

PART 3 - CONSTRUCTION METHODS

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

SECTION 306 - UNDERGROUND CONDUIT CONSTRUCTION

306-1 OPEN TRENCH OPERATIONS

306-1.1 Trench Excavation

306-1.1.3 Maximum and Minimum Width of Trench

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

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

306-1.1.5 Removal and Replacement of Surface Improvements

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

306-1.1.6 Bracing Excavations (Trench Shoring)

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

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

306-1.1.7 Minimum Cover and Clearance

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

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

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

306-1.2 INSTALLATION OF PIPE

306-1.2.1 Bedding

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

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

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

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

otherwise specified.

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

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

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

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

306-1.2.6 Field Jointing of (Ductile) Iron Pipe

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

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

(a) Cement Joints

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

(b) Adjustment Pipe

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

(c) Joint Deflection

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

(d) Polyethylene Encasement

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

306-1.2.6.1 Flanged Joints (General)

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

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

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

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

306-1.2.6.2 Flexible Couplings (All Pipe)

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

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

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

306-1.2.14 Welded Joints

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

306-1.2.15 Sanitary Precautions

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

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

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

306-1.2.16 Construction Water

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

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

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

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

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

306-1.2.17 Pipe Installation

(1) Loading, Transporting, and Unloading

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

(2) Defective or Damaged Material

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

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

(3) Installation

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

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

(4) Ductile Iron Pipe

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

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

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

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

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

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

(5) Cement Mortar Lined and Coated Welded Steel Pipe

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

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

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

306-1.3 BACKFILL AND DENSIFICATION

306-1.3.2 Mechanically Compacted Backfill

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

306-1.3.3.1 Water Densified Backfill

Floataion of Pipe

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

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

306-1.4 Testing Pipelines

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

306-1.5 TRENCH RESURFACING

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

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

306-1.5.1 Temporary Resurfacing

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

306-9 INSTALLATION OF APPURTENANCES

306-9.1 General

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

306-9.3 VALVE INSTALLATIONS

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

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

306-9.4 VALVE BOX INSTALLATIONS

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

306-9.4.1 Valve Box Adjustments

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

306-9.5 BLOW-OFF INSTALLATIONS

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

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

306-9.6 AIR VALVE INSTALLATIONS

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

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

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

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

306-9.9 CURB MARKINGS

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

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

306-9.11 WATER AND FIRE SERVICE WET TAP VALVE INSTALLATIONS

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

306-9.12 SERVICE INSTALLATIONS

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

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

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

306-9.13 PRECAST VAULT, MANHOLE & METER BOX INSTALLATIONS

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

306-9.14 CONNECTIONS TO EXISTING MAINS

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

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

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

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

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

306-10 PROTECTIVE COATING

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

306-11 FIRE HYDRANT INSTALLATIONS

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

310 PAINTING

310-1 General

310-1.5 Painting Schedule

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

310-5.7 Traffic Stripe and Pavement Marker Removal

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

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

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

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

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

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

313 "AS BUILT" DRAWINGS

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

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