN AND PROFILE SHEETS
 - Ⓒ WELD ALL PIPE JOINTS 360°
 - Ⓓ HOLD BACK COATING 6"

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

**8" BLOW-OFF
BELOW GRADE
WITH LESS THAN 10' OF COVER**

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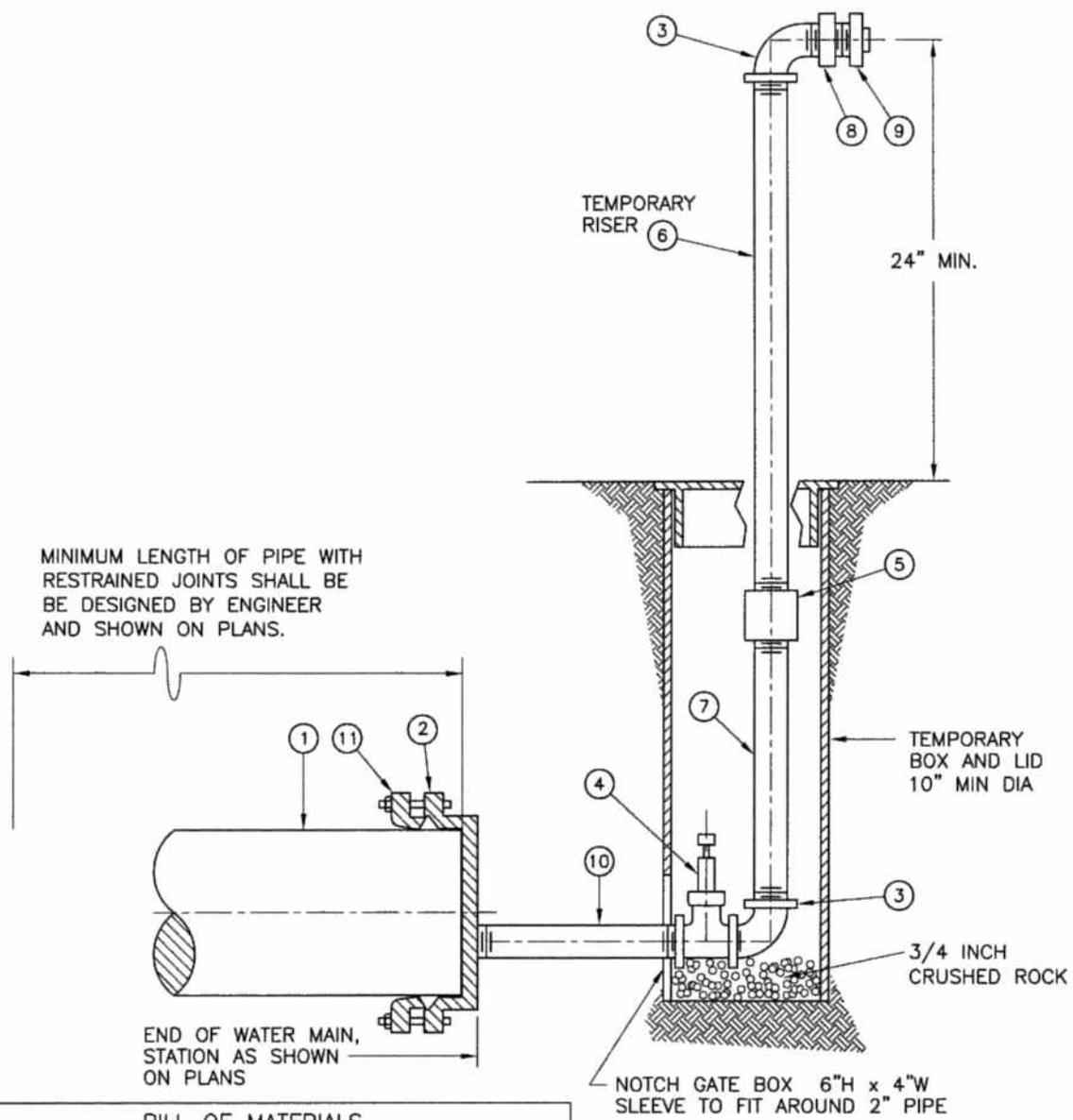


BILL OF MATERIALS		
ITEM	QUANTITY	REFERENCE
① 4" THROUGH 12" MAIN	1	PER PLAN
② MAIN SIZE MJ CAP WITH 2" TAP IPF	1	PER PLAN
③ 2" ADAPTER IPM x SW	1	
④ 2" X 12" COPPER PIPE, SOFT	1	
⑤ 2" 90° ELL SW x SW	1	
⑥ 2" COPPER PIPE, HARD DRAWN	VARIES	
⑦ 2" 90° BRASS ELL IPM x SW	2	
⑧ 2" BRONZE VALVE, FIPT, PER SPEC	1	
⑨ 2" COPPER PIPE, HARD (NO JOINTS)	VARIES	
⑩ 2" ADAPTER SW x IPF	1	
⑪ 2" BRASS PLUG IPM	1	
⑫ 10" GATE BOX CAP & SPLIT SLEEVE	1	CWD-515
⑬ 10" DIA STEEL SLEEVE (VARIES)	VARIES	
⑭ 1" SQ NUT FOR 2" VALVE AS REQUIRED	1	SUPPLIED BY CITY
⑮ MAIN SIZE GRIP RING KIT	1	

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL 2" BLOW-OFF ASSEMBLY
FOR MAINS WITH MORE THAN
42" OF COVER

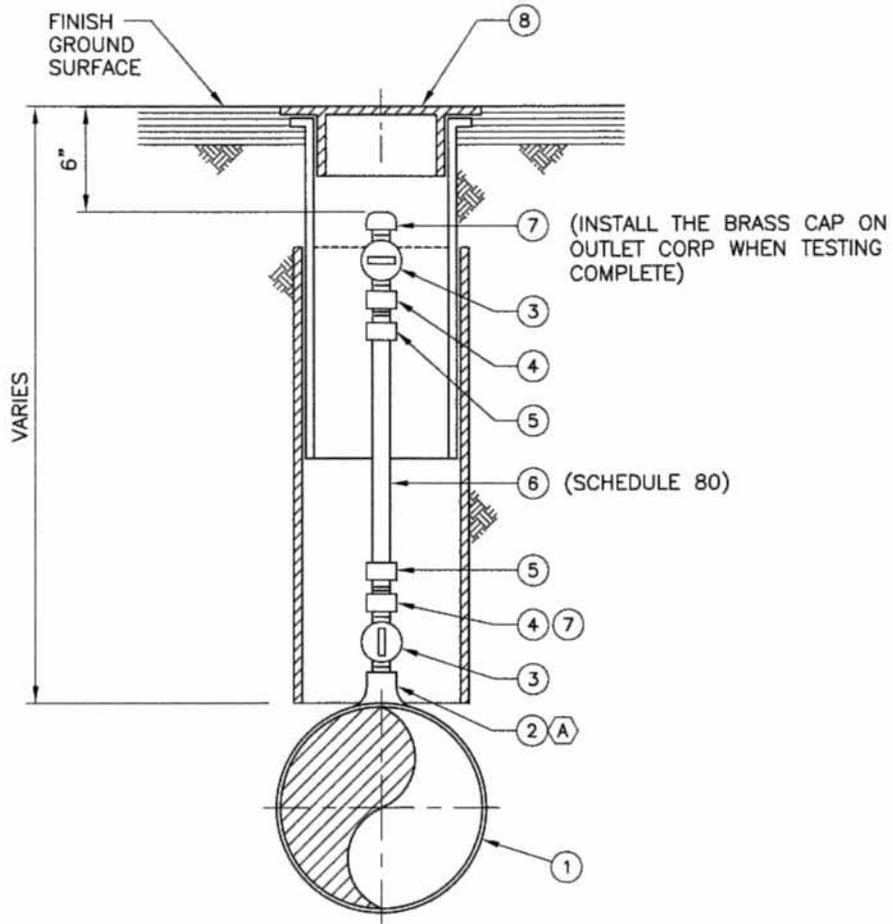
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0	1	10-09	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1



BILL OF MATERIALS	
	QUANTITY
① 4" THROUGH 10" WATER MAIN	PER PLAN
② MJ END CAP WITH 2" TAP	1
③ 2" GALV 90° STREET ELL (IPT)	2
④ 2" GATE (IPT)	1
⑤ 2" GALV COUPLING (IPT)	1
⑥ 2" x 30"± GALV PIPE (IPT)	1
⑦ 2" x 24"± GALV PIPE (IPT)	1
⑧ 2" IPF x 2 1/2" MHT BUSHING	1
⑨ 2 1/2" HOSE CAP	1
⑩ 2" x 12"± GALV NIPPLE (IPT)	1
⑪ MAIN SIZE GRIP RING KIT	1

NOTES:
 1.) CONTRACTOR SHALL LEAVE END CAP IN PLACE UNTIL FINAL CONNECTION BY CITY FORCES

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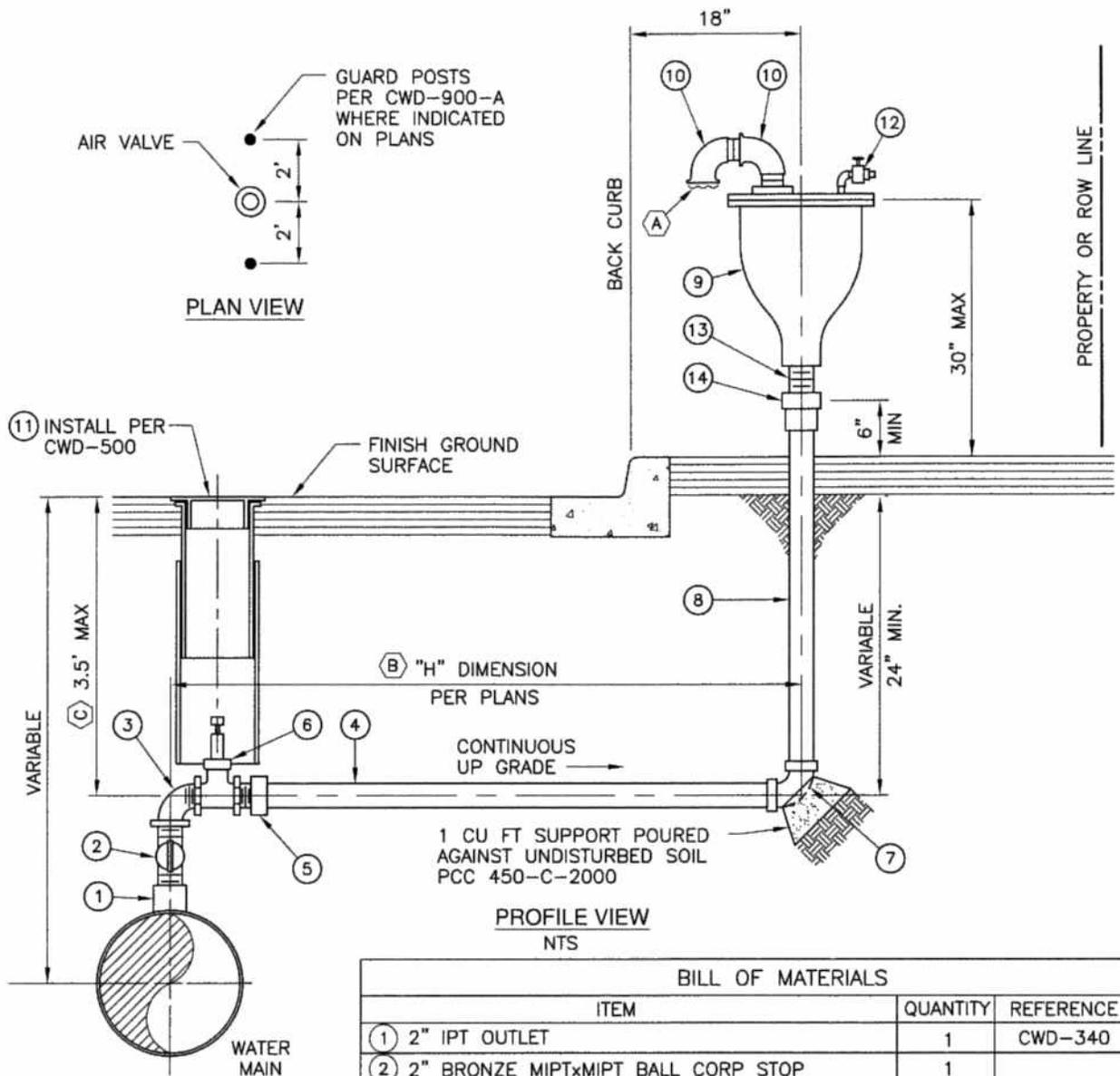
BILL OF MATERIALS		
	QUANTITY	REF
① ML&C STEEL OR DIP WATER MAIN	PER PLAN	
② 1" THREADED OUTLET	1	CWD-340
③ 1" MIPT x MIPT BALL CORP STOP	2	
④ 1" GALV STEEL COUPLING	2	
⑤ 1" PVC ADAPTER	2	
⑥ 1" PVC PIPE	VARIES	
⑦ 1" BRASS CAP	1	
⑧ 10" GATE BOX AND SPLIT-SLEEVE	1	CWD-515

- NOTES:**
- CONTRACTOR SHALL REMOVE VALVE BOX, CLOSE AND CAP 1" BALL CORP STOP AND REMOVE PVC RISER FOLLOWING ACCEPTANCE OF THE TRANSMISSION MAIN.
 - STATION, LOCATION AND SPECIAL NOTES PER PLAN AND PROFILE SHEETS.
- (A) DOUBLE-STRAP SERVICE SADDLES SHALL BE USED ON ALL DIP CONNECTIONS

WATER
 DISTRIBUTION & TRANSMISSION
 CONSTRUCTION METHODS

TEMPORARY
 WATER SAMPLER

APPROV.	DATE	CHECK	APPROV.	DATE	CHECK	APPROV.	DATE	CHECK	APPROV.	DATE	CHECK	APPROV.	DATE	CHECK	APPROV.
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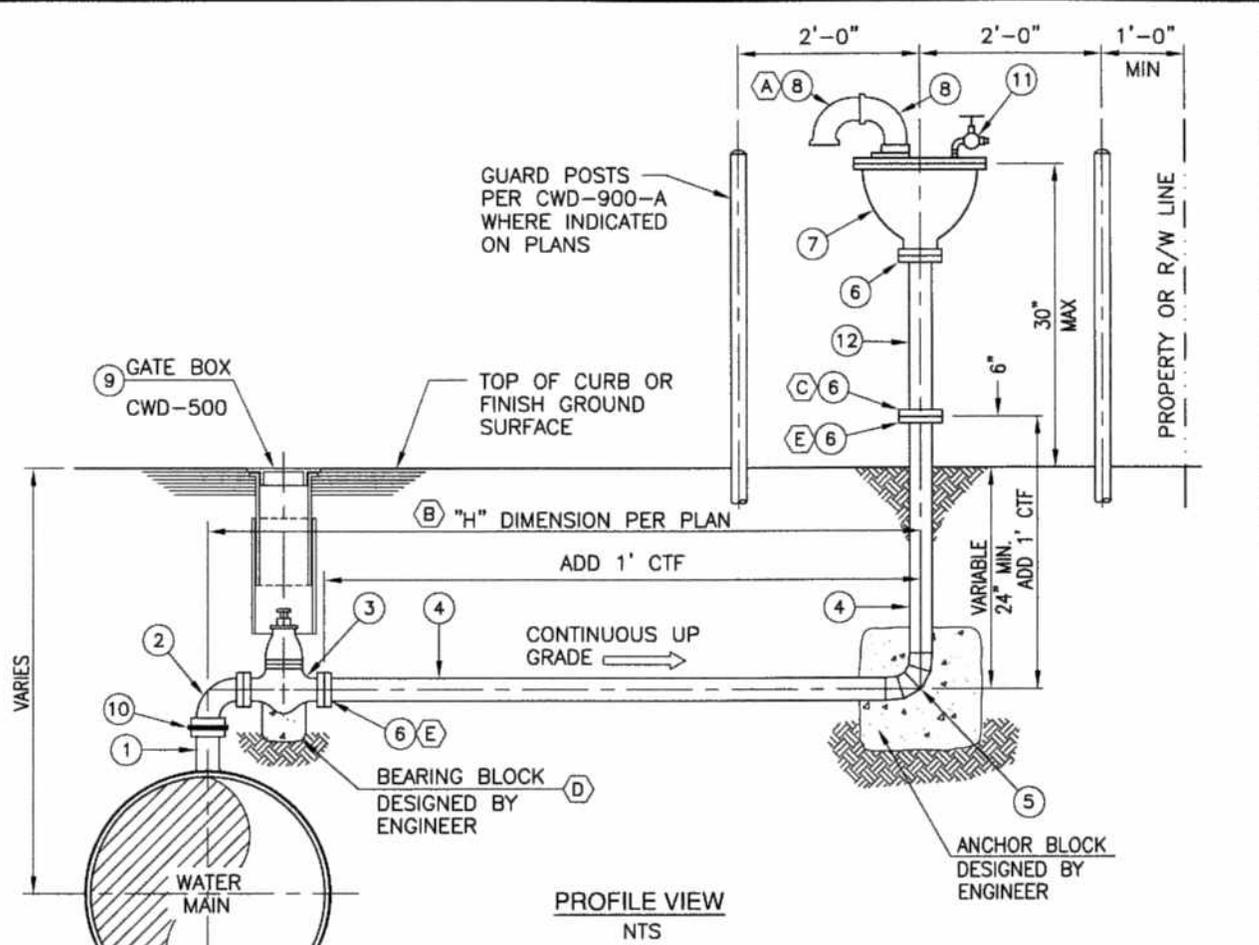
- NOTES:**
- (A) A 1/8" SQ MESH GALVANIZED SCREEN SHALL BE EPOXIED FLAT INTO OPEN ST ELL.
 - (B) STATION, LOCATION, AND SPECIAL NOTES PER PLAN AND PROFILE SHEETS.
 - (C) USE 2" COPPER PIPE BETWEEN CORP STOP AND ELL TO ADJUST DEPTH - IF NEEDED.
 - (D) DOUBLE-STRAP SERVICE SADDLES SHALL BE USED ON ALL DIP CONNECTIONS.

BILL OF MATERIALS		
ITEM	QUANTITY	REFERENCE
① 2" IPT OUTLET	1	CWD-340
② 2" BRONZE MIPTxMIPT BALL CORP STOP	1	
③ 2" BRASS STREET ELL	1	
④ 2" TYPE K COPPER PIPE (SOFT)	VARIABLE	
⑤ 2" SW x IPM BRONZE ADAPTER	1	
⑥ 2" RW GATE VALVE	1	
⑦ 2" SW x SW 90° ELL	1	
⑧ 2" HARD DRAWN COPPER PIPE, TYPE K	VARIABLE	
⑨ 2" UNIVERSAL AIR VALVE	1	
⑩ 2" GALV STREET ELL	2	
⑪ 8" GATE VALVE CAP, GALV SPLIT SLEEVE, & 12 GA STL PIPE	1	CWD-500
⑫ 1/4" BRASS GATE VALVE, 1/4" BRASS PLUG, 1/4" x 2" BRASS NIPPLE, 1/4" BRASS STREET ELL	1 EA	
⑬ 2"ø x 6" NIPPLE	1 EA	
⑭ 2" SW x IPF BRONZE ADAPTER	1 EA	

WATER DISTRIBUTION & TRANSMISSION CONSTRUCTION METHODS

TYPICAL 2" AIR VALVE INSTALLATION

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DATE	10-09
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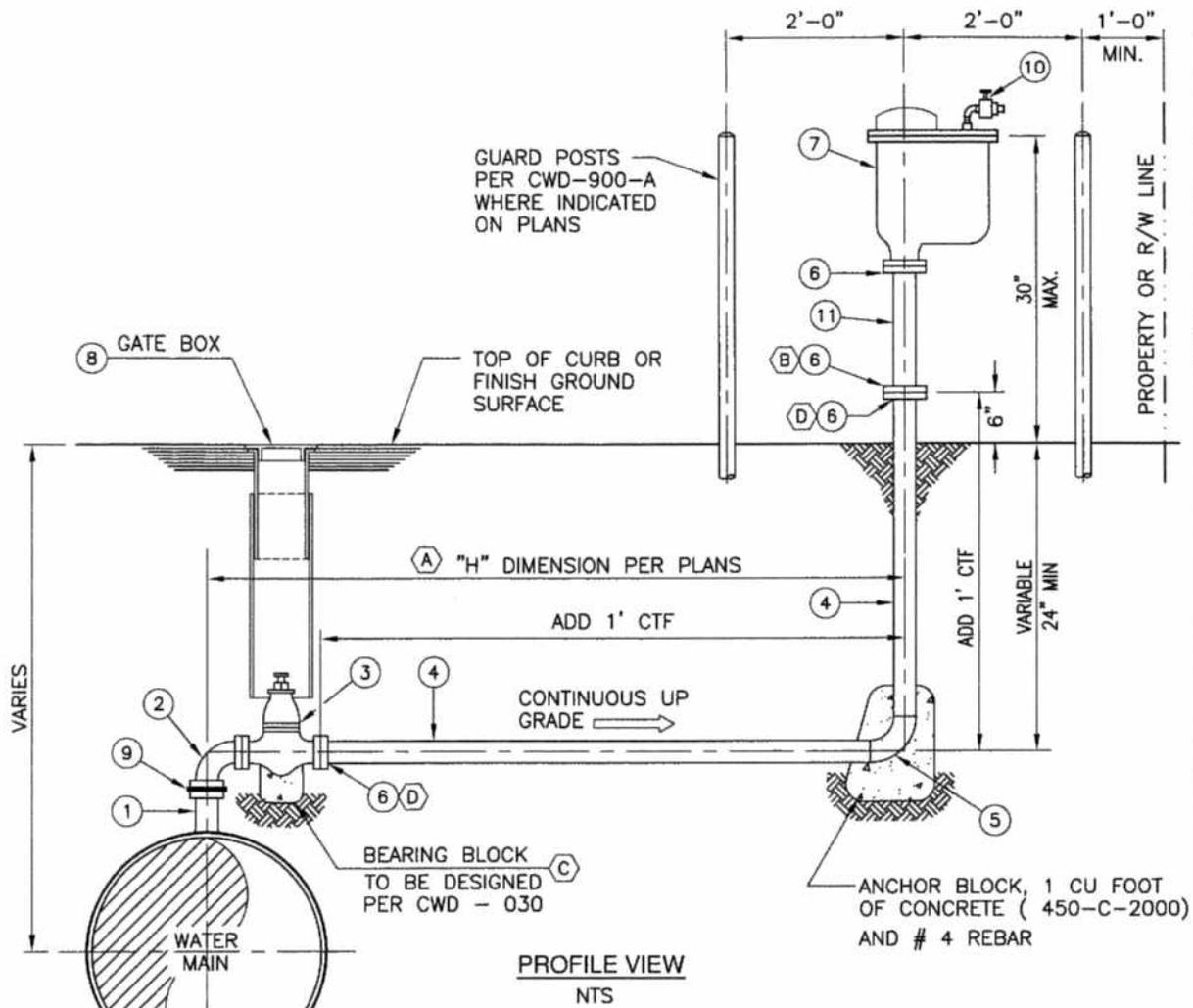
- NOTES:**
- (A) A 1/8" SQ. MESH, GALVANIZED SCREEN, SHALL BE EPOXIED INTO OPEN STREET ELL.
 - (B) STATION, LOCATION, AND SPECIAL NOTES PER PLAN AND PROFILE SHEETS.
 - (C) BREAK-OFF BOLTS, CADMIUM-PLATED OR GALVANIZED. INSTALL WITH NUT ON TOP AND COUNTER-BORE, PACKED WITH SILICONE.
 - (D) BEARING BLOCK SHALL NOT REST ON MAIN AND SHALL BE NOTCHED ON BOTH SIDES PER CWD-500
 - (E) HOLD BACK COATING 6"

BILL OF MATERIALS		
ITEM	QUANTITY	REFERENCE
(1) 4" FLANGED OUTLET	1	CWD-300
(2) 4" 90° ELL F/F	1	
(3) 4" RW GATE VALVE F/F	1	
(4) 4" ML&C STL PIPE, 10 GA 4" ID, 5/16" CML, 3/4" CMC	VARIABLE	
(5) 4" - 4 PC 90° ELL (WELD)	1	
(6) 4" WELD FLANGE, SHIP LOOSE	3	
(7) 4" UNIVERSAL AIR VALVE	1	
(8) 4" GALV STREET ELL	2	
(9) 8" GATE BOX CAP, GALV SPLIT-SLEEVE, AND 12 GA STL PIPE	1	CWD-500
(10) FLANGE INSULATION KIT AS REQUIRED PER SPECIFICATIONS	1	
(11) 1/2" BRASS GV 1/2" x 2" BRASS NIPPLE, 1/2" BRASS STREET ELL, & 1/2" BRASS PLUG	1	
(12) 4" DIA X 12" STL SPOOL, PE X PE, ML & NO COATING	1	

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL 4" AIR VALVE
INSTALLATION

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NOTES:

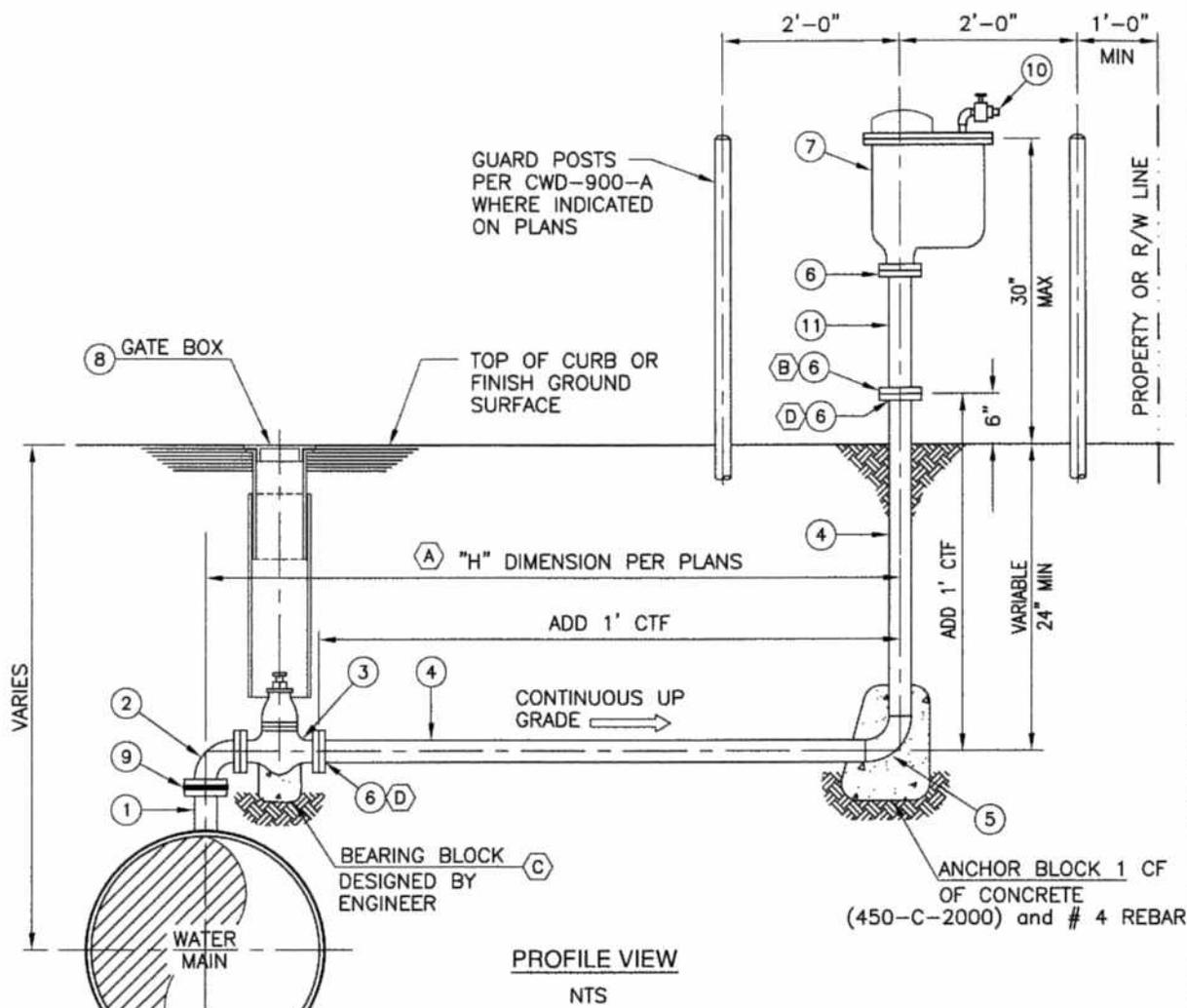
- (A) STATION, LOCATION, AND SPECIAL NOTES PER PLAN AND PROFILE SHEETS.
- (B) BREAK-OFF BOLTS, CADMIUM-PLATED OR GALVANIZED. INSTALL WITH NUT ON TOP AND COUNTER-BORE, PACKED WITH SILICONE.
- (C) BEARING BLOCK SHALL NOT REST ON MAIN AND SHALL BE NOTCHED ON BOTH SIDES PER CWD-500
- (D) HOLD BACK COATING 18"

BILL OF MATERIALS		
ITEM	QUANTITY	REFERENCE
(1) 6" FLANGED OUTLET	1	CWD-300
(2) 6" 90° ELL F/F	1	
(3) 6" RW GATE VALVE F/F	1	CWD-500
(4) 6" ML&C STL PIPE, 10 GA 6" ID, 5/16" CML, 3/4" CMC	VARIABLE	
(5) 6" - 90° WELD ELL	1	
(6) 6" WELD FLANGE, SHIP FLG LOOSE	6	
(7) 6" COMBINATION AIR VALVE, PER SPEC	1	
(8) 8" GATE BOX CAP, GALV SPLIT-SLEEVE, AND 12 GA STL PIPE	1	CWD-515
(9) FLANGE INSULATION KIT AS REQUIRED PER SPECIFICATIONS	1	
(10) 1/2" BRASS GV, 1/2" x 2" BRASS NIPPLE, 1/2" BRASS STREET ELL, 1/2" BRASS PLUG	1 EA	
(11) 6" DIA X 12" STL SPOOL, PE X PE, ML & NO COATING	1	

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL 6" AIR VALVE
INSTALLATION

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APPROV.	2	CHECK	APPROV.	2	CHECK	APPROV.	2	CHECK	APPROV.	2	
DATE		DATE		DATE		DATE		DATE		DATE	
DRAWN		DRAWN		DRAWN		DRAWN		DRAWN		DRAWN	
APPROV.	1	CHECK	APPROV.	1	CHECK	APPROV.	1	CHECK	APPROV.	1	
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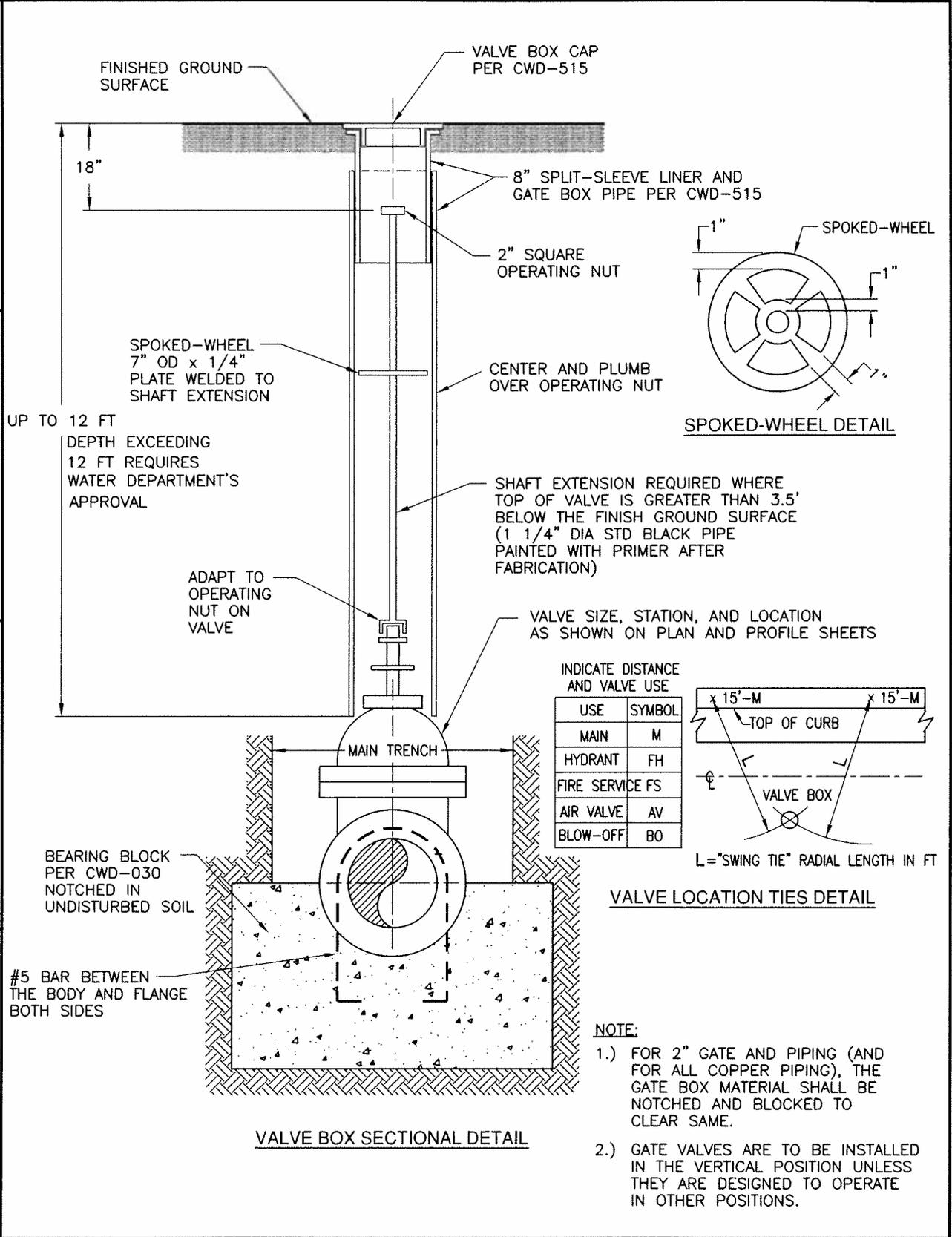
- NOTES:**
- (A) STATION, LOCATION, AND SPECIAL NOTES PER PLAN AND PROFILE SHEETS.
 - (B) BREAK-OFF BOLTS, CADMIUM-PLATED OR GALVANIZED. INSTALL WITH NUT ON TOP AND COUNTER-BORE, PACKED WITH SILICONE.
 - (C) BEARING BLOCK SHALL NOT REST ON MAIN AND SHALL BE NOTCHED ON BOTH SIDES PER CWD-500
 - (D) HOLD BACK COATING 18".

BILL OF MATERIALS (ALL PIPE...)		
ITEM	QUANTITY	REFERENCE
(1) 8" FLANGED OUTLET	1	CWD-300
(2) 8" 90° ELL F x F	1	
(3) 8" RW GATE VALVE F x F	1	CWD-500
(4) 8" ML&C STL PIPE, 10 GA 8" ID, 5/16" CML, 3/4" CMC	VARIABLE	
(5) 8" - 90° WELD ELL	1	
(6) 8" WELD FLANGE, SHIP LOOSE	6	
(7) 8" COMBINATION AIR VALVE, PER SPEC	1	
(8) 8" GATE BOX CAP, GALV SPLIT-SLEEVE, AND 12 GA STL PIPE	1	CWD-515
(9) FLANGE INSULATION KIT AS REQUIRED PER SPECIFICATIONS	1	
(10) 1/2" BRASS GV 1/2" x 2" BRASS NIPPLE, 1/2" BRASS STREET ELL, 1/2" BRASS PLUG	1 EA	
(11) 8" DIA X 12" STL SPOOL, PE X PE, ML & NO COATING	1	

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

**TYPICAL 8" AIR VALVE
INSTALLATION**

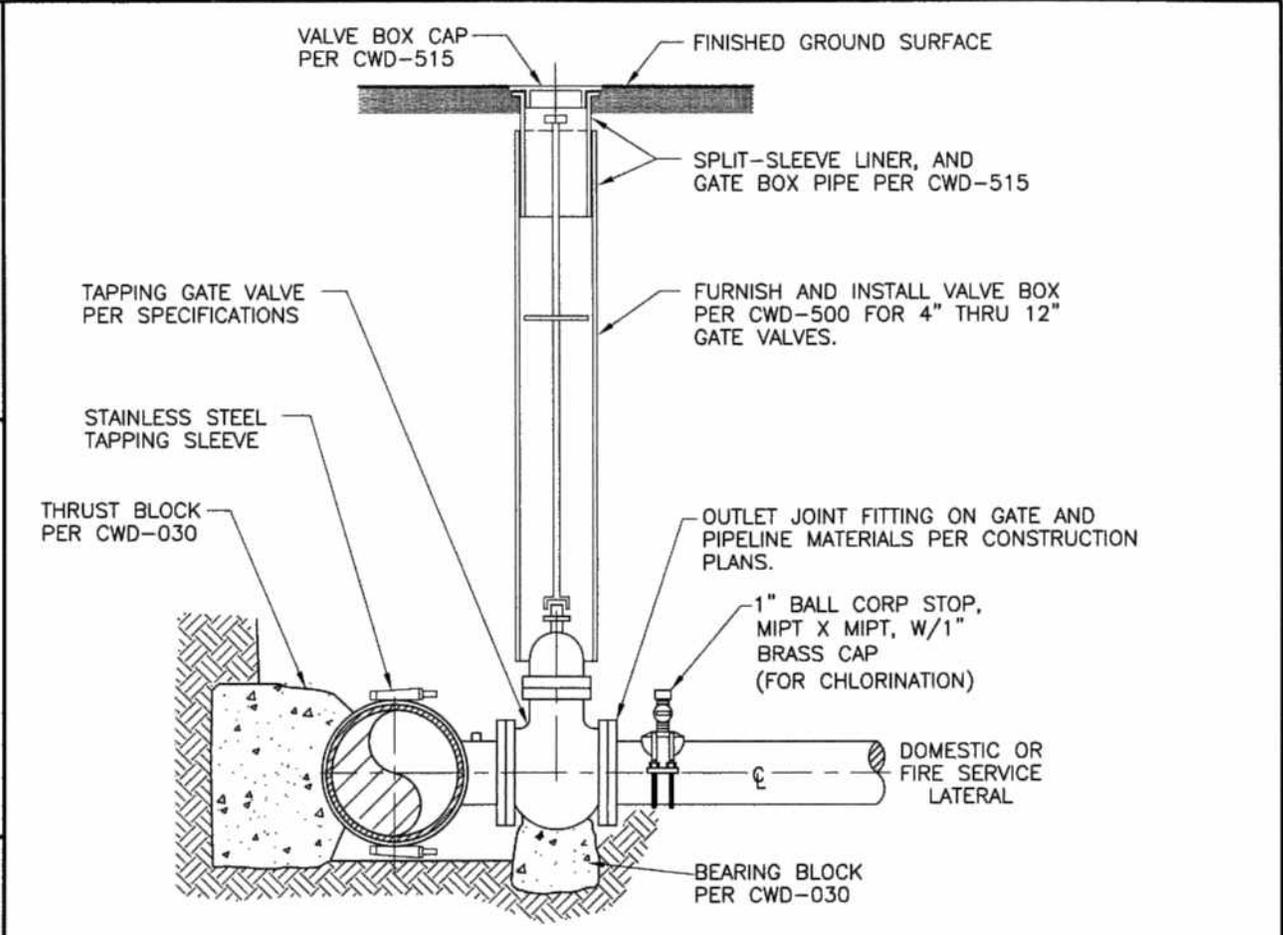
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APPROV.	
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DRAWN	2
APPROV.	
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DATE	
DRAWN	1
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DATE	10-09
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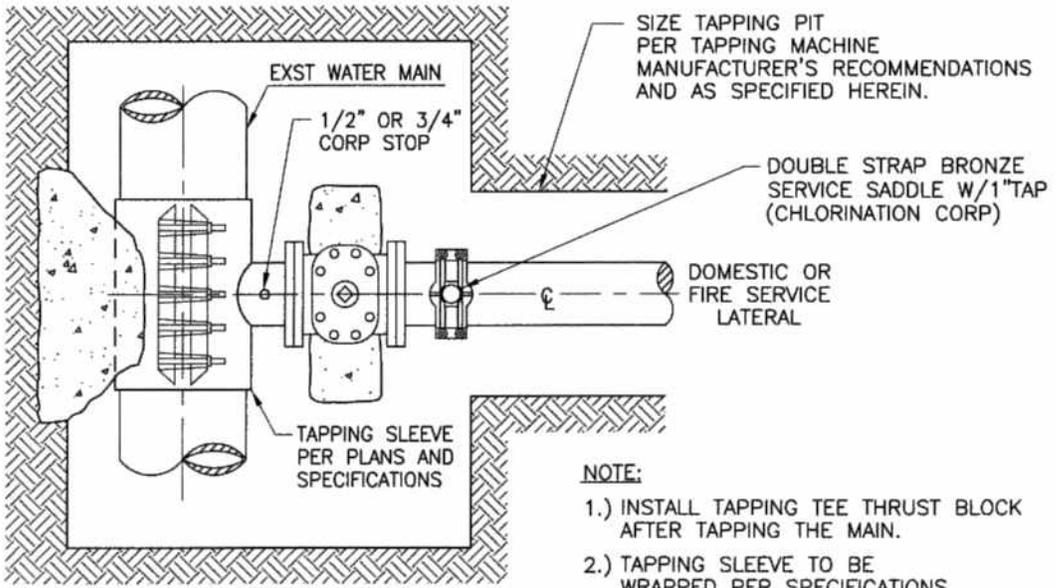
WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL VALVE BOX
FOR GATE VALVES

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SECTIONAL VIEW



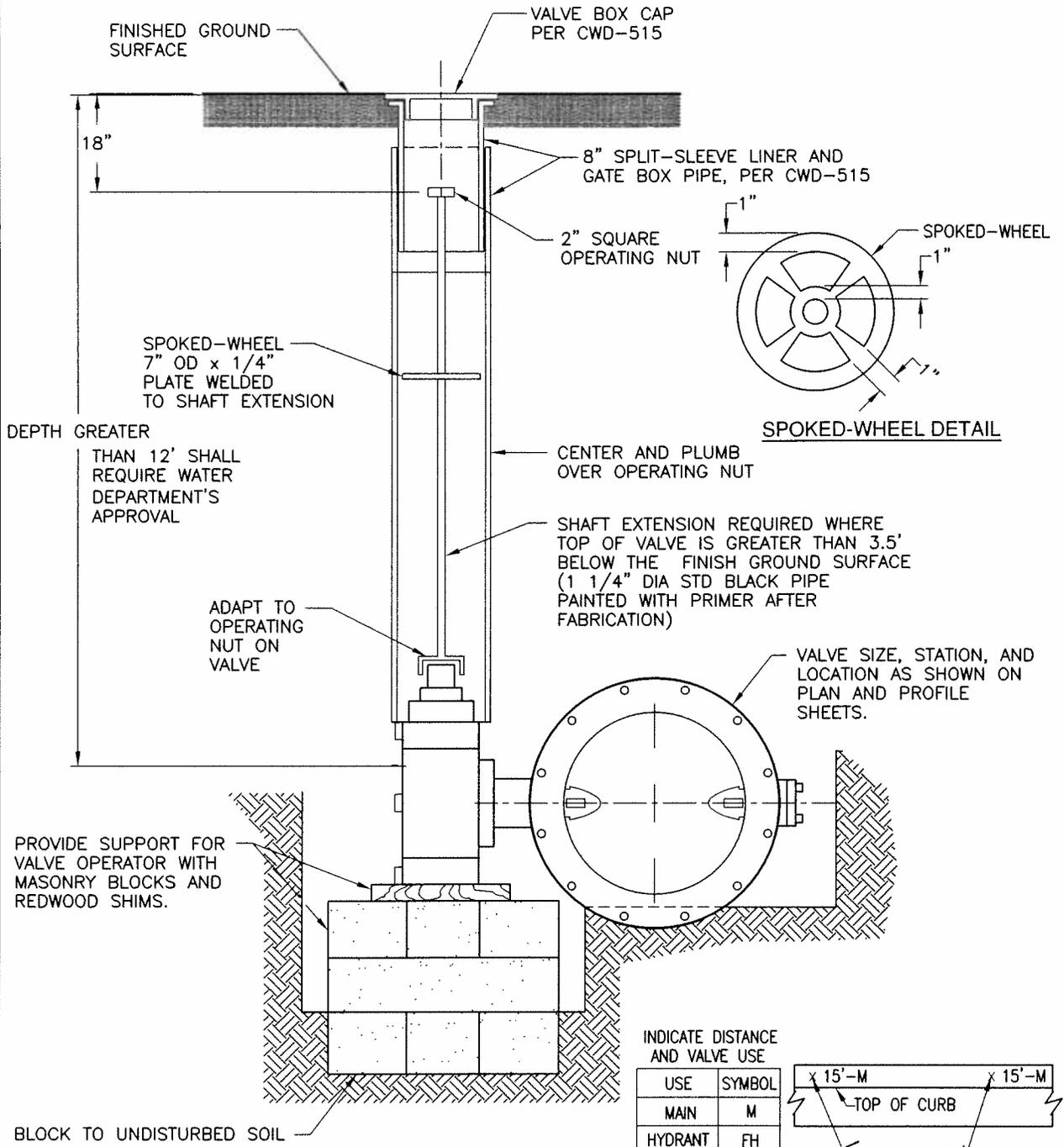
PLAN VIEW

- NOTE:**
- 1.) INSTALL TAPPING TEE THRUST BLOCK AFTER TAPPING THE MAIN.
 - 2.) TAPPING SLEEVE TO BE WRAPPED PER SPECIFICATIONS.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

**TAPPING SLEEVE AND
TAPPING VALVE DETAIL FOR
DOMESTIC AND FIRE SERVICES**

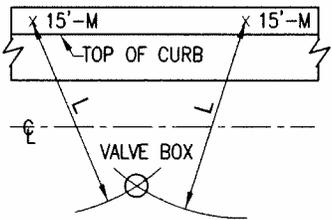
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SECTIONAL VIEW

INDICATE DISTANCE AND VALVE USE

USE	SYMBOL
MAIN	M
HYDRANT	FH
FIRE SER	FS
AIR VALVE	AV
BLOW-OFF	BO

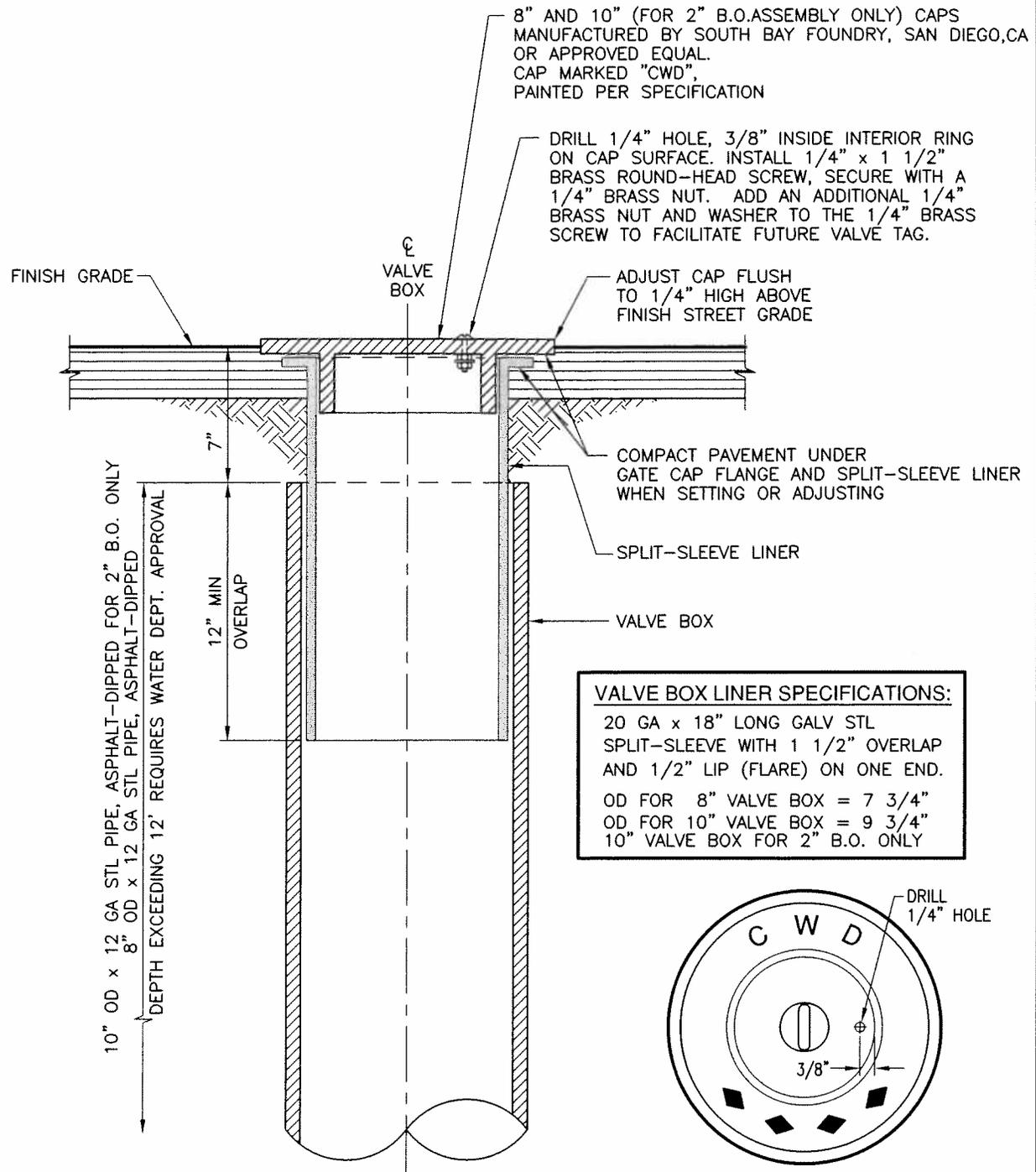


VALVE LOCATION TIES DETAIL

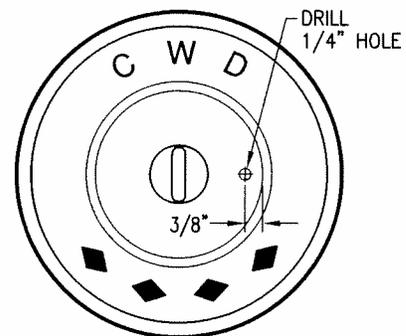
WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

**TYPICAL VALVE BOX
FOR BUTTERFLY VALVES**

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3	DRAWN		DATE		CHECK		APPROV.	



VALVE BOX LINER SPECIFICATIONS:
 20 GA x 18" LONG GALV STL
 SPLIT-SLEEVE WITH 1 1/2" OVERLAP
 AND 1/2" LIP (FLARE) ON ONE END.
 OD FOR 8" VALVE BOX = 7 3/4"
 OD FOR 10" VALVE BOX = 9 3/4"
 10" VALVE BOX FOR 2" B.O. ONLY



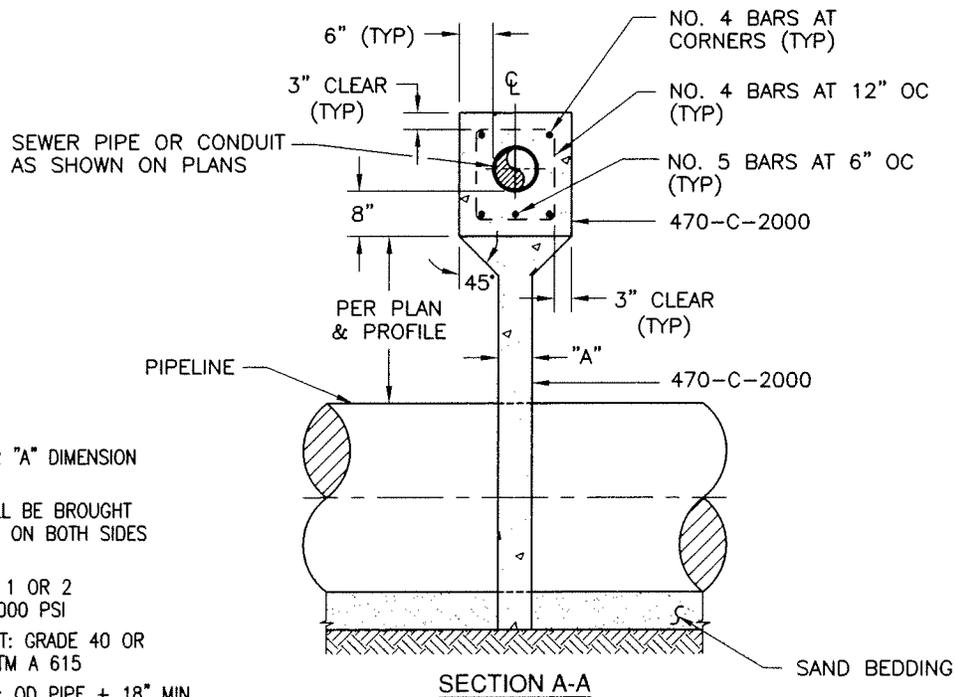
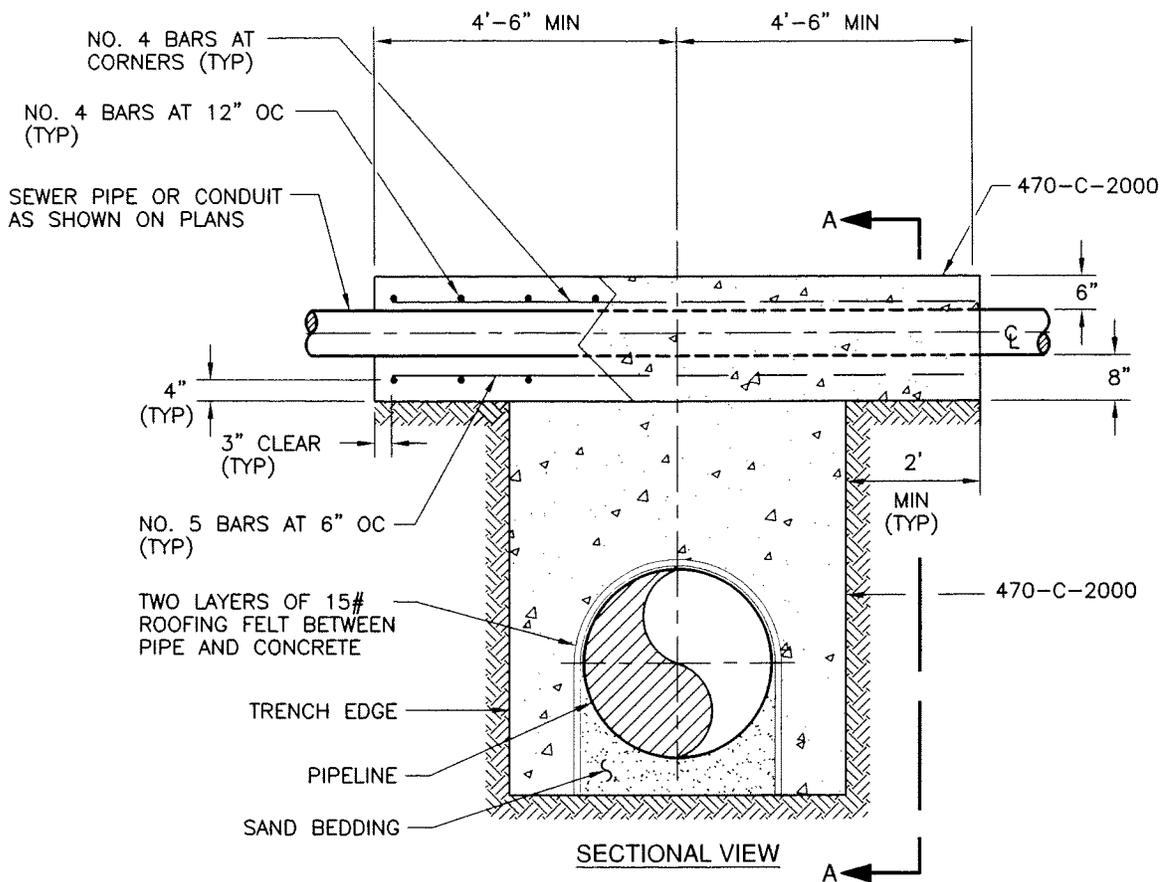
TYPICAL VALVE BOX CAP

- NOTES:**
- 1.) THIS STANDARD IS TO BE USED IN CONJUNCTION WITH STANDARD DRAWINGS CWD-500, CWD-504, AND CWD-510.

WATER
 DISTRIBUTION & TRANSMISSION
 CONSTRUCTION METHODS

TYPICAL SPLIT-SLEEVE LINER AND
 CAP FOR 8" AND 10" VALVE BOX

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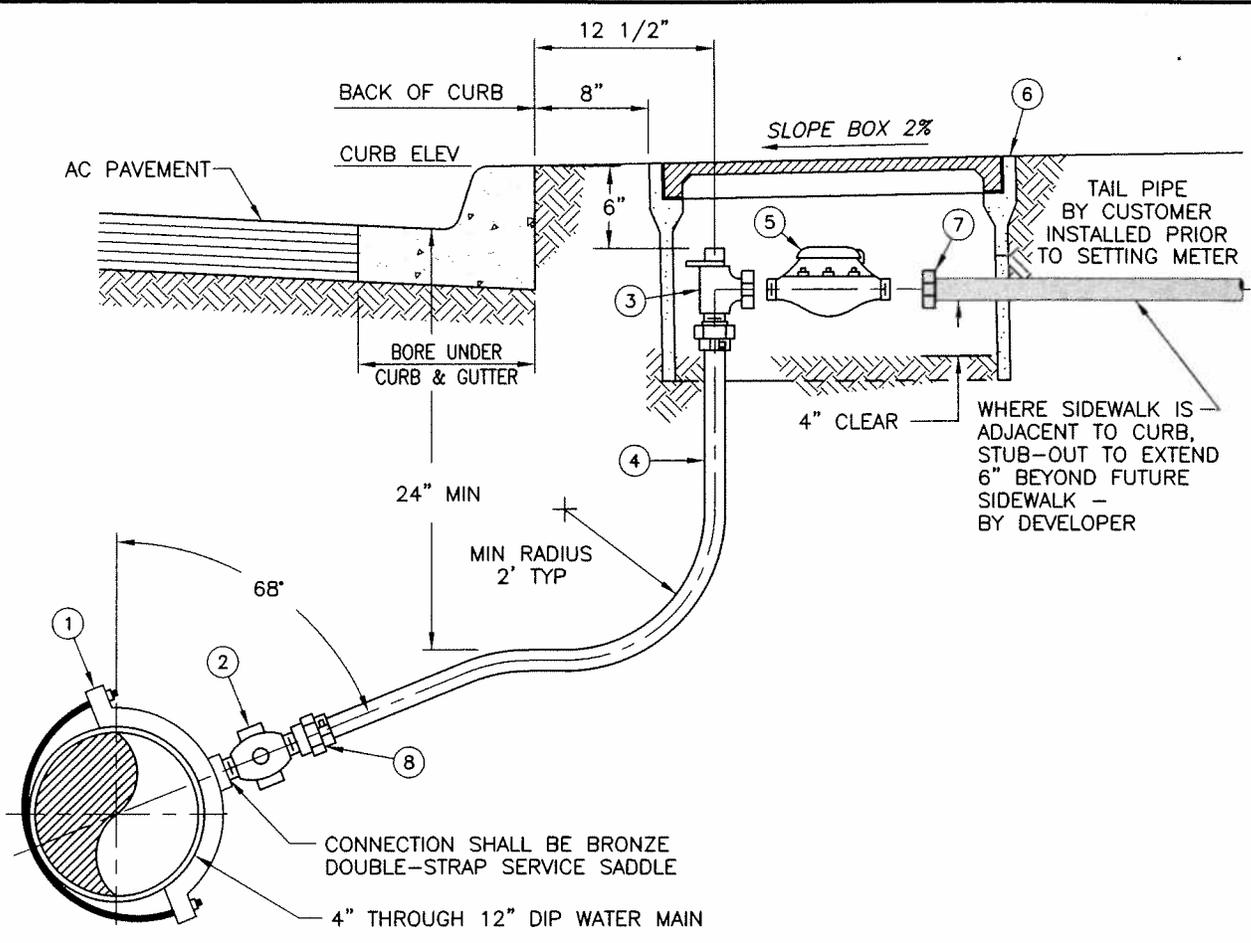
NOTES

- 1.) SEE PLAN FOR "A" DIMENSION (8" MIN)
- 2.) BACKFILL SHALL BE BROUGHT UP UNIFORMLY ON BOTH SIDES OF WALL.
- 3.) CEMENT: TYPE 1 OR 2
ASTM 5150, 2000 PSI
- 4.) REINFORCEMENT: GRADE 40 OR
GRADE 60, ASTM A 615
- 5.) TRENCH WIDTH: OD PIPE + 18" MIN

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TYPICAL CONDUIT SUPPORT

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TYPICAL STREET INSTALLATION

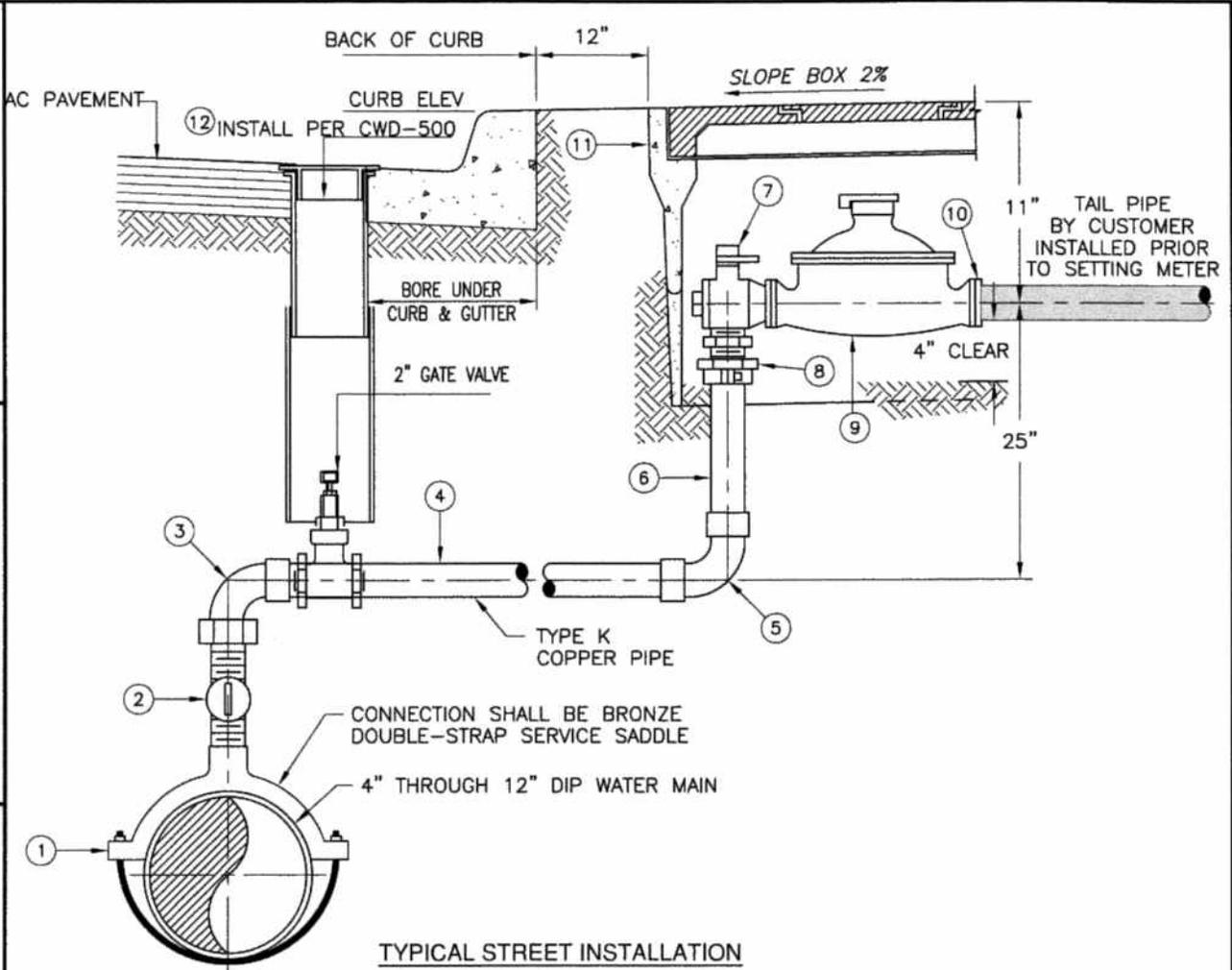
BILL OF MATERIALS	
ITEM	QUANTITY
① BRONZE DOUBLE-STRAP SERVICE SADDLE (IPT)	1
② 1" BRONZE MIPT x MIPT BALL CORP STOP	1
③ ANGLE BALL METER STOP COMPRESSION x METER COUPLING (WITH 1" x 3/4" ADAPTER FOR 3/4" METER) PER SPECIFICATIONS	1
④ 1" TUBING, SOFT COPPER, TYPE K)	VARIES
⑤ METER INSTALLED BY CITY FORCES	1
⑥ METER BOX PER SPECIFICATIONS AND/OR PLANS.	1
⑦ 1" OR 3/4" COUPLINGS	1
⑧ 1" FIPT x COMPRESSION ADAPTOR	1

- NOTES:**
- METER BOX COVER TO BE CAST IRON WHERE BOX IS IN ALLEY OR DRIVEWAY.
 - CONTRACTOR SHALL INSTALL METER BOXES WITH READING HOLE AT TIME ANGLE METER STOPS ARE INSTALLED.
 - CITY WILL FURNISH A TEMPORARY SERVICE METER JUMPER, PRIOR TO INSTALLING METER, UPON PAYMENT OF FEES.
 - METER BOX TO BE CLEANED BEFORE NEW METER CAN BE INSTALLED BY CITY FORCES.

WATER
 DISTRIBUTION & TRANSMISSION
 CONSTRUCTION METHODS

1-INCH WATER SERVICE

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TYPICAL STREET INSTALLATION

BILL OF MATERIALS	
ITEM	QUANTITY
① BRONZE DOUBLE-STRAP SERVICE SADDLE (IPT)	1
② 2" BALL CORPORATION STOP MIPT x MIPT	1
③ 2" FIPT/SW BRASS 90° ELL	1
④ 2" TYPE K COPPER PIPE (SOFT)	VARIABLE
⑤ 2" SW/SW COPPER 90° ELL	1
⑥ RISER PIPE (2" HARD DRAWN COPPER)	1
⑦ 2" ANGLE BALL METER STOP (IPF x METER FLG)	1
⑧ 2" COUPLING (COMP x MIPT)	1
⑨ 1 1/2" OR 2" METER (INSTALLED BY CITY)	1
⑩ 1 1/2" OR 2" METER FLANGE (INSTALLED BY CITY)	1
⑪ METER BOX: CONCRETE COVER 2 PC OR STEEL COVER 2 PC	1
⑫ 8" GATE VALVE CAP, GALV SPLIT SLEEVE, & 12 GA STL PIPE - PER CWD - 500	1

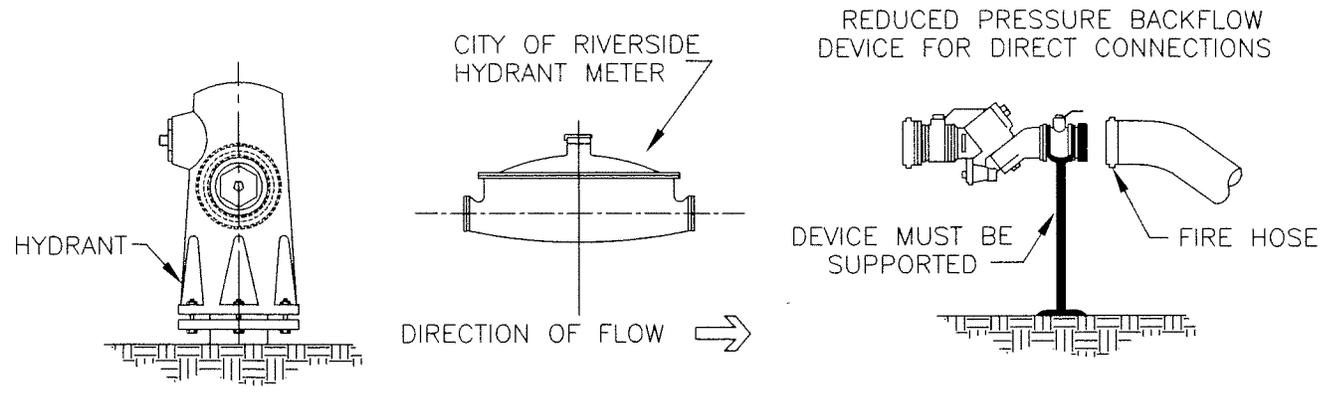
- NOTES:
- 1.) A STEEL METER BOX LID IS REQUIRED IN ALLEY OR DRIVEWAY.
 - 2.) DOUBLE GASKETS SHALL BE USED ON EACH SIDE OF METER SPACER (JUMPER) UNTIL METER IS INSTALLED BY CITY.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

2-INCH WATER SERVICE

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WATER SERVICE CONNECTION , NOT LIMITED TO HYDRANT CONNECTIONS.



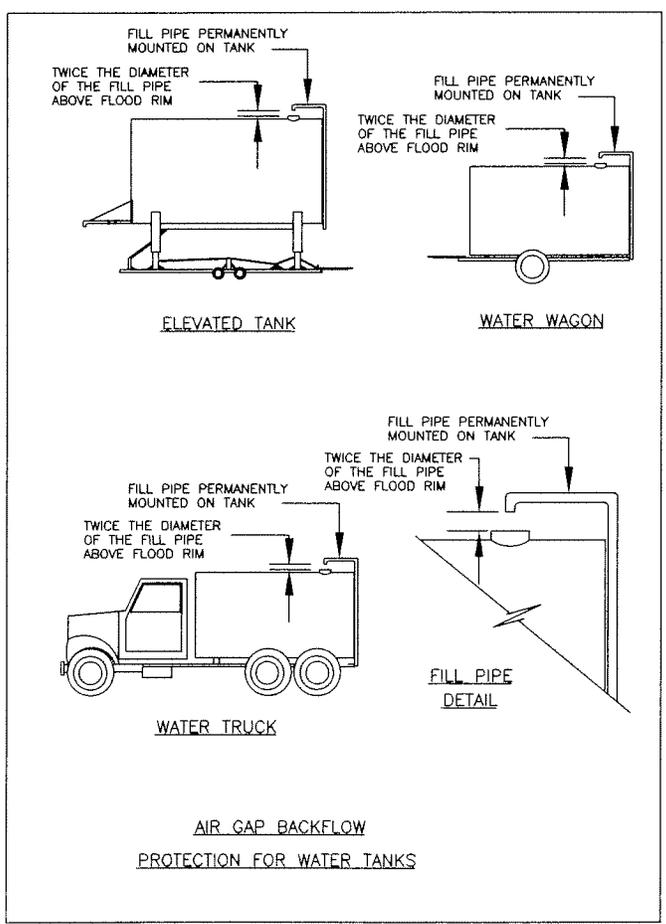
GUIDELINES:

1. AN AIR GAP IS REQUIRED AT SERVICE CONNECTION WHEN:
 - a) A REDUCED PRESSURE BACKFLOW DEVICE (RP) IS NOT AVAILABLE.
 - b) THE POTABLE WATER SUPPLY IS USED TO SUPPLEMENT A NONPOTABLE OR RECYCLED WATER SUPPLY.
2. A REDUCED PRESSURE BACKFLOW DEVICE (RP) IS REQUIRED WHEN:
 - a) AN AIR GAP IS NOT PRACTICAL.
 - b) CUSTOMER'S LENGTH OF HOSE EXCEEDS 50'.
 - c) WATER IS APPLIED DIRECTLY VIA HOSE.
 - d) THERE IS ANY PROCESS OR EQUIPMENT DIRECTLY SUPPLIED VIA CONNECTION.
 - e) THERE IS ANY RIDGED PIPING OR VALVE DOWNSTREAM OF CONNECTION.

CONNECTION IS SUBJECT TO APPROVAL OF THE PROGRAM SPECIALIST. CONNECTION AND BACKFLOW DEVICE MUST BE INSPECTED IMMEDIATELY AFTER INSTALLATION. TO SCHEDULE AN APPOINTMENT, CALL 951-351-6320 OR 951-351-6282.

TEMPORARY CONNECTION METER CONTACTS

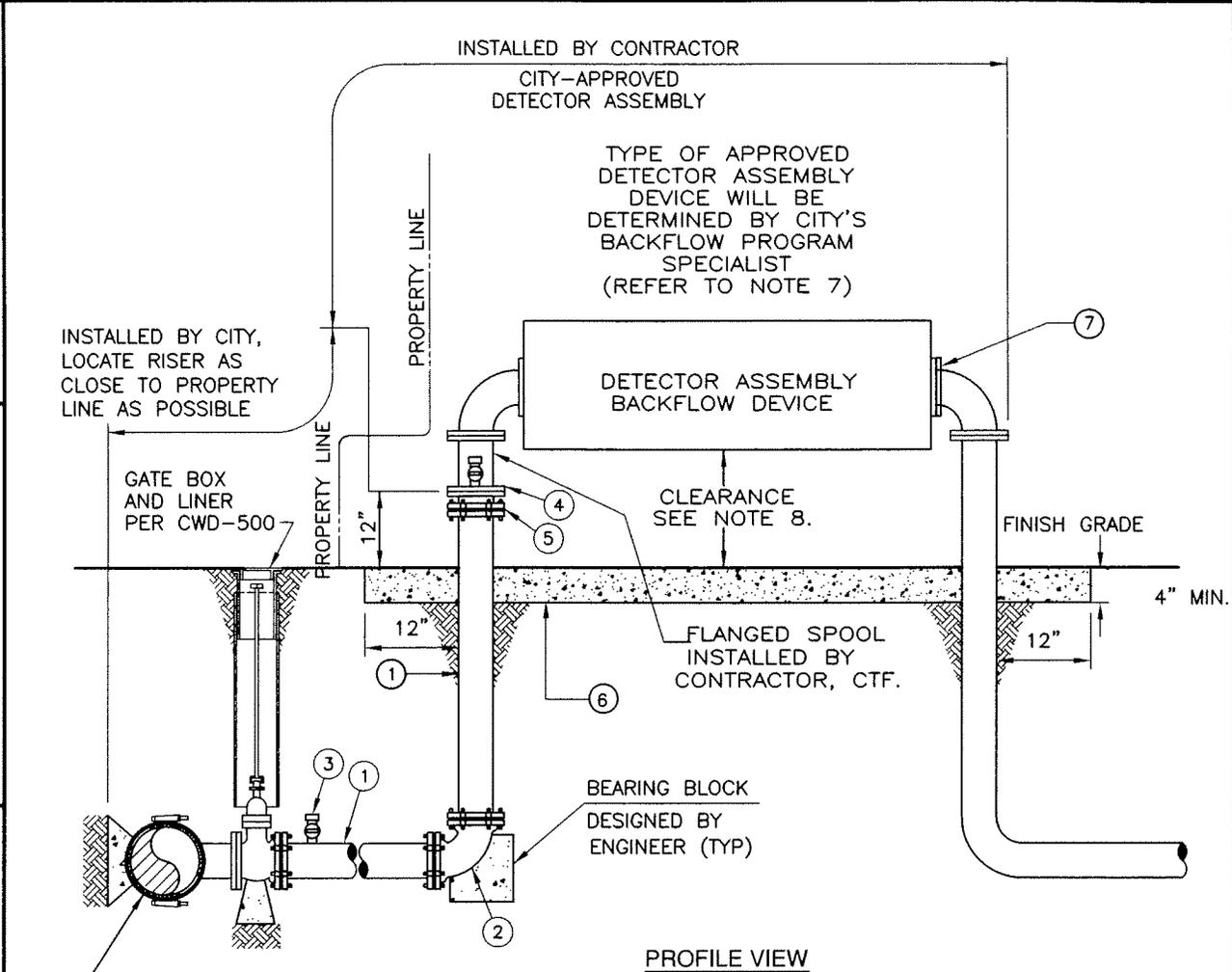
- 951-826-5285 - WATER ENGINEERING
- 951-351-6320 - WATER OPERATIONS/ BACKFLOW
- 951-351-4350 - WATER MAINTENANCE
- 951-782-0330 - CUSTOMER SERVICE



WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TEMPORARY, EMERGENCY, OR CONSTRUCTION
WATER SERVICE/ BACKFLOW PROTECTION

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PROFILE VIEW

NOTES

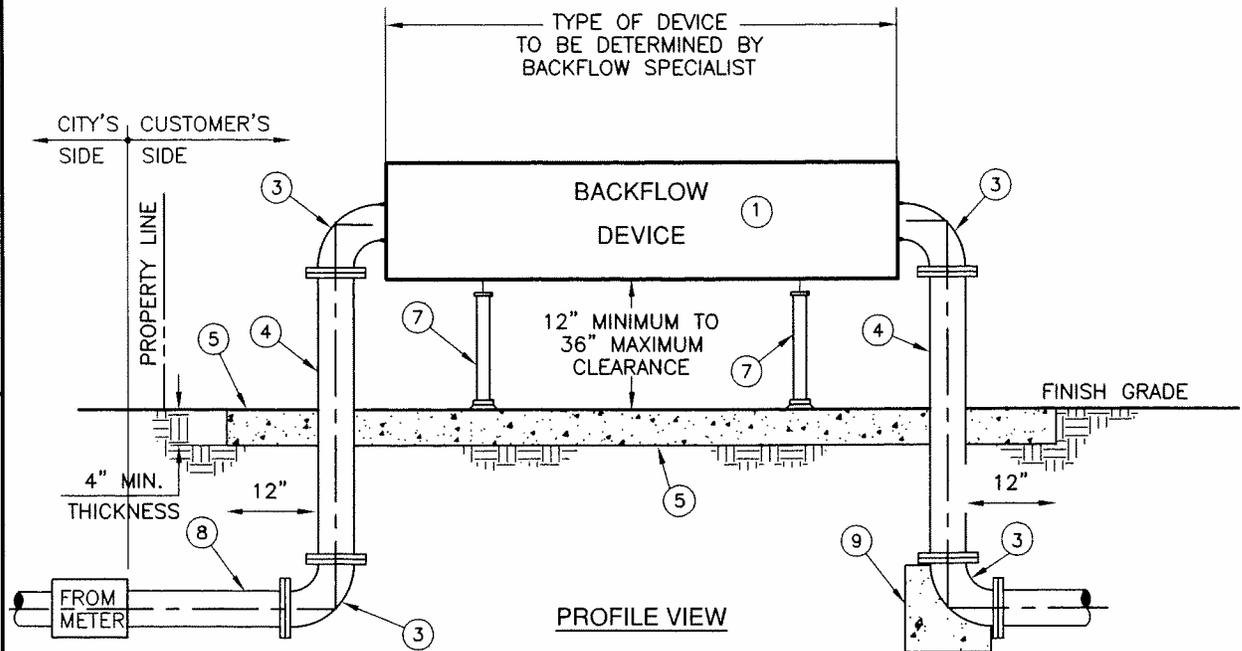
1. PRIME AND WRAP BURIED PIPE TO 6" ABOVE GRADE WITH POLYKEN #927 AND #900, OR APPROVED EQUAL.
2. CITY FORCES WILL BLIND FLANGE CONNECTION POINT. WATER INSPECTOR IS TO BE PRESENT WHEN BLIND FLANGE IS REMOVED AND DETECTOR ASSEMBLY IS INSTALLED.
3. FACILITIES TO BE DISINFECTED PER SPECIFICATION 205, PART 5.
4. CONTRACTOR TO SWAB CONNECTING VALVES WITH 600 PPM CHLORINE WHEN MAKING CONNECTION.
5. CONTRACTOR TO PAINT ALL ABOVE GRADE PIPING AND DETECTOR ASSEMBLY.
6. FOR 10" DETECTOR ASSEMBLY INSTALL 12" LATERAL AND PIPING. CUSTOMER TO SUPPLY 12" x 10" FLANGED REDUCERS ON BOTH SIDES OF DETECTOR ASSEMBLY.
7. CONTACT CITY BACKFLOW PROGRAM SPECIALIST FOR DETECTOR ASSEMBLY SPECIFICATION, AND FOR INSPECTION AND TESTING IMMEDIATELY AFTER INSTALLATION AT 951-351-6320.
8. FOR DETECTOR ASSEMBLY CLEARANCE REQUIREMENTS REFER TO CWD-616-1 AND CWD-617.
9. RESTRAIN ALL JOINTS WITH APPROVED RESTRAINT ASSEMBLY.

MATERIALS	
ITEM	
①	DUCTILE IRON PIPE (CLASS 350)
②	90° ELL
③	1" BALL CORPORATION STOP INLET FOR CHLORINATION POINT TO BE CLOSED AND CAPPED AFTER SUCCESSFUL DISINFECTION.
④	TEMPORARY BLIND FLANGE WITH 1" IPT TAP AND 1" BALL CORPORATION STOP FOR SAMPLE.
⑤	FLANGE X MECHANICAL JOINT ADAPTOR, AS REQUIRED.
⑥	4" MIN. CONCRETE SLAB-NECESSARY FOR EROSION PREVENTION
⑦	TEST PLATE REQUIRED FOR PRESSURE TEST

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

4" THRU 12" ABOVE GROUND
FIRE SERVICE

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NOTES:

1. PRIOR TO INSTALLATION, LOCATION OF THE BACKFLOW DEVICE SHALL BE SUBJECT TO THE APPROVAL OF THE BACKFLOW PROGRAM SPECIALIST 951-351-6320/6282. DEVICE SHALL BE LOCATED AS CLOSE TO METER AS PRACTICAL (MIN. 18", MAX. 24" BACK OF RW)
2. PLACE BOTTOM OF DEVICE A MINIMUM OF 12 INCHES AND NOT MORE THAN 36 INCHES ABOVE FINISH GRADE.
3. INSPECTION OF PLUMBING IS REQUIRED PRIOR TO CONCRETE THRUST BLOCK AND/OR ABOVE GROUND SLAB BEING POURED.
4. MATERIALS SHALL BE IN COMPLIANCE WITH THE APPROVED MATERIALS SPECIFIED BELOW.
5. THE DEVICE MUST BE INSPECTED AND TESTED IMMEDIATELY AFTER INSTALLATION. TO SCHEDULE AN APPOINTMENT CALL 951-351-6320/6282.

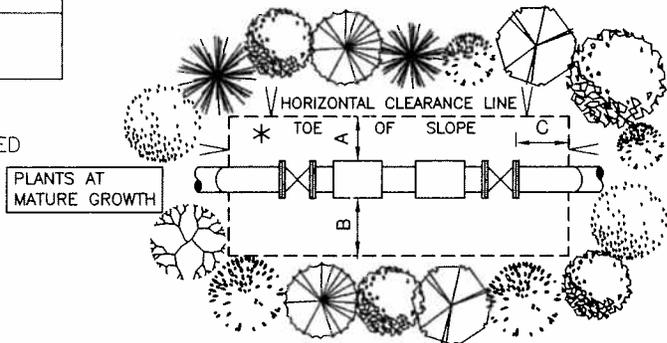
ITEM	EACH	DESCRIPTION
①	1	BACKFLOW DEVICE (TYPE OF DEVICE TO BE DETERMINED BY BACKFLOW PROGRAM SPECIALIST)
③	2	90 DEGREE ELBOW
④	2	FLANGED RISER PIPE
⑤		CONCRETE PAD (NECESSARY TO PREVENT EROSION)

ITEM	EACH	DESCRIPTION
⑦	2	PIPE SUPPORT
⑧	1	SERVICE LINE (NO PVC)
⑨	1	CONCRETE THRUST BLOCK

ADEQUATE AND SAFE CLEARANCE MUST BE PROVIDED TO PERMIT TESTING AND REPAIR WORK

MINIMUM CLEARANCE SCHEDULE			
SIZE	* A	B	C
3" AND UP	24"	24"	12"

*REFERENCE TO INCLINE AND DECLINE SLOPES



OVERHEAD VIEW OF CLEARANCE REQUIREMENTS

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

BACKFLOW PREVENTION ASSEMBLY
3" & LARGER ABOVE GROUND INSTALLATION

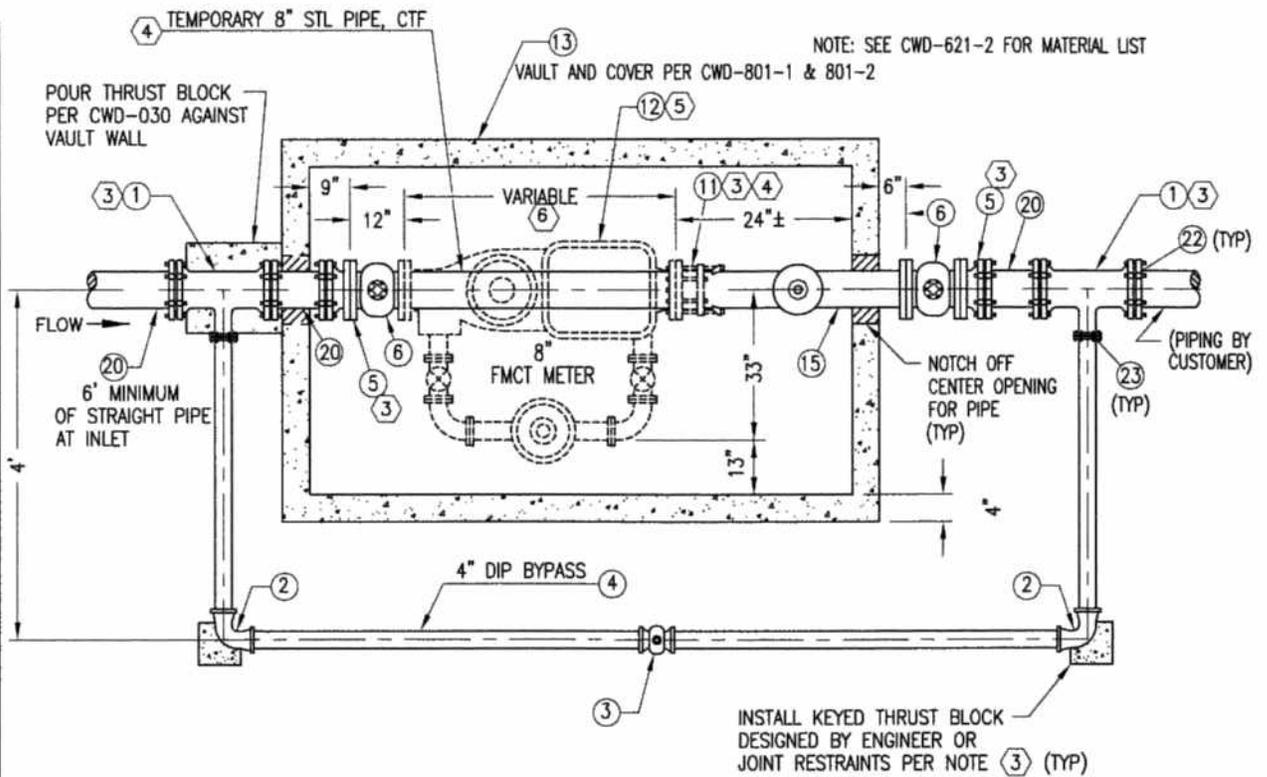
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 APPROV. 2
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BILL OF MATERIALS				
ITEM	QUANTITIES			REFERENCE
	3" METER	4" METER	6" METER	
① DIA x 18" ADAPTER, FLG x MJ	1-(4" DIA)	1	1	
② GATE VALVE, DIA x FLG x FLG	2-(4" DIA)	2	2	
③ DIA x 2" BRONZE SERVICE SADDLE	2-(4" DIA)	2	2	
④ WELD FLANGE x DIA	1	1	1	
⑤ 2" x 12" BRASS NIPPLE	1	1	1	
⑥ 4" x 3" BRASS BUSHING	2	NA	NA	
⑦ 3" x 6" BRASS NIPPLE	1	NA	NA	
⑧ 2" GATE VALVE - BRONZE	3	3	3	
⑨ 4" SCREW FLANGE	2-(4" DIA)	NA	NA	
⑩ 2" BRASS PLUG	1	1	1	
⑪ COMPOUND METER, DIA x FLG x FLG	1	1	1	PUR REQ
⑫ DIA x FLANGED COUPLING ADAPTER	1	1	1	
⑬ VAULT AND COVER	1	1	1	CWD-800-1/2
⑭ STEEL PIPE, DIA x (SCHEDULE 40)	3 LNR FT CTF			
⑮ 2" HEAVY BLACK COUPLING	1	1	1	
⑯ DIA X 36" DIP SPOOL FLG x FLG	1-(4" DIA)	1	1	
⑰ 3" SCREW FLANGE	2	NA	NA	
⑱ 3/4" CRUSHED ROCK	16 CU FT			
⑲ CONCRETE PCC 480-C-2000	15 CU FT			
⑳ NO. 4 REBAR	48 LNR FT±			
2" BY-PASS (ALT A)				
⑳ 2" x 90° ELL SW x MIPT	2	2	2	
㉑ 2" COPPER PIPE, SOFT	7 LNR FT ±			
㉒ 2" BRASS UNION	1	1	1	
㉓ 2" x 3" BRASS NIPPLE	2	2	2	
2" BY-PASS (ALT B)				
㉔ 2" x 90° STREET ELL	2	2	2	
㉕ 2" BRASS PIPE	7 LNR FT ±			
㉖ 2" BRASS UNION	1	1	1	
㉗ 2" x 3" GALV NIPPLE	2	2	2	

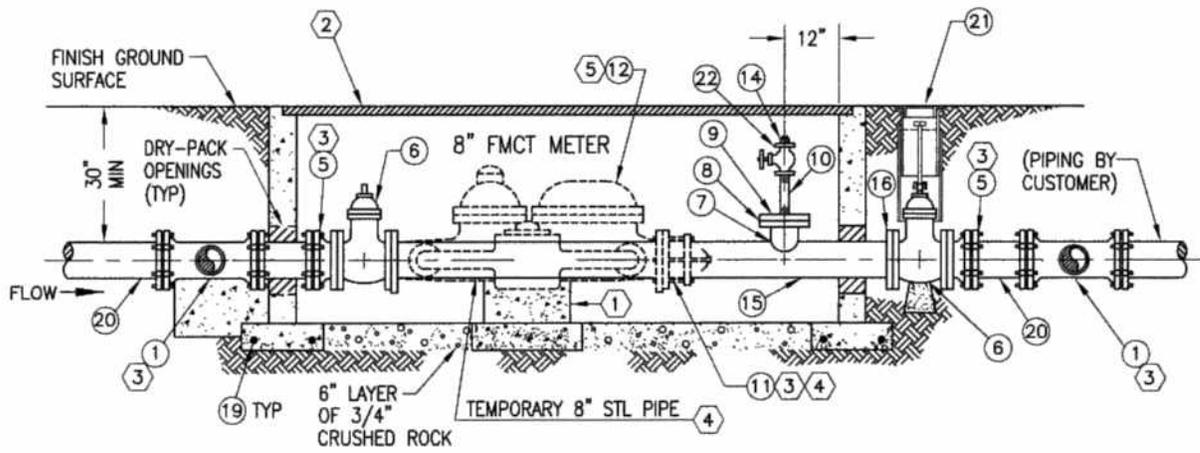
WATER
 DISTRIBUTION & TRANSMISSION
 CONSTRUCTION METHODS

BILL OF MATERIALS FOR
 3", 4" AND 6" COMPOUND METER
 WATER SERVICE

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PLAN VIEW



PROFILE VIEW

GENERAL NOTES:

- ① SUPPORT METER ON CONCRETE PAD AND CONCRETE BLOCK.
- ② ADJUST VAULT AND COVER TO MEET SIDEWALK AND CURB GRADE. PAINT PER CONSTRUCTION SPECIFICATION SECTION 310.
- ③ PROVIDE JOINT RESTRAINTS PER CONSTRUCTION SPECIFICATION.
- ④ CONTRACTOR SHALL INSTALL ALL PIPE, FITTINGS, AND MATERIALS BETWEEN THE TAPPING GATE AND "PIPING BY CUSTOMER", INCLUDING TEMPORARY FLANGE COUPLING CONNECTION AT THE INFLUENT VALVE LOCATION.
- ⑤ CITY FORCES WILL FURNISH AND INSTALL 8" FMCT METER AND FAB METER READING LID.
- ⑥ VARIABLE LENGTH IS PER MANUFACTURER'S REQUIREMENTS.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

8" FMCT WATER SERVICE

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BILL OF MATERIALS		
ITEM	QUANTITY	REFERENCE
① 8" x 4" TEE MJ X MJ	2	
② 4" - 90° ELL MJ X MJ	2	
③ 4" RW GATE VALVE MJ X MJ	1	
④ 4" DI PIPE	23 FT±	
⑤ 8" FLG X MJ ADAPTER	2	
⑥ 8" GATE VALVE F X F	2	
⑦ 6" STL PIPE (SCHEDULE 40)	1 FT	
⑧ 6" WELD FLANGE	1	
⑨ 6" BLIND FLANGE W/2" IPT TAP	1	
⑩ 2" X 12" GALV NIPPLE	1	
⑪ 8" FLANGED COUPLING ADAPTER	1	
⑫ 8" COMPOUND METER	1	
⑬ VAULT AND COVER	1	CWD-801-1/2
⑭ 2" BRASS PLUG	1	
⑮ 8" STL PIPE (SCHEDULE 40)	7 FT±	
⑯ 8" WELD FLANGE	1	
⑰ CONCRETE PCC 480-C-2000	20 CU FT±	
⑱ 3/4" CRUSHED ROCK	28 CU FT	
⑲ NO 4 REBAR	64 FT±	
⑳ 8" DI PIPE	2 FT	
㉑ 8" GATE BOX MATERIAL	1	CWD-500
㉒ 2" GATE VALVE - BRONZE	1	

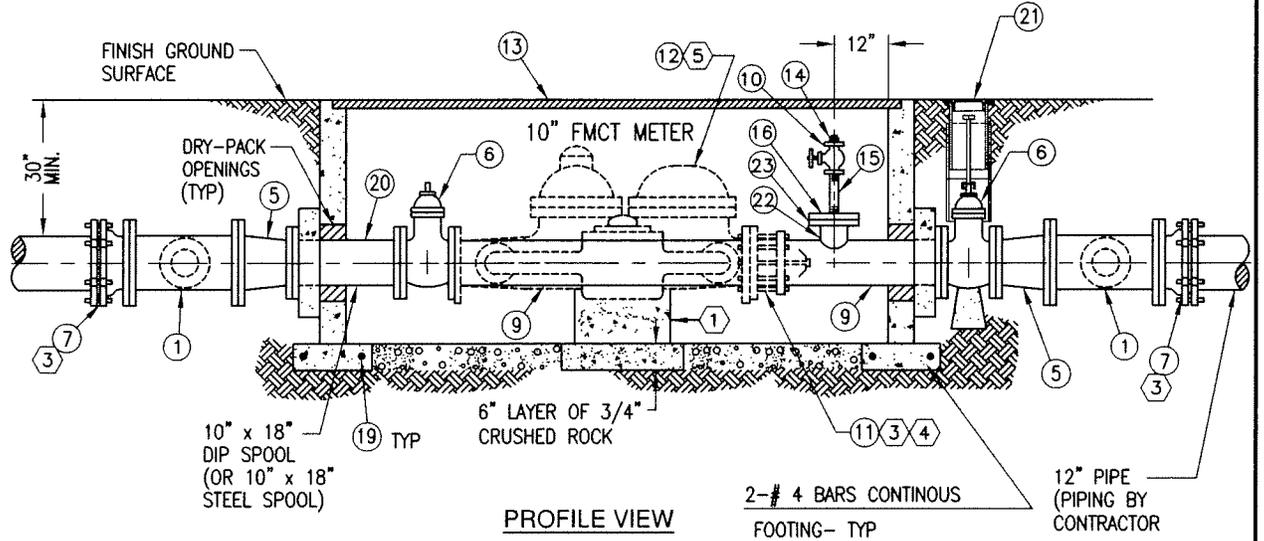
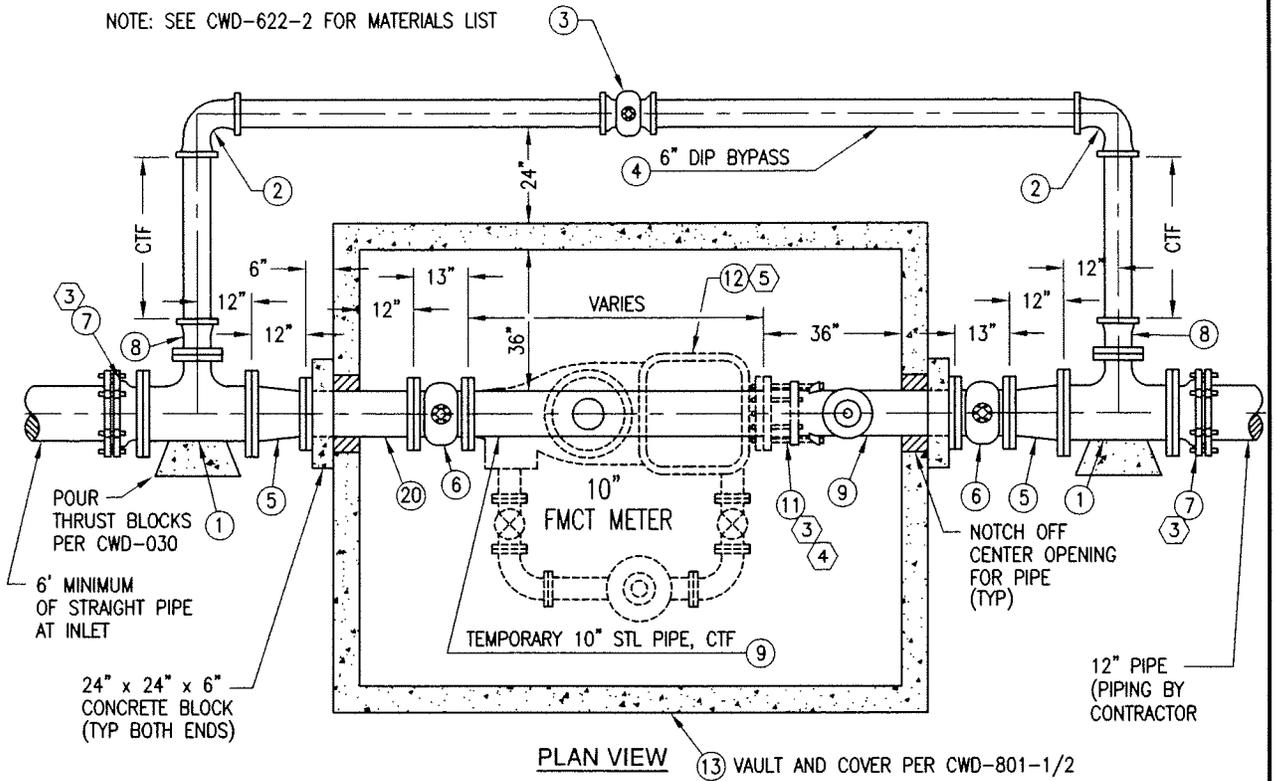
WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

BILL OF MATERIALS FOR
8" FMCT WATER SERVICE



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NOTE: SEE CWD-622-2 FOR MATERIALS LIST



GENERAL NOTES:

- ① SUPPORT METER ON CONCRETE PAD AND CONCRETE BLOCK.
- ② ADJUST VAULT AND COVER TO MEET SIDEWALK AND CURB GRADE. PAINT PER CONSTRUCTION SPECIFICATION, SECTION 310.
- ③ PROVIDE JOINT RESTRAINTS, PER CONSTRUCTION SPECIFICATION.
- ④ CONTRACTOR SHALL INSTALL ALL PIPE, FITTINGS, AND MATERIALS BETWEEN THE TAPPING GATE AND "PIPING BY CONTRACTOR", INCLUDING TEMPORARY FLANGE COUPLING CONNECTION AT INFLUENT VALVE.
- ⑤ CITY FORCES WILL FURNISH AND INSTALL 10" COMPOUND METER AND FAB. METER READING LID.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

10" DOMESTIC WATER SERVICE

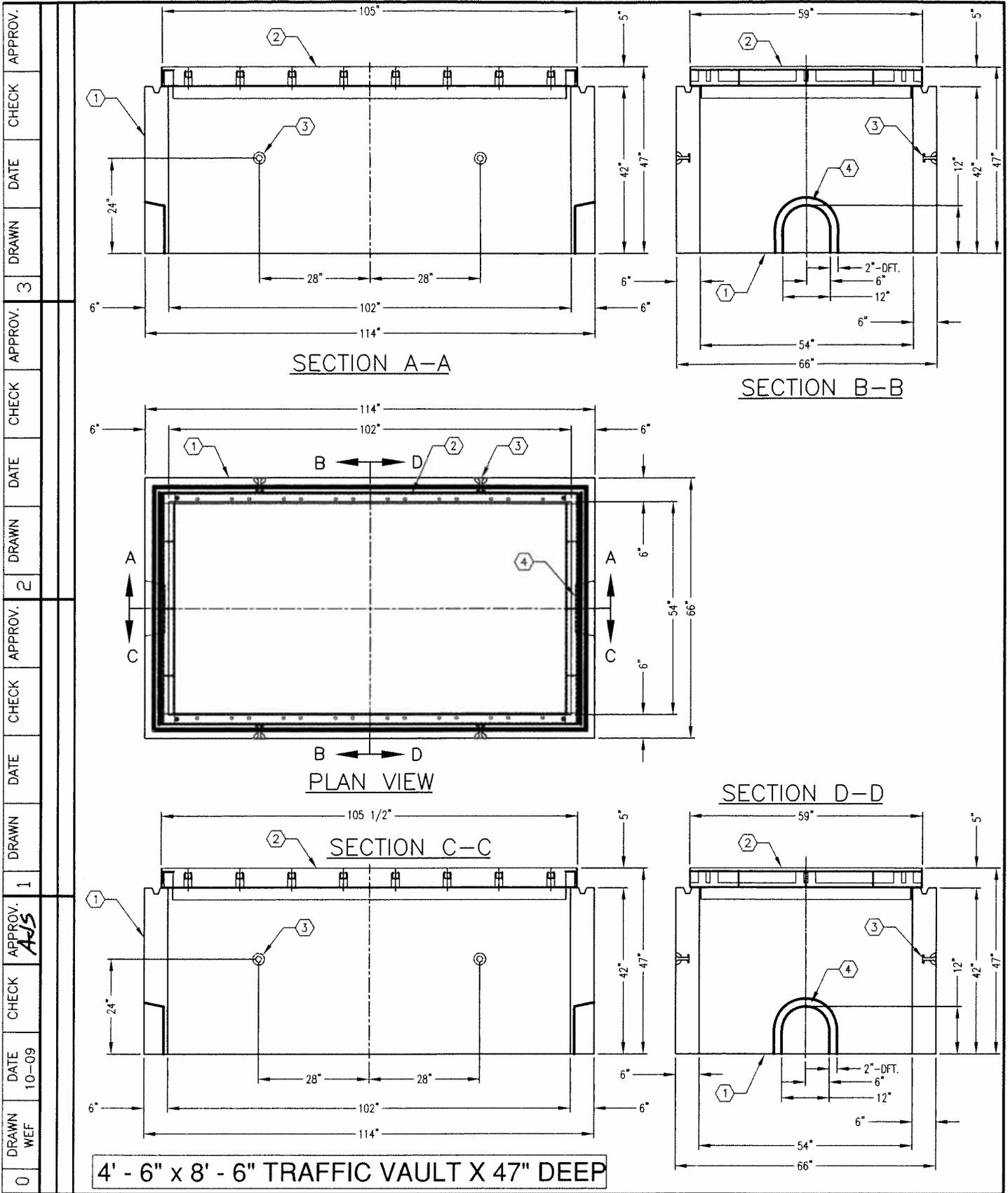
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BILL OF MATERIALS		
ITEM	QUANTITY	REFERENCE
① 12" x 6" TEE F/F*	2	
② 6" 90° ELL RT	2	
③ 6" RW GATE VALVE MJ X MJ	1	
④ 6" DI PIPE	20 FT±	
⑤ 12" x 10" REDUCER F/F	2	
⑥ 10" GATE VALVE F/F	2	
⑦ 12" FLG X MJ ADAPTER	2	
⑧ 6" F/MJ ADAPTER	2	
⑨ 10" STL PIPE (SCHEDULE 40)	10 FT±	
⑩ 2" BRONZE GATE VALVE	1	
⑪ 10" FLANGE COUPLING ADAPTER	1	
⑫ 10" COMPOUND METER	1	
⑬ VAULT AND COVER	1	CWD-802-1/2
⑭ 2" BRASS PLUG	1	
⑮ 2" X 12" GALV NIPPLE	1	
⑯ 6" BLIND FLG W/2" IPT TAP	1	
⑰ CONCRETE PCC 480-6-2000	40 CU FT	
⑱ 3/4" CRUSHED ROCK	40 CU FT	
⑲ NO 4 REBAR	64 FT±	
⑳ 10" x 18" DIP SPOOL, F/F	ALTERNATE FOR STEEL	
㉑ 8" GATE BOX MATERIAL	1	
㉒ 6" STL PIPE (SCHEDULE 40)	1 FT	
㉓ 6" WELD FLG	1	

* 12" x 12" TEE F/F WITH 12" x 6" REDUCER
MAY BE USED INSTEAD OF 12" x 12" x 6" TEE.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

BILL OF MATERIALS FOR
10" COMPOUND WATER SERVICE



APPROV.	CHECK	DATE	DRAWN	0
APPROV.	CHECK	DATE	DRAWN	1
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WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TRAFFIC RATED VAULT FOR
3" THRU 6" COMPOUND METERS

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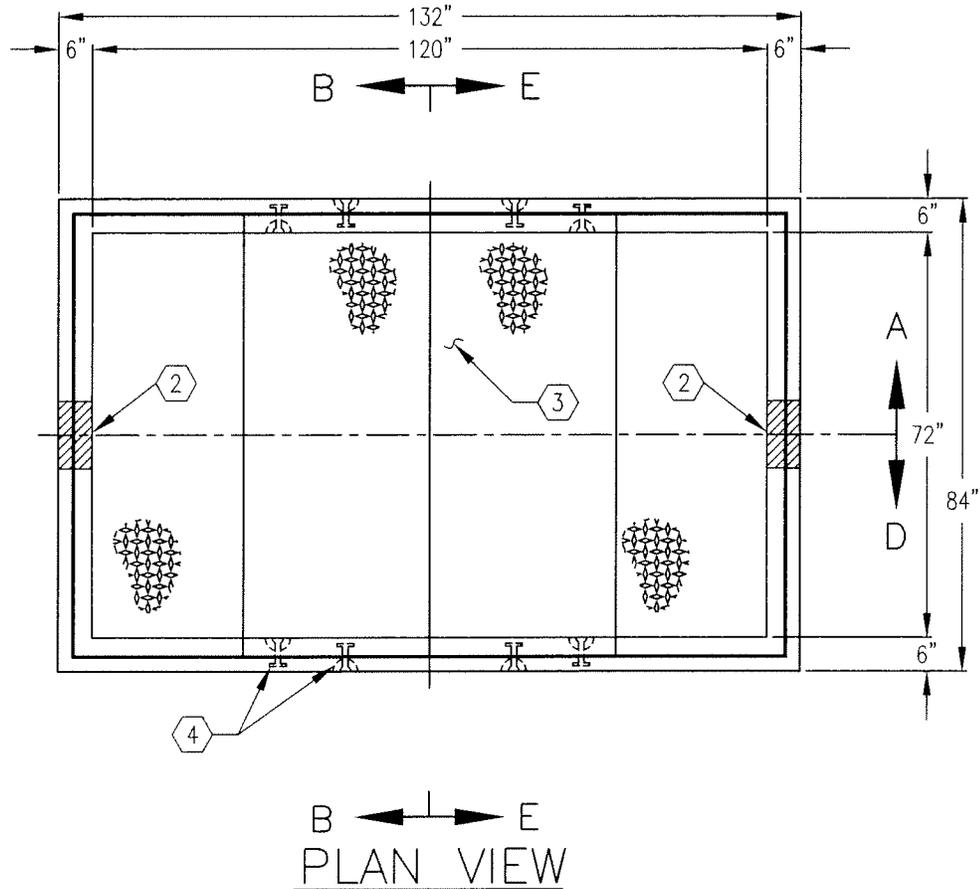
6'-0" x 10'-0" TRAFFIC VAULT X 48 DEEP

GENERAL NOTES:

- A . VAULT DESIGNED IN ACCORDANCE WITH AASHTO H-20-44 TRAFFIC BRIDGE LOADING USING 5,500 PSI [37.92MPa] COMPRESSIVE STRENGTH CONCRETE AND 60,000 PSI [413.2MPa] YIELD STRENGTH ASTM A-706 STEEL REINFORCEMENT PER CALC.
- B . VAULT TO BE PLACED ON A MIN. 6" BASE OF CRUSHER RUN FOR EASE OF INSTALLATION AND EVEN LOAD DISTRIBUTION.
- C . MIN. SOIL BEARING CAPACITY ASSUMED TO BE 2,000 PSF.
- D . INSTALLATION OF VAULT WILL BE PER THE MANUFACTURER'S REQUIREMENTS AND PROCEDURES.
- E . ALL TOLERANCES MUST MEET THE MANUFACTURER'S REQUIREMENTS.

1. 42" LOWER SECTION . WT. 8,950 Lbs.
2. 12"DIA x 18" H MOUSE HOLE . LOCATE AS FOLLOWS: LOWER SECTION, (2) CORE MTD.
3. (4) PIECE GALV. BOLT DOWN TRAFFIC COVER, AND FRAME W/ (11) REMOVABLE BEAM.
4. 4 TON x 4 3/4" GALVANIZED RISS FOR HANDLING, LOCATE AS FOLLOWS: LOWER SECTION (4) CORE & SHELL MTD.

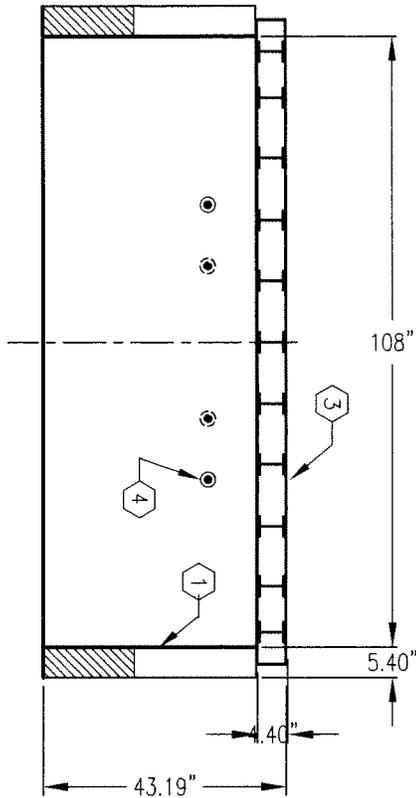
THESE NOTES APPLY TO BOTH CWD-801-1 AND CWD-801-2



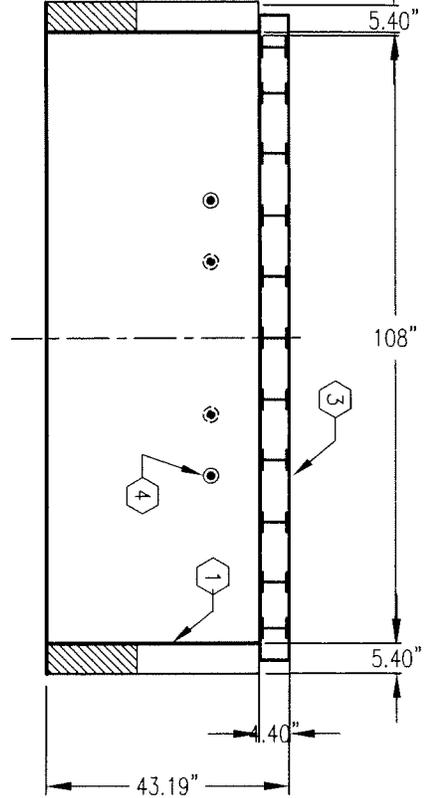
WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TRAFFIC RATED VAULT FOR
8", 10" & 12" COMPOUND METERS

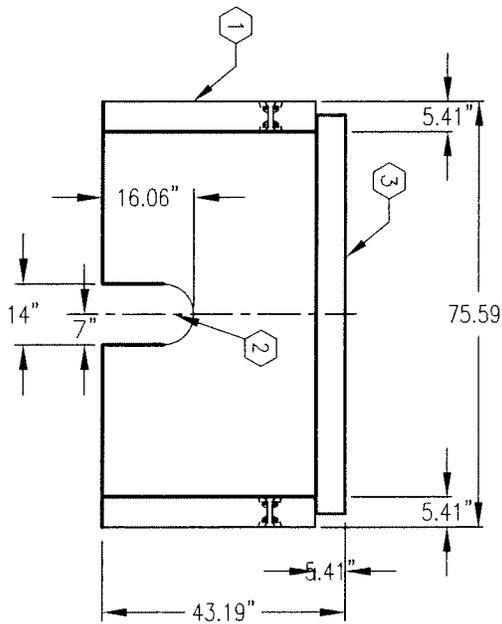
6'-0" x 10'-0" TRAFFIC VAULT X 48 DEEP



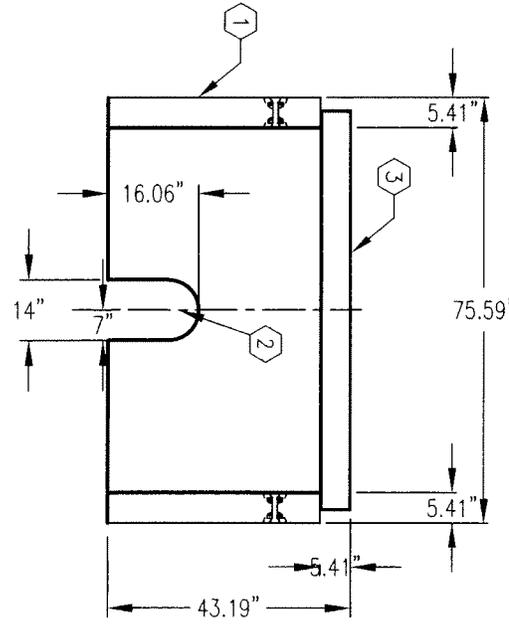
SECTION D-D



SECTION A-A



SECTION E-E



SECTION B-B

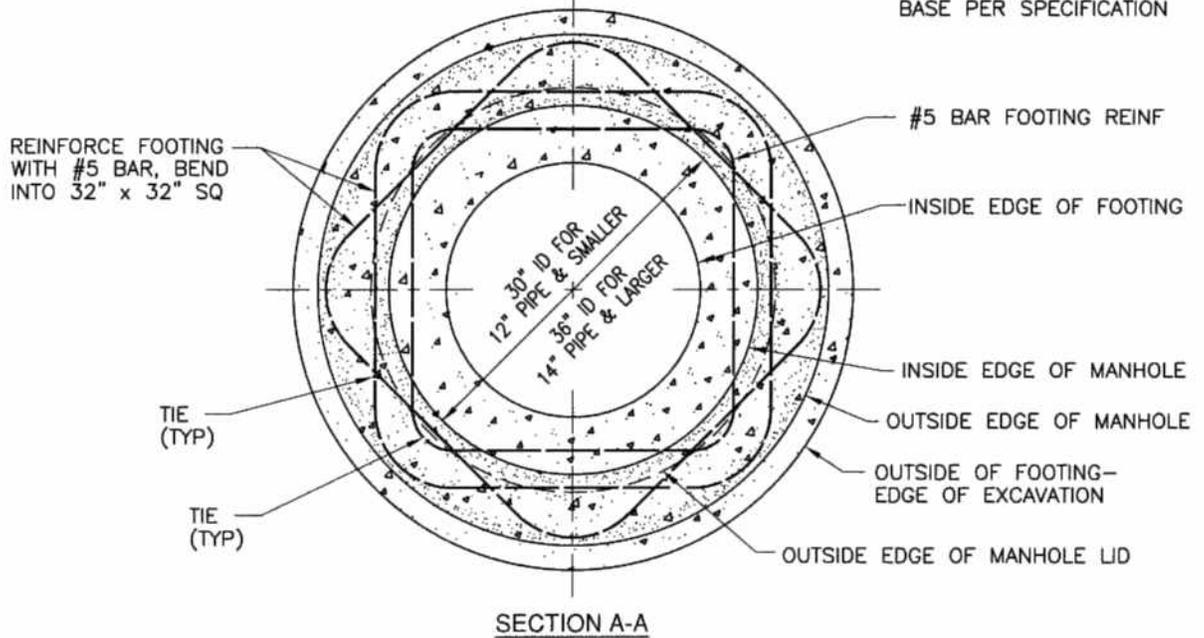
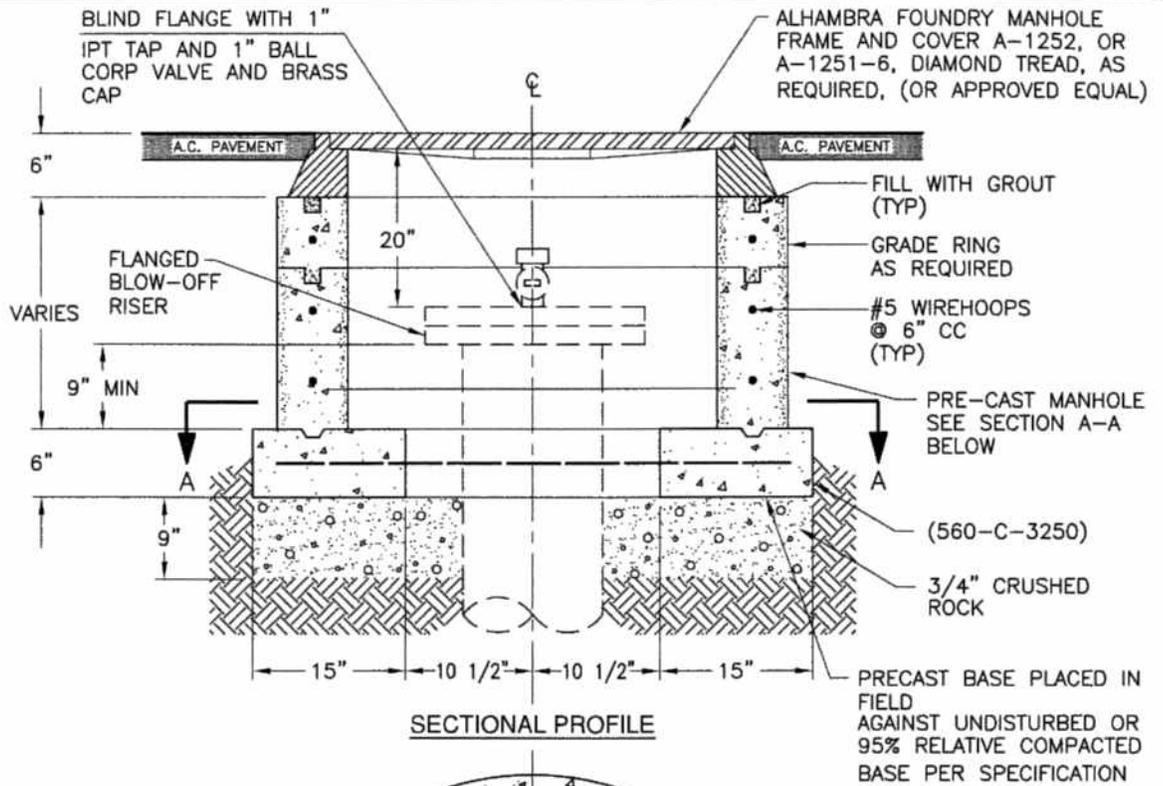
SECTION VIEW

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WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

TRAFFIC RATED VAULT FOR
8", 10" & 12" COMPOUND METERS

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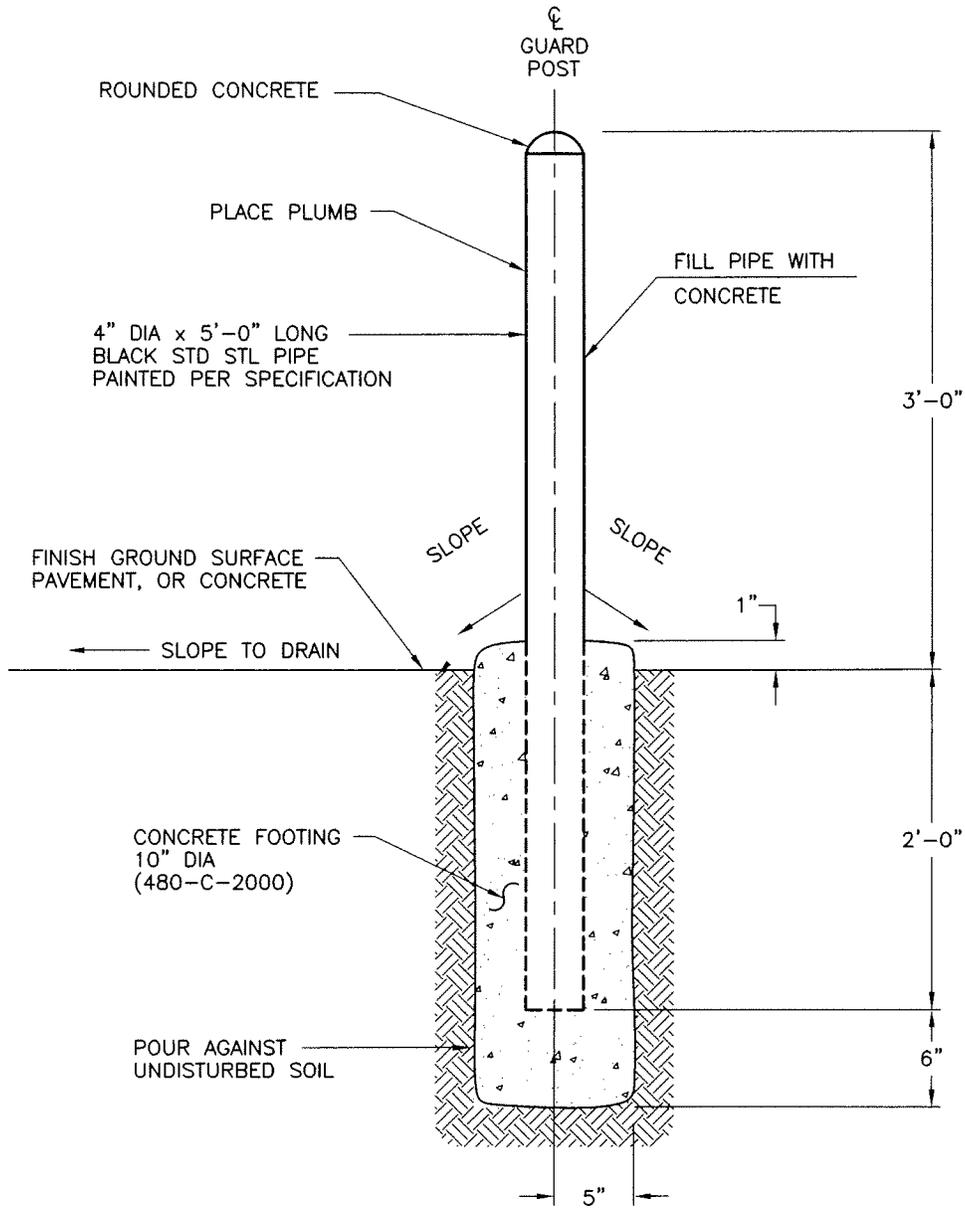


- PRE-CAST MANHOLE SECTION SPECIFICATIONS:**
- 1) DESIGN LOADING H = 20 - S 16
 - 2) CEMENT: TYPE II, ASTM C150, 3250 PSI
 - 3) REINFORCEMENT: GRADE 40 OR GRADE 60 ASTM A615
 - 4) COVER TO BE DIAMOND-TREAD FINISH, LETTERED "CWD"

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

BLOW-OFF MANHOLE
INSTALLATION

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SECTIONAL VIEW

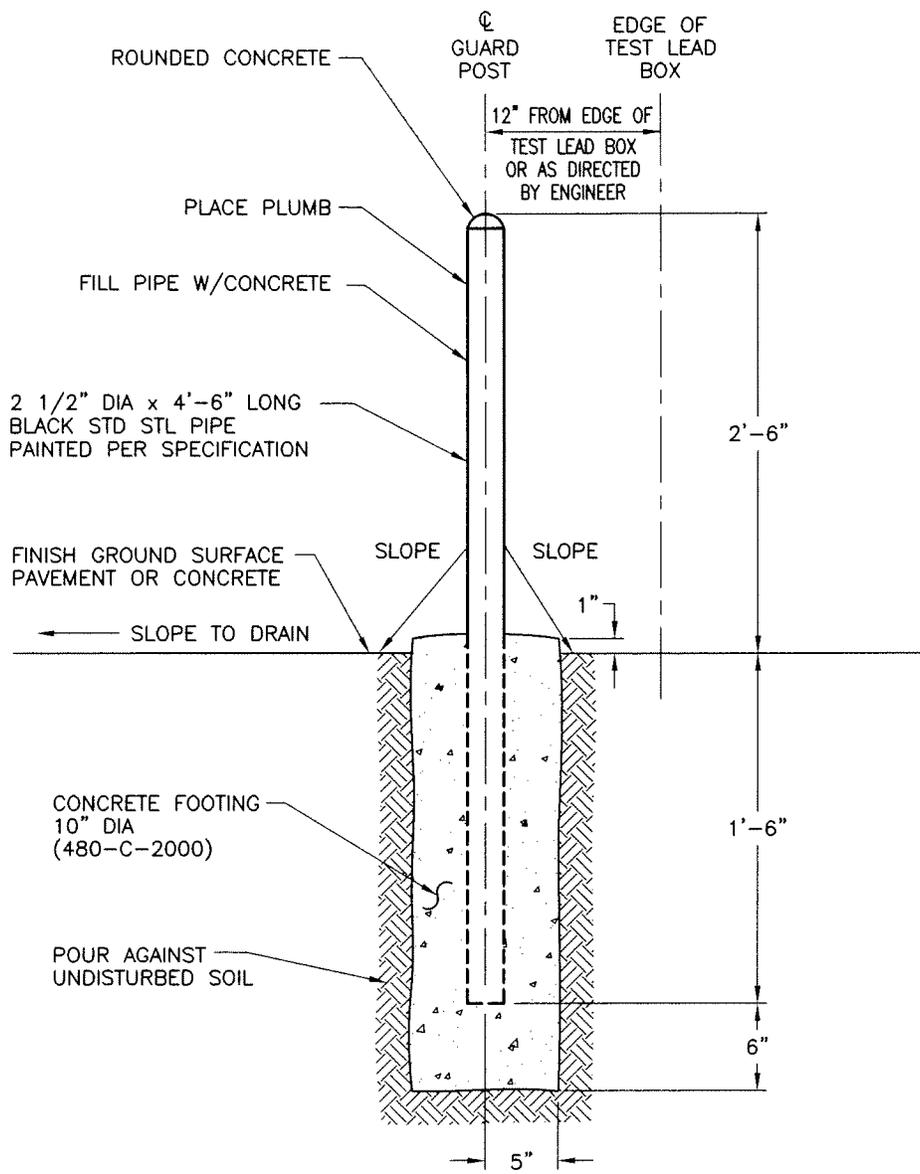
NOTES:

- 1.) NUMBER AND POSITION OF GUARD POSTS AS SPECIFIED ON PLANS.
- 2.) REFER TO "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION", SEC. 210 AND SEC. 310.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

4" DIA. GUARD POST INSTALLATION

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APPROV.	APPROV.
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DATE	DATE
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1	1
APPROV.	APPROV.
CHECK	CHECK
DATE	DATE
DRAWN	DRAWN
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SECTIONAL VIEW

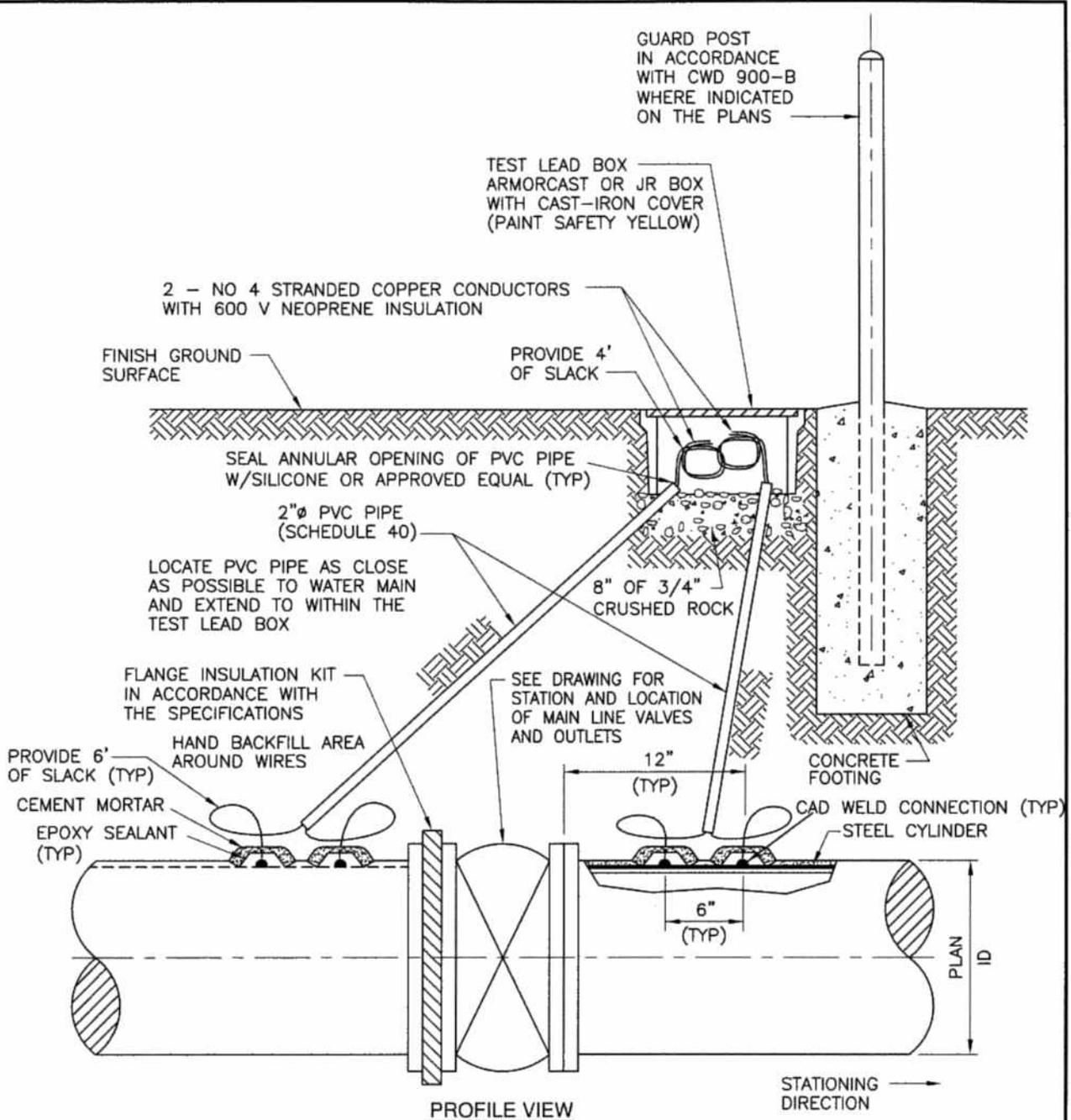
NOTES:

- 1.) NUMBER AND POSITION OF GUARD POSTS AS SPECIFIED ON PLANS.
- 2.) REFER TO "STANDARD SPECIFICATIONS PUBLIC WORKS CONSTRUCTION", SEC 210 AND 310.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

2.5" DIA. GUARD POST INSTALLATION

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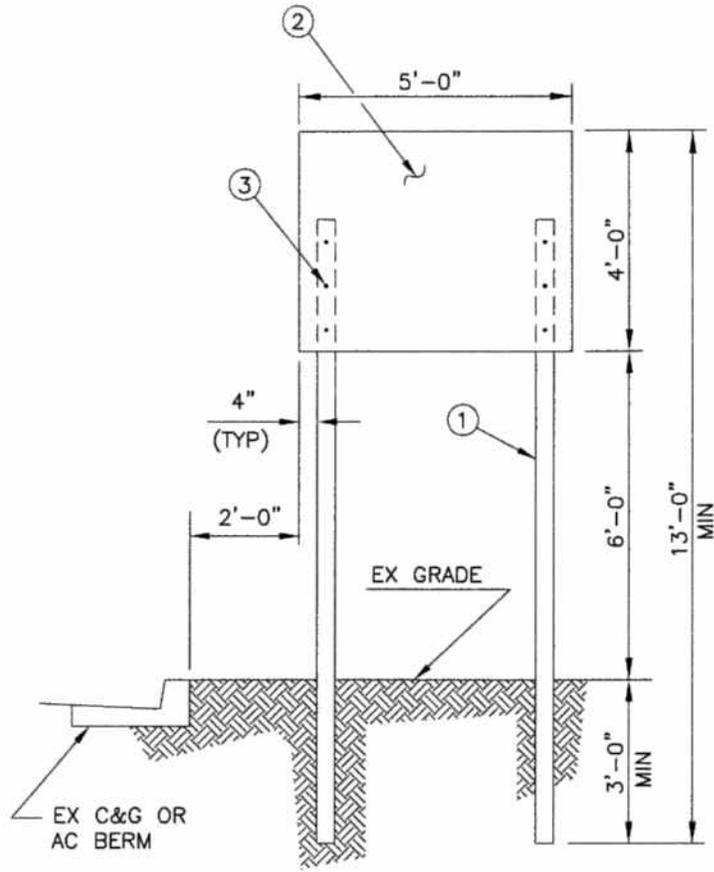
NOTES

- 1.) FLANGE INSULATION GASKETS SHALL BE FULL-FACED, NEOPRENE-COATED FABRIC-REINFORCED PHENOLIC, 1/8 INCH THICK. A ONE-PIECE SLEEVE AND WASHER, SEPARATE PHENOLIC WASHER, AND TWO CADMIUM-PLATED STEEL WASHERS SHALL BE USED FOR EACH BOLT OR CAP SCREW.
- 2.) FLANGE KITS SHALL BE FURNISHED IN ACCORDANCE WITH THE SPECIFICATIONS.
- 3.) TEST LEAD CONNECTIONS AND LOCATIONS IN ACCORDANCE WITH CWD-922.
- 4.) TEST LEADS SHALL BE TAGGED AND/OR COLOR-CODED EAST/WEST OR NORTH/SOUTH OF VALVE.
- 5.) TEST LEAD INSULATION KIT SHALL BE STRIPPED BACK ONE INCH FROM ENDS.
- 6.) WHEN FLANGE KITS ARE SPECIFIED: SIZE _____ - 150# - TYPE EN-DW.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

FLANGE INSULATION
AND TEST LEAD INSTALLATION

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CONSTRUCTION NOTES:

- ① 2 - DOUGLAS FIR CONSTRUCTION GRADE 4" X 4" POST.
- ② 3/4" THICK PLYWOOD.
- ③ FASTEN PLYWOOD SIGN TO POST W/6 - 5"± CARRIAGE BOLTS W/NUTS, FLAT WASHERS, AND JAM NUTS.

NOTES:

- 1) EXACT LOCATION OF SIGN TO BE DETERMINED BY ENGINEER WITH APPROVAL BY CITY PUBLIC UTILITIES DEPARTMENT.

WATER
DISTRIBUTION & TRANSMISSION
CONSTRUCTION METHODS

NOTIFICATION SIGN

