



CITY OF RIVERSIDE

PUBLIC UTILITIES DEPARTMENT
WATER DIVISION

SPECIFICATION NO. 205

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

September 2022

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APPENDIX I **DESIGN CRITERIA**

Available for download at <https://www.riversideca.gov/utilities/developers/water-engineering/design-standards>

APPENDIX II **APPROVED MATERIAL LIST**

Available for download at <https://www.riversideca.gov/utilities/developers/water-engineering/construction-standards>

APPENDIX III **STANDARD DRAWINGS**

Available for download at <https://www.riversideca.gov/utilities/developers/water-engineering/construction-standards>

**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” (2021 Edition and any adopted supplements) applying to private contracts for Public Improvement.
(Refer Subsection 2-5.1 of Part I)

PART 1 – GENERAL PROVISIONS

SECTION 1 - TERMS, DEFINITIONS, ABBREVIATIONS AND SYMBOLS

1-2 DEFINITIONS

- | | | |
|-------------------------|---|---|
| Agency (City, Owner)- | - | 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

AWWA	American Water Works Association
DDW	State Water Resources Control Board Division Of Drinking Water
CRSI	Concrete Reinforcing Steel Institute
CWD	City Water Division
PWD	Public Works Department
SSPWC	Standard Specifications for Public Works Construction
DIPRA	Ductile Iron Pipe Research Association

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

1-3.4 Symbols

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

1-4 UNITS OF MEASURE

1-4.1 General

The U.S. Standard Measures, also called the U.S. Customary System, is used as the principal measurement system in these Special Provisions and shall be used for construction.

SECTION 2 - SCOPE AND CONTROL OF THE WORK

2-1 AWARD AND EXECUTION OF CONTRACT

2-1.1 Scope of The Project

The work to be done, in general, shall include furnishing all labor, materials, tools, equipment, and incidentals, unless otherwise specified, to construct the waterline complete in place in accordance with the Plans and Specifications.

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.

2-5.6 Publications

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

2-5.7 Material List and Drawing

The Contractor shall submit to the Engineer, for the Engineer's approval, an original list of materials which the contractor proposes to install. A submittal log will be provided by RPU electronically for the contractor to populate. The Contractor shall be responsible for any material purchased, labor performed, or delay to the work prior to such approval. The list shall be complete as to the name of the manufacturer, size and catalog number of unit; and shall be supplemented by such other data as may be required, including detailed scale drawings, and any non-standard special material, and shall show any proposed deviation from the Plans. The Contractor shall submit for approval when requested, sample articles of any materials proposed for use. All such data shall be submitted electronically for review.

The Contractor shall also furnish all literature and drawings which are received with the maintenance of that equipment.

2-7 SUBSURFACE DATA

The Contractor assumes all responsibility for the foreknowledge of the extent and nature of the soil properties in the construction zone before and during construction.

2-9 SURVEYING

2-9.1 Permanent Survey Markers

The Contractor shall not disturb or destroy any existing monuments or benchmarks. If any survey monuments or benchmarks need to be removed and replaced, Contractor shall notify the Engineer prior to construction.

Before removing any monuments in preparation for construction, the City will set at least four ties for each monument to be removed and replaced, all at Contractor's expense. After construction, the City will replace each monument using the aforementioned ties and file a corner record for each replaced monument, all at Contractor's expense.

2-9.2 Survey Service

The Contractor shall provide cut sheets and survey staking. The Contractor shall bear the expense for the replacement of survey stakes, in case of their removal or destruction.

For all water pipelines, the contractor shall provide construction staking at pipeline connections, grade breaks, at fittings, and at appurtenances. Survey cut sheets shall

contain station locations, fills, cuts, offsets and elevations.

2-9.4 Line and Grade

With regard to vertical alignment, pipelines shall be constructed so that actual flow line elevations, measured at pipe joints, are within 0.1 foot of design flow line elevations. Pipelines, when installed, shall have continuous slope upgrade or downgrade, corresponding with design slope, without any high spots.

With regard to horizontal alignment, waterline shall be constructed so that actual waterline centerlines, measured at pipe joints, are within 0.1 foot of design centerlines.

2-9.5 Survey Staking Along a Radius

Developers Surveyor will provide lay sheets for all radius pipeline alignments from beginning to end and provide field staking at beginning and end of the radius and at 15-foot intervals throughout.

2-11 INSPECTION

A City Inspector will be required on the job site at all times as deemed necessary by the City. A 48-hour minimum notice is required when requesting inspection. 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 Inspector's 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 paid for by the developer prior to meters being set. Overtime rate is 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 charged at two times the Inspectors pay rate plus overhead.

2-11.2 City Holidays

CITY HOLIDAYS WILL BE OBSERVED ON THE FOLLOWING DAYS:

January 1 st	New Year's Day
Third Monday in January	Martin Luther King Jr's Birthday
Third Monday in February	President's Day
Last Monday in March	Cesar Chavez Day
Last Monday in May	Memorial Day
July 4 th	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

4-1.1.1 Conformity with Contract Documents and Allowable Deviations

The work shall conform to the lines, grades, dimensions, tolerances, and material and equipment requirements shown on the plans or set forth in the specifications. Although measurement, sampling, and testing may be considered evidence as to such conformity, the Engineer shall be the sole judge as to whether the work or materials deviate from the plans and specifications, and his decision as to any allowable deviations therefrom shall be final.

If specific lines, grades, and dimensions are not shown on plans, those furnished by the Engineer shall govern.

4-1.1.2 Manufacturer's Instructions

All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, supplier, or distributor, except as otherwise specifically provided in the plans and specifications.

4-1.1.3 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 the Developer: Bituminous paving materials, base material and relative compaction. These tests shall be made by and at the expense of the Developer after requested by the City in such number and at such locations as deemed necessary by the Engineer to ensure compliance with Specification.

4-1.5 Certification

Written test certificates, maintenance manuals, parts list, and related drawings on the material listed in section 2-5.3 shall be submitted for approval prior to installation; other certificate requirements are set forth in Part 2 Construction Materials.

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. The Contractor shall immediately notify the CWD and the PWD of the damaged sewer laterals. 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.

5-4 RELOCATION

5-4.1 Utility Interferences

The Contractor shall adjust the pipeline grade as necessary (after approval by the Engineer) to clear all utilities or other interferences including, but not limited to, gas, telephone, underground electrical, water mains, and sewer services and storm drains.

The Contractor shall have the appropriate agencies locate their facilities prior to construction. All utility interferences shall be verified prior to actual construction by exposing the utility. It shall be the Contractor's responsibility to notify the Engineer of any utility conflicts which have been verified by exposing the utility.

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). 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, ACCEPTANCE AND WARRANTY

The Work will be inspected by the Engineer for final acceptance upon receipt of the Contractor's written assertion that all Work has been completed. When, in the judgment of the Engineer, all work has been completed in accordance with the plans and specifications and is ready for final acceptance, the Engineer may accept the Work as complete, and will issue a formal acceptance in writing. The date of the Engineer's acceptance of the Work will be the date when the Contractor is relieved from responsibility to protect and maintain the Work.

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

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 street right-of-way or on City property until the Contractor has obtained the necessary permits. The Contractor shall obtain and pay for all permits and fees and give all notices necessary and incident to the due and lawful prosecution of the work and to the preservation of the public health and safety.

The Contractor shall have a permit for excavation from the Division of Industrial Safety as provided for in Labor Code Section 6500. A copy of this permit shall be kept at the job site.

Excavations with depth greater than 5 feet are subject to OSHA excavation permit requirements. The Contractor shall obtain the permit, at his own expense, with no additional cost to the City.

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 comply with all regulations and requirements of the City of Riverside Public Works Department, the Director of Public Works, and 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 alongside the public right-of-way. The Contractor shall assume full responsibility for any damage caused by stockpiling of materials and shall repair same at Contractor's expense. The Contractor shall also be responsible for providing traffic control as required to protect the public from hazards caused by stockpiling within the 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.

7-10.4.5 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 the City 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.

7-18 WRITTEN COMMUNICATIONS

Contractor's written communications, including letters, field memoranda, requests for substitution (RFS) and requests for information (RFI) shall be written in a clear and concise manner. In particular, RFSs and RFIs shall clearly describe the condition or issue of concern, the cause of the condition or issue and the proposed solution or specific question being posed to the Engineer.

SECTION 8 - FACILITIES FOR AGENCY PERSONNEL

8-1 GENERAL

Facilities for City 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 will be given to the Engineer, Inspector, Police, Sheriff, Street Maintenance Division, Public Works Department Engineer, and any other necessary parties. All City services can be reached at 951-826-5311. For convenience to the Contractor in complying with the other provisions of this section, the following telephone numbers are listed:

CITY OF RIVERSIDE

Electric	951-826-5311
Fire Department	951 826-5321
Police Department - Non-Emergency	951 826-5700
Street Light Repair	951-826-5311
Street Superintendent	951-826-5311
Traffic Engineering Division	951-826-5311
Traffic Signal Maintenance	951-826-5311
Water	951-826-5311
Water Division – Cross Connection	951 351- 6282
Utility Operation Center – Customer Service Division	951-826-5311

OTHER AGENCIES

Alvord Schools (for bus lines)	951 351-9325
American Medical Response	
Ambulance Service	951 684-5520
California Highway Patrol	951 637-8000
County of Riverside (Transportation Dept.)	951 955-6790
Mining and Tunneling Unit	909 383-6782
RTA	951 684-0850
Riverside Schools	951 788-7134 (for bus lines)
Southern California Edison (Emergency)	1-800-611-1911
Southern California Gas Company (Emergency)	1-800-427-2200
Special Services Transportation	951 687-8080 (for bus lines)
AT&T (Emergency)	1-800-288-2020
Underground Service Alert (USA)	1-800-227-2600

SECTION 11 – CONSTRUCTION PHASING

11-1 CONSTRUCTION SEQUENCE

Phase I: Submittals

- Contractor will submit on all components of the pipeline project along with all necessary business licenses, permits, insurances and procedure plans.

Phase II: Preconstruction Meeting

Phase III: Construction

- Prior to trench excavation contractor shall pothole all existing utilities within the roadway that cross the proposed water line and parallel the proposed water line within two feet.
- Contractor will construct the pipeline and all appurtenances per plan, backfill all trenches to meet compaction requirements and submit as-built drawings for approval prior to proceeding.

Phase IV: Testing

- Contractor will perform their own pre-pressure test, an official pressure test, valve leakage test, flushing of the main and appurtenances, perform disinfection of the pipeline and all appurtenances, dichlorination and flushing of the main and all appurtenances and perform water quality testing per section 700 of the specifications.

Phase V: System Connections

- System connections will be performed by RPU Forces unless otherwise noted in the approved plans.

Phase VI: Jumpers and Meter Requests

- Developer will submit as necessary the required request for jumper and meters to the RPU Inspection team

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

Base material shall consist of crushed aggregate or crushed miscellaneous only.

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-3250, 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.

201-1.4.4 Hand 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. All grout utilized for interior pipe lining shall be NSF approved.

SECTION 203 - BITUMINOUS MATERIALS

203-6 ASPHALT CONCRETE

203-6.1 Asphalt Types for Various Uses. Contractor will utilize asphalt materials in accordance with the most recent edition of Riverside Public Works standard 203-6 "Asphalt Concrete".

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. The Contractor shall schedule inspection of pipe delivery 48 hours minimum in advance.

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; Per approved materials list.
- (2) Rubber gasket push-on joint – ANSI A21.11/AWWA C111
- (3) Flanged joint - ANSI A21.10/AWWA C110
- (4) Restrained joint - ANSI A21.10/AWWA C110. All joint restraints shall be per the approved material list. **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. CWD Engineer/ Inspector reserves the right to reject fittings at his/her own discretion.

207-9.5 Approved Pipe Manufacturers.

See approved materials list.

207-9.6 Approved Fitting Manufacturers.

See approved materials list.

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 Water Pipe.

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 as specified on the plans. 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.

NSF approved 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 on all pipe 24" and larger. Pipes smaller than 24" shall have the bracing removed prior to installation. 10-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 Fitting Manufacturers.

See approved materials list.

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 and shall be NSF approved.

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. All solder used shall be NSF approved.

1" Copper- no sweat fittings are permitted.

2" Copper – full 20-foot lengths are to be used keeping solder couplings 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 and shall be NSF certified.

207-25.3 Steel Pipe

Steel pipe used in 4 inch and larger fire/domestic services or guard posts shall be Schedule 40, conform to ASTM A-120, and shall be NSF certified with the exception of guard posts.

207-25.4 Galvanized Steel Pipe

Galvanized Steel Pipe shall conform to ASTM A-120, Schedule 40 and NSF certified.

207-25.5 Gate Box Material

The respective minimum thicknesses of steel pipe used for 8-inch and 10-inch gate boxes shall be 12 Gauge Pipe and 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/ Painting Schedule

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

No.	Application	Primer	Paint
1	Gate Box Caps & Rims	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust-Oleum, Dunn/Devoe, Safety Blue or City Approved
2	Air Valves	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust/Oleum, Dunn/Devoe, Forest Green or City Approved
3	Fire Hydrants	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust-Oleum, Dunn/Devoe, Safety Yellow or City Approved
4	Blowoff Hydrants	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust-Oleum, Dunn/Devoe, Safety Yellow/Safety Blue
5	Air Valve Guard Posts	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust-Oleum, Dunn/Devoe, Forest Green
6	Hydrant Guard Posts	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust-Oleum, Dunn/Devoe, Safety Yellow
7	Locating Guard Posts	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust-Oleum, Dunn/Devoe, Safety Yellow
8	Steel Vault Lid	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust-Oleum, Dunn/Devoe, Soft Grey
9	Above Grade Piping	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust-Oleum, Dunn/Devoe, San Tan
10	Curb Markings	1 coat, Red, Rust-Oleum, Dunn/Devoe	2 coats of Rust-Oleum, Dunn/Devoe, Safety Blue

Miscellaneous Appurtenances - "Tnemec" Pota-Pox Plus series 140F epoxy coating, or City approved equal.

All paint and protective coatings shall be holiday free.

- Suppliers:
 - (1) Dunn Edwards
 - (2) Glidden Professional
 - (3) Vista Paint

All the above paints, with the exception of red and black primer shall be **industrial strength**. "SprayCan" application will be allowed for the blue marking paint only. 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 the sum of the mating flange thickness, the gasket, and the depth of the nut plus 1/8" before torquing. 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 1/2-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.

See approved materials list.

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 phenolic, 1/8-inch thick.

3. The gaskets shall have the following assembly minimum physical characteristics:
 - a. Compression strength24,000 psi
 - b. Dielectric strength..... 500 V/Mil
 - c. Operating temperatureup 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 strength26,000 psi
 - (4) Operating temperatureup to 300° F
 - (5) Water absorption..... 1% Max.

 - b. Flange Insulation kits shall be manufactured by:
See approved materials list.

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 370 epoxy coating, Holiday Free, or City approved equal. "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.

250-4.1.1 Approved Manufacturers:

See approved materials list.

250-5 GATE VALVES.

250-5.1 2-inch to 3-inch Gate Valves. Unless otherwise specified, gate valves 2-inch through 3-inch shall conform to ANSI/NSF 61, and the following:

- a. Gate valves shall be rated 250 psi max working pressure, iron body with 10 mils epoxy coating interior and exterior, Triple O-ring seal, non-rising stem, iron wedge and threaded ends.
- b. Gate valves used in corp stop, 2-inch blowoff or corp stop shall have a 2-inch square cast iron operator nut.
- c. Iron gate valves shall be:
 - (1) See approved materials list.

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 or C515 and the following:

- (1) Resilient-seated gate valves shall be iron bodied with all stainless-steel internal mountings and working parts. Valve stems shall be cold rolled stainless steel 430F with a minimum yield strength of 40,000 psi.
- (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 or C515.
- (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) See approved materials list.

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 shall 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) See approved materials list.

Mechanical Type Joint

(1) See approved materials list.

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. Valve box caps and extensions shall be returned to the City.

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:
 - (1) See approved materials list.

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 and shall be NSF certified.

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.

See approved materials list.

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.

See approved materials list.

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.

See approved materials list.

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:

See approved materials list.

- b. Super Hydrant:

See approved materials list.

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 a sufficient number 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 pipeline. 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) See approved materials list.

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) See approved materials list.

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. See approved materials list.

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:

See approved materials list.

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. Joint lubricant shall be kept free of dirt and debris, etc. at all times. All joint lubricant shall be NSF certified.

250-14 POLYETHYLENE ENCASEMENT

POLYETHYLENE ENCASEMENT. Polyethylene encasement shall be V-BIO type as defined by the Ductile Iron Pipe Research Association (DIPRA).

- a. Polyethylene encasement shall have a minimum thickness of 8 mil and conform with Section 4.1 of AWWA C105/ANSI A21.5.
- b. Use only 2-inch wide, 10 mil thick, plastic tape for fastening polyethylene encasement as described in section 306-10 of these special provisions.

PART 3 - CONSTRUCTION METHODS

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

SECTION 300 - EARTHWORK

300-1 CLEARING AND GRUBBING

300-1.1 General

The following work is included under clearing and grubbing:

- a. Mobilization in accordance with Section 9-3.4 of the Standard Specifications.
- b. Maintaining dust control at all times, by watering during the entire time of the project, whether extended or not, including developing a water supply and furnishing and placing all water for all work done in the contract, including water used for extra work.
- c. Site Clean-up.

SECTION 301 – TREATED SOILS, SUBGRADE PREPARATION AND PLACEMENT OF BASE MATERIALS

301-1 SUBGRADE PREPARATION

301-1.3 Relative Compaction

Where asphalt concrete is used as a base material and over 0.50 of a foot in depth, the subgrade shall be compacted to 95 percent relative compaction.

301-2 UNTREATED BASE

301-2.1 General

In lieu of crushed aggregate base as per Section 200-2.2 of the Standard Specifications, the Contractor may use, at the Contractor's option, processed miscellaneous base as per Standard Specifications, Section 200-2.5, or Class 2 aggregate base as per Section 26-1.02 of the State Standard Specifications. All base material shall be compacted to 95 percent relative compaction.

SECTION 306 - UNDERGROUND CONDUIT CONSTRUCTION

306-1 OPEN TRENCH OPERATIONS

306-1.1 Trench Excavation

306-1.1.1 General

Unless otherwise specified in these Specifications, excavation shall include the removal of all materials of whatever nature encountered, including rock and all obstructions of any nature that would interfere with the proper execution and completion of the Work. Payment for excavation shall be included in the installation cost of the pipe for the items involved, regardless of trench width, adjustment to pipeline horizontal and vertical alignment or realignment, and no additional compensation will be allowed.

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.

306-1.1.3.1 Trench Cave-In

Where the maximum trench width is exceeded and the trench sides are caving-in, the Engineer may, require the Contractor to use concrete or other means of special bedding for vertical distance of not less than one-half the pipe outside diameter.

306-1.1.3.2 Minimum Cover and Clearance

Unless otherwise shown on the plan, 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.

	<u>Sub-Grade</u>	<u>Finished Grade</u>
(1) 6" & 8" diameter	2' - 0"	3' - 0"
10" & 12" diameter	3' - 0"	4' - 0"

(2) Cover between top of the valve stem and the subgrade surface at the time of construction shall be 6-inches.

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.

306-1.1.5 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

Contractor shall hire a Registered Civil Engineer in the State of California to design any trench shoring for the project.

306-1.1.7 Trench Dewatering

Prior to submitting Contractor's bid, it shall be the Contractor's responsibility to determine the extent of the groundwater. The Contractor shall be responsible for removal of such groundwater per section 7-8.6.2.

Where groundwater or soft, spongy, unstable material is encountered and the native material does not afford a solid foundation for pipe sub-grade, the trench shall suitably be dewatered and a firm, stable base shall be constructed for the pipe by excavating any unsuitable material to twenty four inches minimum depth below sub-grade base, or if required a stable base shall be constructed by placing a City approved rock bedding upon which the sub-grade can be prepared. If the necessity for such additional bedding material is required for control of groundwater, the Contractor shall bear the expense of the additional excavation and bedding. All costs involved in the removal of groundwater shall be included in the contract lump sum price, and no separate compensation will be allowed.

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 9 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 material. The bedding material shall be compacted to 90% of relative density by hand or mechanical tamping method.
- (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 (spring line) 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.
- (8) In the inspection of the water mains, no more than 300 feet of pipe shall be laid without being inspected.
- (9) The Sand Bedding Material is suitable for water jetting.

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 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.

306-1.2.2.1 Systems Connections (General)

The Water Division will make all system connections to the existing mains, unless otherwise shown on the plans.

The Contractor shall verify the station, offset, depth, pipe diameter, and material of the existing connection point prior to laying the last 100 feet toward the station. The Contractor shall make the necessary cut-to-fits and shall adjust the line and grade as necessary. After the chlorination, and pressure and bacteriological 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, all labor and materials shall be charged to the Contractor to perform said work.** Valves shall be operated by City of Riverside field forces only.

306-1.2.2.2 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 pipe laying is not in progress, or at the end of the day's work, all openings in the pipeline shall be closed with watertight, rodent-proof plugs. The Contractor shall have an emergency plug at the pipe heading at all times during pipe laying 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. Contaminated material may have additional bacteriological samples taken at the Inspector's discretion. All exterior joints of the pipe laid in the trench shall be completed before the workday is stopped.

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. Materials such as jute or hemp shall not be used.

The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water. The lubricant shall be delivered in closed containers and shall be kept clean.

306-1.2.2.3 Construction Water

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 meter and an Approved Backflow Prevention Device.

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 City's Utilities Operation Center (UOC) located at 2911 Adams Street 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 Cross-Connection Technician 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. Contractor shall obtain fire hydrant meter and backflow device through RPU customer service prior to commencement of work. Customer Service can be reached at (951) 782-0330.

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.

306-1.2.2.4 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.

Contractor will install the pipeline and appurtenances in compliance with the most recent edition of requirements per Title 22 of the California Code of Regulations and the Department of Drinking Water Standards.

(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, 13' minimum.

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 re-laid 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. For pipe diameters 21-inches and smaller an accessory such as a specially designed rubber ball wrapped in burlap shall be used to screed off excess mortar leaving a smooth and continuous surface between pipe sections as it is pulled through the pipe.
- (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.

306-1.2.4.1 Field Jointing of Mortar Lined and Coated Steel Pipe.

Mortar lined and coated steel pipe and fittings shall be joined in accordance with the manufacturer's installation manual and AWWA M11. Bonding jumpers or flange insulation is required.

(1) Adjustment Pipe.

The Contractor shall provide necessary cut-to-fits to place all valves, elbows, or outlets on the design station.

(2) Joint Deflection.

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

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.

(1) Adjustment of 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.

(2) 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.

(3) Polyethylene Encasement

Polyethylene encasement shall be V-BIO type as defined by the Ductile Iron Pipe Research Association (DIPRA).

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

b. Use only 2-inch wide, 10 mil thick, plastic tape for fastening polyethylene encasement as described in section 306-10 of these special provisions.

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 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 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 and Split Butt-Straps

All welding carried out by the Contractor shall be governed by AWWA C-206, Field Welding of Steel Water Pipe, and as noted below.

(a) General

1. Field welding of steel pipes and fittings shall conform to requirements of AWWA C206. Field welding of ductile and cast-iron pipe or fittings is prohibited.
2. All welding shall be done by an unvarying arc-welding process which excludes the atmosphere during the process of deposition and while the metal is in a molten state. The size and type of electrode used, and the current and voltage required, shall in all cases be subjected to the approval of the Engineer. The type of wire and flux to be used for automatic processes shall also be subject to the approval of the Engineer.
3. Rusted or otherwise damaged electrodes shall not be used, and violation of this provision shall be sufficient cause for rejection of the work. Used flux from automatic welders shall be sifted free of fines and coarse pieces and shall have all mill scale removed before reusing.

4. All welds shall be of uniform composition, neat, smooth, full strength, ductile, and shall be made with a technique which will ensure uniform distribution of load throughout the welded section with a minimum tendency to produce eccentric stress or distortion in the weld or in the metal adjacent thereto.

(b) Quality of Welds

1. There shall be no greater evidence of oxidation in the metal of the weld than in the metal of the unwelded plate. All welded joints shall be of a type that will produce complete fusion of the plates and shall be free from unsound metal, pinholes, and cracks.

2. The finish of welded joints shall be reasonably smooth and free from grooves, depressions, burrs, and other irregularities, and there shall be no valley or undercut in the center or edges of any weld.

3. All back chipping on both automatic and hand welding, whether for repairs or preparation of the groove for the original weld, shall be subject to inspection before being filled with weld metal. All butt welds shall be back chipped with a round-nosed tool to sound metal and inspected before welding the reverse side.

(c) Field Joints

1. Field joints shall be of the weld bell and spigot type. Welded joints shall conform to the details shown on the drawings for welded field joints or for butt-strap joints where required for closure.

2. At all welded lap or butt-strap field joints, the outside weld or welds, as the case may be, shall be made with at least one (1) downhand pass and one (1) uphand pass. Fitting of butt straps shall be done with angle-bar clips and bolts pulled tight, provided that such angle-bar clips shall be removed to the satisfaction of the Engineer upon completion of welding. The use of chains and jacks to pull up straps will not be permitted.

(d) Hand Welding

a. In all hand welding, the metal shall be deposited in successive layers so that there will be at least as many passes or beads in the completed weld as indicated in the following table:

<u>Plate Thicknesses</u> (inches)	<u>Fillet Weld,</u> <u>Minimum Number of Passes</u>
3/16	1
1/4	2

5/16	3
3/8	3
13/32	3
7/16	4
15/32	4
1/2	4

More than 1/2 1 for each 1/8 inch and any remaining fraction thereof

2. For all hand butt welds and other hand welds where possible, except plain 90-degree fillet welds, the plate edges shall be so prepared that there will be sufficient angle in the welding groove to prevent side arcing of the electrode and to permit penetration at the deepest point of the groove. All such welds shall be back chipped with a round-nosed tool to clean metal on the reverse side from the side of deepest penetration before any welding is done on said reverse side. Each hand pass and each back chipped welding groove shall be subject to inspection before the ensuing pass is made. Each hand pass shall be the full width of the weld.

3. For all hand welds, not more than 1/8" of metal shall be deposited in each pass. Each pass except the final one, whether in butt or fillet welds, shall be ground and/or chipped to remove dirt, slag, or flux before the succeeding bead is applied. Each pass shall be thoroughly fused into the plates at each side of the welding groove or fillet and shall not be permitted to pile up in the center of the weld. Undercutting along the side will not be permitted.

(e) Defects

All porosity and cracks, trapped welding flux, or other defects in the welds shall be completely chipped out in a manner which will permit proper and complete repair by welding. Defective welds shall in general be repaired by hand welding; provided that the repair of defects in automatic welds shall be made on automatic welding machines where, in the Engineer's opinion, the defect is so extensive as to make a hand repair undesirable.

(f) Contractor's Equipment

The Contractor's equipment for all welding and flame cutting shall be designed and maintained in such condition, at all times, as to permit qualified welding operators to obtain the requirements prescribed in these specifications. In all welding by an automatic process, both the rate of deposition of weld metal and the rate of travel of the electrode shall be automatically controlled. The submerged arc process shall be used for automatic welding.

(g) Welders

1. Welding shall be done by skilled welders who have had adequate experience in the method and materials to be used. All welding operators shall be qualified under the standard qualification procedure of the latest edition of the ASME Boiler and Pressure Vessel Code, Section IX, Welding Qualifications. Any welder or welding operator performing work under this contract shall have been qualified for the process involved within the past three (3) years.

2. The Contractor, when required by the Engineer, shall conduct tests of his welders to determine their ability to produce welds that are in compliance with these specifications. Tests shall be made in accordance with the above-named qualification procedure using machines and electrodes similar to those that are to be used on the work and in the presence of the Engineer, who shall determine the quality of the work done. In lieu of tests conducted in the presence of the Engineer, the City may require that welders be qualified under the ASME qualification procedure by a testing agency approved by the City. The specimens shall be welded in the same position in which the welder is qualifying to work, and the same number of passes shall be used.

3. The City may call for additional test plates as the work progresses and may demand the removal of any welder from the work under the contract whose work on the pipe is not satisfactory, regardless of the quality of the test welds. The Contractor shall furnish all materials and bear all expense of qualifying welders.

4. The sequence of welding and all welding procedures shall be subject to approval by the Engineer.

Field Weld joints shall have the exterior joint recess grouted; split butt-straps shall be coated with a stiff Class "C" mortar in accordance with the Standard Specification and reinforced with expandable metal lath or two layers of 2" x 4" x 13-gauge weld mesh.

306-1.3 BACKFILL AND DENSIFICATION

306-1.3.1 General

The backfill material as defined in the Standard Specifications shall include the following:

(1) The Backfill Zone shall be considered as the volume between the top of the bedding zone to the bottom of the paving base material.

(2) The excavated material is not suitable to be used within the pipe zone nor in the pipe bedding zone unless the excavated material is blended with imported coarse grain sandy soil to meet the project specifications. The excavated material is suitable to be used as backfill material in the pipe trench zone provided it is free from organic matter and other deleterious materials.

(3) Backfill material shall consist of moist clean loose earth, sand, gravel, or rock free of clay and silt as well as brush, roots, and organic substances. From the top of selected backfill for the bedding material to within 1 foot of ground surface or pavement subgrade, backfill material shall be free of material exceeding 3 inches in greatest dimension. It shall also be compacted to 90 percent relative compaction minimum. Within 1 foot of ground surface or pavement subgrade, backfill material shall be free of material exceeding 2 inches in greatest dimension and it shall be compacted to 95 percent relative compaction minimum. Rocks shall be mixed with suitable soil to eliminate voids; they shall not be nested. Backfill material shall be well graded.

(4) Backfill material shall be placed in lifts not exceeding 12 inches in thickness (loose measurement) and each lift shall be compacted to 90 percent relative compaction minimum by hand tampers, pneumatic tampers, or mechanical compactors except that the upper 12 inches of backfill shall be compacted with mechanical compactors or compaction equipment, excluding stompers, to 95 percent relative compaction. Alternatively and except for the upper 12 inches of backfill, sandy, granular soils may be densified by water settlement. Trench to be backfilled by water settlement shall be diked at suitable intervals not exceeding 100 feet. Impounded water shall be of sufficient depth so that earth pushed or shoveled into trench will at all times fall into water, becoming completely saturated. If necessary, jetting may augment flooding. Backfill densified by water settlement shall be densified to 90 percent relative compaction minimum. Contractor shall use mechanical compactors or compaction equipment, excluding stompers, to achieve required compaction if required densification is not achieved by water settlement.

(5) Internal pipe bracing or strutting shall not be removed until the backfill material is compacted to the specified requirement. If the backfill material is densified with water, the bracing shall not be removed until the backfill material has settled and dried.

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 Floatation 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.

306-1.3.3.2 Compacting

The native backfill material is not suitable for water jetting.

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

306-1.5.1.1 Temporary Resurfacing

Temporary resurfacing, 3-inches deep (minimum), will be required at the following locations:

- (a) All paved trench areas.
- (c) Temporary pavement shall be maintained in a smooth cohesive condition, flush with the existing pavement, until replaced by permanent pavement. Any voids, ripples, breaks, etc., shall be repaired before the end of the workday.

306-1.5.2.1 Permanent Resurfacing

Permanent resurfacing shall consist of placing the asphalt concrete pavement material in accordance with the City of Riverside, Public Works Department, Standard drawing 453, and these Specifications.

The Contractor shall adjust all water facilities to finished grade, clean the inside of the valve boxes, clean pavement off the valve lid, prime and paint per CWD-515.

Re-stripping of the streets shall be done by the Contractor per City standards.

306-1.5.3 Sanitary Sewer Clearance

Broken or damaged sanitary sewer laterals shall be immediately repaired or remodeled per PWD Standard Drawing Nos. 554-1 and 2. The Contractor shall support and backfill the sanitary sewer lateral at said locations.

306-2 JACKING OPERATIONS

306-2.1 General

The Water Division will provide a grade point for establishing the casing pipe elevation for the Contractor and layout the jacking pit with hubs. The Contractor shall submit for approval, a drawing of the jacking pit, showing the pit dimensions and the shoring plan and steel plate design, if necessary.

The Contractor shall provide the necessary traffic control equipment in compliance with Section 7-10 of these specifications.

- a. The ends of the casing pipe shall be sealed with brick and mortar. The void area between the carrier pipe and the casing pipe shall be filled with sand slurry.
- b. The end of the casing pipe shall be square cut by mechanical methods.
- c. The Contractors Surveyor shall check the grade and the alignment of the casing pipe.
- d. All casing pipe length shall be equal to the auger length.

Jacking pits left open overnight require the approval of the Engineer. Any and all additional cost for approval and requirements shall be at the expense of the Contractor.

The Contractor's representative in charge of the jacking operations shall have a minimum of two years field experience and shall be on the job site at all times when jacking work is in progress.

The Contractor shall call the Senior Engineer of the State of California, Division of Occupational Safety and Health, Mining and Tunneling Unit, (909) 383-6782, to setup a pre-job conference at the job sites.

306-2.3 Jacking Steel Casing

The Contractor shall be responsible for all cutting and welding of the casing pipe for the project. The lengths of the casing pipe shall be in even multiples of ten feet, unless otherwise specified by the boring contractor and approved by the Engineer. This does not apply to field cut sections. The casing pipe can be used pipe if it meets the same specification as new pipe and approved by the Engineer.

306-2.5 Tolerances

Jacking tolerances shall be between 1 percent right and 1 percent left from the survey line and shall be between 1 percent up and 1 percent down from the theoretical grade.

306-9 APPURTENANT PIPELINE STRUCTURES AND INSTALLATION

306-9.1 General

The Contractor shall furnish all transportation, materials, equipment, and labor to complete the excavations, backfill materials, street repairs and other earthwork incidental to the construction of appurtenant structures and appurtenances, and any work necessary or incidental to provide a complete and operating water main as contemplated in the plans and these Specifications.

306-9.1 Flange Insulation and Test Lead Installation

- a. No less than 2 snug fitting alignment pins shall be used in aligning the flanges for the insulating joints. These pins shall remain in place until the bolts have been installed in all the remaining holes and have been drawn up tightly.
- b. The City shall make electric tests after the installation to ensure that the insulating sections are effective.
- c. The #4 stranded copper test leads shall be attached to steel pipe with Cadweld HA-3 connection, CAHAA-IL W/F33, standard charge; and to Ductile Iron Pipe with Cadweld HB connection, CAHBA-IL, XF-19 charge.
- d. Mix and firmly apply epoxy putty to provide a watertight seal at least 1/4-inch thick over weld and bare wire. Overlay wire insulation by 1/2-inch.
- e. Upon completion of the project and prior to placing the trench pavement, the Contractor, at his own expense, shall hire a qualified testing firm to test the continuity of all bonds. Tests shall be conducted between test stations and the measured resistance shall not exceed the theoretical resistance by more than 130%. All test data shall be submitted to the Engineer for review and approval. Contractor, at his own expense, shall repair all bonds that fail the continuity test and shall retest those sections for continuity.

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 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 has been pressure tested, at the test pressure.
6. "Valve Location Ties" shall be made by City Forces either in accordance with Section 306-9.8 in these Special Provisions or as a white 4" x 4" witness post set at the property line.
7. 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.
8. Butterfly valves shall be installed with the valve operator on the "up station", right side of the valve.

306-9.4 Valve Box Installations

1. The Contractor shall install valve box cap and rim, 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 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 primer after fabrication.
6. The valve box caps shall be set flush to 1/4" above the finished pavement surface.
7. Where valve box or Manhole installations are not within paved areas, a 6-inch

thick concrete pad, 520-A-2500, 24-inches greater in diameter shall be formed around the appurtenance.

8. The valve box cap shall be painted per paint schedule, Section 310-1.1.1.

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 piping between the outlet valve and the pumper riser shall be at a continuous downgrade of not less than 1/4-inch per foot.

2. Where blowoff manholes are placed in sidewalk areas, the sidewalk shall be saw-cut and removed to the nearest score line. The manhole cover and rim shall be set to sidewalk grade and the sidewalk replaced.

3. Where blowoff manholes are placed in unpaved areas, the cover and rim shall be set flush with the existing edge of pavement or as directed by the Engineer.

4. The manhole cover and rim shall be Alhambra Foundry A-1252, diamond thread finish and lettered CWD.

5. The manhole cover and rim shall be painted per paint schedule, Section 310-1.1.1.

6. The blind and mating flange shall be painted with two (2) coats of primer paint.

306-9.5.1 Temporary Blowoff Installations

1. 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.

2. Should the Contractor use a concrete thrust block, Contractor 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 system connection 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 elbow on the air valve riser shall be at a continuous up grade of ¼-inch per foot.
4. On 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.

306-9.7 Terminal Housing Installations

1. The Contractor shall install terminal housing boxes at the locations shown on the Standard Drawings.
2. All terminal housing boxes located in the sidewalk or paved areas shall be set flush with the existing surface.

306-9.8 Concrete for Thrust, Anchor, and Bearing Blocks

1. Concrete thrust blocks and anchors 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. Structural steel exposed directly to the soil shall be coated with Koppers #50

bitumastic coating, or a City approved equal, prior to pouring the thrust blocks.

306-9.9 CURB MARKINGS

"Location ties" for valves and blow-offs shall be marked by the Contractor with a 2" x 1/2" wide "+" using blue marking 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-inch-high lettering. One set of the Plans shall be marked with the locations and dimensions and submitted to the Engineer upon completion of the Work. "Location Ties" shall be installed by City Forces.

The locations of all services shall be marked with a chiseled "+" on the **curb face**. The pipeline 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 grinded in the curb by the Contractor at the time of construction. The grind "+" shall be 2" high by 2" wide and 1/8" deep.

306-9.9.1 Abandoning Curb Markers

After the existing water valves have been abandoned, the Contractor shall remove existing painted "Location Ties" to the satisfaction of the City. All stray markings shall be removed by Contractor.

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 to any tap, fitting, or joint.
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. Meter boxes shall not be placed in driveways except as approved by the Engineer.

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 shall be 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, all labor and materials to perform said 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 "No-Ox-Id-Grease" 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.

SECTION 310 - PAINTING

310-1 General

Refer to Section 210-1.5 for description of color designation and approved manufacturers.

310-1.1.1 Painting Schedule

<u>Item</u>	<u>Color (1)</u>	<u>No. of Coats</u>
Gate Box Caps and Rims	Red (primer)	1
	Blue	2
Air Valves	Red (primer)	1
	Green	2
Guard Posts	Red (primer)	1
	Yellow w/ Blue Top	2
Fire Hydrants	Red (primer)	1
	Yellow	2
Curb Markings	Blue	1

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

310-5.6.1 General

Striping and pavement markings for temporary detours and pavement restoration, shall conform to the provision of Sections 210, "Paint and Protective Coatings" and 310-5.6 "Painting Traffic Striping, 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, Construction Inspector, phone (951) 826-5341.

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 7-10.4.5, "Public Safety During Non-Working Hours" of these Special Provisions.

As an option, reflective adhesive tape may be utilized for temporary striping as directed by the Engineer. 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. Temporary striping shall also include the designation (paint or type) of crosswalks at signalized intersections.

The Contractor shall remove all reflective adhesive tape applied to the pavement surface as directed by the Engineer.

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 7-10.4.5 of the Special Provisions will apply.

SECTION 312 - PAVEMENT MARKER PLACEMENT AND REMOVAL

312-1.1 Placement of Reflective Markers

Contractor shall be required to furnish and install Type I two-way blue reflective markers as shown on the Public Utilities Department Standard Drawing C.W.D. - 700.

312-3.1 Traffic Stripe and Pavement Marker Removal

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

SECTION 313 "AS BUILT" DRAWINGS

After construction has been completed, and before pressure testing and flushing can commence, "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, and stationing of all water service laterals and their run length. Service connections to the main are stationing on pipeline stationing. The Contractor shall show lengths of installed services and stationing of service saddle and note any deviations from the original plans on the "As Built" drawings. "As Built" drawings shall be prepared electronically and in PDF format, all deviations from the original plan will be on a clean print and shall be legibly marked in red ink. If the contractor requests to substitute a component for one that was already submitted and approved, the contractor will identify the location of the alternative manufacturers component and make note in the "As Built" drawings as to its location and the necessary information contained within this section. The "As Built" drawings are required to be submitted to RPU Inspector for acceptance and returned to the contractor "approved" prior to scheduling hydrostatic tests and at the engineer's discretion.

The following as-built information must be contained within the submitted drawings:

Valves (Gate and Butterfly):

STA:

Manufacturer (Mfr):

Model:

Size:

No of turns:

Fire Hydrants:

STA:

Mfr:

Model:

Lateral length:

Model of check valve (where applicable):

Gate valve: Mfr / Model / Size / # of Turns:

Water Services (including Fire Services):

STA:

Size:

Length:

Air Release Valves & Blow-Offs:

STA:

Mfr:

Model:

Size:

Length:

Gate valve: Mfr / Model / Size / # of Turns:

Alignment (vertical and horizontal) breaks:

For horizontal breaks: orientation from pipe alignment: N (north); S; E; or W

PART 7 - TESTING & DISINFECTION OF WATER MAINS & APPURTENANCES

700-1 GENERAL

All water mains and appurtenances shall be tested for pressure and leakage, shall be disinfected, and bacteriological tests accepted by the City of Riverside Public utilities prior to utilizing the water mains and appurtenances 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) All blowoffs, air valves, services, hydrants, and other appurtenances have been installed and adjusted to final grade and location.
- (2) The backfill material shall have been compacted to the required compaction through the 90 percent compaction zone as shown on CWD-040- 1 & 2.
- (3) All concrete anchor and thrust blocks shall have cured for a minimum of three (3) days.
- (4) Base materials, with the exception of the final surface course of asphalt concrete, may be placed prior to the pressure test.
- (5) "As-built" drawings and all affidavits and certificates of compliance have been submitted to the Inspector and returned approved.

The pressure test shall be maintained on the test section not less than two (2) hours. The

Contractor may at Contractor's convenience conduct a preliminary pressure test at any time 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 lowest elevation of the water main under test.

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 a 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, at no additional cost to the City.

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 200 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.

The lengths of fire hydrant, blowoff, or air valve laterals and service lines are not included in the overall length of pipe in determining the allowable leakage. All welded sections of steel pipe mains are also excluded from the calculated allowable leakage.

All noticeable leaks shall be stopped regardless of the results of the test. 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) Non-welded steel joints
15 gal/in. dia./mile/24 hours
- (2) Ductile Iron Pipe and CML&C Steel Pipe
15 gal/in. dia./mile/24 hours
- (3) Welded Joints – 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. Any retesting shall be at Contractor's expense.

The pump, pipe connection, measuring devices and all other equipment, labor and materials necessary for performing the leakage test shall be furnished by Contractor. The Engineer will use the City's measuring device and pressure gauge. An RPU allowable pressure leakage form will be populated by the Engineer and maintained as record of test results.

700-4 FLUSHING

The new mains shall be cleaned and 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 feet per second. 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 pipeline from the point of filling to the point of blow-off.

The Contractor should verify that proposed hydrants to be used have adequate pressure to perform his flushing operation. If necessary, the Contractor shall use a pump to acquire adequate pressure for his flushing operation, all in his expense. The following table is a guide only:

REQUIRED OPENINGS TO FLUSH PIPELINES
(40 psi Residual Pressure)

Pipe Size	Flow Required to Produce 2.5 ft/sec	Orifice Diameter	Hydrant Number	Outlet Diameter
INCHES	GPM	INCHES		INCHES
4	100	15/16	1	2-1/2
6	220	1-3/8	1	2-1/2
8	390	1-7/8	1	2-1/2
12	880	2-13/16	1	4-0
16	1570	3-3/4	1	4-0

If, in the opinion of the Engineer, dirt enters the pipe, the interior of the pipe shall be cleaned and swabbed as necessary with five percent hypochlorite disinfecting solution.

It is the responsibility of the Contractor to dispose of the flushed 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 shall provide adequate drainage from the site.

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

2-inch backflow devices:..... 160 gpm

2-inch fire hydrant meter:..... 200 gpm

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

700-5 CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SANTA ANA REGIONAL PERMIT

Contractor shall channel (using sandbags or other means) flushing flow. Contractor shall protect all property from flooding and other damage during flushing operations. Contractor

shall post "flooding ahead" signs in streets as required and as directed by Engineer. Because of demand on existing water system, the Engineer may require Contractor to flush the pipeline over several days, in the evenings, weekends, or holidays, at Contractor's expense.

Contractor shall not allow any discharges from the construction site which may have an adverse effect on receiving waters of the United States.

Contractor shall, at his expense, obtain a discharge permit from the California Regional Water Quality Control Board, Santa Ana Region (Regional Board) for discharge of water from trench dewatering, line flushing, and testing operations. A copy of said discharge permit shall be provided to the City. Contractor shall comply with conditions therein and perform the monitoring required. If the Regional Board determines that a discharge permit is not required for said work, then the Contractor shall comply with any and all applicable criteria and conditions established by the Regional Board, including compliance with the requirements of the General Water Discharge Requirements for Discharges to Surface Waters which pose an insignificant threat to water quality (Order No. 98-67).

Order No. 98-67 includes submittal of a Notice of Intent and a waste discharge report to the Regional Board. In addition, Template Monitoring and Reporting Program No. 98-67, appended to Order No. 98-67, includes the following monitoring and reporting requirements:

1. Estimate and report daily discharge flow, collect samples of each discharge and have them analyzed for the 8 parameters listed on Pages 2 and 3 of the Template Monitoring and Reporting Program No. 98-67. All samples shall be representative of the waste discharge under conditions of peak load.

All sample collection, sample preservation, and analyses shall be performed in accordance with the latest edition of "Guidelines Establishing Test Procedures for Analysis of Pollutants" promulgated by the U.S. Environmental Protection Agency (40 CFR 136). All sample analyses shall be performed by an analytical laboratory certified by the California Department of Health Services to perform such analyses.

2. Report any discharge which is in violation of the discharge specifications (Order No. 98-67) to the Regional Board, Santa Ana Region within 24 hours.
3. Notify the Regional Board 5 days before commencing any discharge.
4. Prepare monthly monitoring reports for submittal to the Regional Board. The reports shall include:
 - a. Results from all analyses for the previous month.
 - b. Daily flow data.
 - c. A report detailing Contractor's compliance or noncompliance with Order No. 98-67 and the discharge authorization letter.

700-6 DISINFECTION

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

Contractor must use one of the RPU approved companies who are licensed to perform chlorination. List of approved companies will be provided by the Contract Administrator. Should the contractor choose to use a different company, of equal qualifications, contractor shall obtain prior approval from the Contract Administrator.

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 re-chlorinated 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 ensure 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.

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

2-inch backflow devices:..... 160 gpm

2-inch fire hydrant meter:..... 200 gpm

700-7 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 or 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 laboratory technician and transported to the laboratory for testing. Such tests shall meet DPH 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 is required for two consecutive days, 24-hours apart. All samples, each day, must indicate ten tubes negative and have a standard plate count of less than 500. Failure of any sample will require complete retesting, under these procedures, for two consecutive days. Testing laboratory shall fax results to Public Utilities, Water Division at (951) 826-2498 immediately, once results are known. If a sample test fails any of the one or two day tests, then the Contractor is directed to contact the Water Division immediately.** It is very important that all test results be submitted in writing to the Water Inspector as soon as available.

Contractor must use one of the RPU approved companies who are licensed to perform water quality sampling. List of approved companies will be provided by the Contract Administrator. Should the contractor choose to use a different company, of equal qualifications, contractor shall obtain prior approval from the Contract Administrator

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.

700-8 CONTRACTOR'S RESPONSIBILITY FOR TESTING AND DISINFECTION

It is the sole responsibility of Contractor to construct a water main which passes the pressure and leakage test and to complete the 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 undisinfecting mains whether by their workmen, subcontractors or any other person who may come in contact with the water from the undisinfecting 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.

Water required for the initial filling, pressure testing, leakage testing, flushing and chlorination, may be obtained from an existing City of Riverside main or fire hydrant by use of a City of Riverside Water Division meter and an Approved Backflow Prevention Device.

All water must be measured through a City of Riverside Water Division meter. The Contractor may use Contractor's own Approved Backflow Prevention Device; however, it

shall be approved by the City of Riverside, Backflow Program Specialist before use. The operation of any valve on any existing main shall be performed by the utility owner.

700-9 SYSTEM 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 meter backflow 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.