BASIC SPECIFICATIONS

SECTION C

WATER PIPELINE CONSTRUCTION SPECIFICATIONS

1. WATER PIPE INSTALLATION

A. General

The Contractor shall furnish and install all water pipeline material required for the construction of the water pipeline and appurtenances as herein specified and shown on the Drawings. All pipeline material shall be installed per manufacturer's published recommendations and per the applicable published standards for the particular material being installed unless otherwise modified herein. In case of any conflict, the most stringent and highest requirement shall govern, and the Contractor shall adhere to said requirement, all at no additional cost to the District.

B. Installation

Pipe shall be accurately laid to alignment and grade shown on Drawings or established by District. Each section of pipe shall be lowered into trench in a manner that will prevent injury to pipe, coating, or joints and shall be carefully bedded to provide continuous bearing and prevent uneven settlement. Inside of pipe shall be clean and free from foreign material of any kind before being installed. Contractor will lay pipe units with bell ends in direction of laying, unless otherwise ordered by District or set forth in these Specifications and Drawings.

C. Handling

Contractor may find it necessary to move or haul pipe during progress of the work. Dropping or bumping of pipe will not be permitted, and all damaged pipe will be rejected. Rejected pipe may be repaired if permitted by District, and such repairs shall be subject to approval of District. If pipe is damaged beyond repair through Contractor's hauling or moving program, Contractor shall, at their own expense, replace the pipe. After District and/or material supplier has delivered pipe to Contractor in good order and condition on the job, it shall be Contractor's

responsibility to keep it in good condition, and they shall repair or replace, at their own expense, any pipe damaged from any cause after delivery.

Contractor shall take all necessary precautions to prevent pipe from floating due to water entering trench from any source, shall assume full responsibility for any damage due to this cause, and shall, at their own expense, restore and replace pipe to its specified condition and grade if it is displaced due to floating. Contractor shall maintain inside of pipe free from foreign materials and in a clean, sanitary condition until its acceptance by District.

At all times when work of installing pipe is not in progress, all openings into pipe and ends of pipe in trench shall be tightly closed to prevent entrance of animals and foreign materials.

D. Joints (CML/CMC Pipelines)

(1) Type of Joints and Bonding Requirements

Water pipeline joints shall be constructed in accordance with District Standards. All joints shall be fully welded LAP joints. The minimum number of weld passes shall be per the Welding Specifications Section C.2B contained herein. Where indicated on the Drawing, Contractor shall install insulation flange kits in accordance with District requirements.

(2) Field Joints - Cement Mortar Lining

Mortar shall be Hubs all patch quickset non shrink commercial grout or a District approved equal packaged dry mortar mix consisting of one part cement and three parts sand. Quantity of water shall be sufficient so that when mortar is firmly compressed into a ball shape, it will hold its shape without slump. Mortar shall be mixed separately for each joint to be patched.

Special care should be taken to avoid damage to lining or coating during lowering pipe into trench.

(3) Field Joints - Cement Mortar Coating

Outside field joints are required to be coated with cement-mortar. This shall be accomplished by wrapping a canvas or paper diaper around the joint. The diaper is held on each side by steel strapping. Cement mortar shall be composed of 1 part cement and not more than 3 parts sand and mixed to a consistency of thick cream. The top of the pour must be covered with a protective material, such as cloth or paper.

E. Curved Alignment

Laying pipe on curved alignment with unsymmetrical closure of spigot into bell rings shall be permitted as recommended by pipe manufacturer. For the purpose of reducing angular deflection at pipe joints and for closure sections, Contractor shall be permitted to install pipe sections of less than standard length.

Closing courses and short sections of pipe shall be fabricated and installed by Contractor as found necessary in the field. Where closing pieces are required, Contractor shall make the necessary measurements and shall be responsible for their correctness.

F. Manufacturer Access

Pipe manufacturer shall have free access to the work during laying operations and testing. Any improper act on the part of Contractor which pipe manufacturer may observe shall be reported to District.

G. Allowable Variations in Pipeline Alignment

The pipeline alignment, as shown on the Plans, was determined from record land net data and interference information obtained from contacting the various utilities, along with conducting a field check during design. After the award and prior to the commencement of construction, it will be necessary to review the pipeline alignment shown on the Drawings, just prior to Contractor's trenching for verification of field conditions regarding interference facilities. Contractor and, Engineer and District shall field-review each section of the proposed pipeline to verify the alignment for trenching purposes. The specifications provide that the

District may vary pipe alignment (ALL AT NO ADDITIONAL COST TO THE DISTRICT).

H. Pipeline Cover

Pipeline cover as shown on the attached Standard Drawings and/or the Design Drawings, is hereby defined to be Design Cover over pipeline. Therefore, should field conditions determined at time of construction show that any pipe grade changes are required, District reserves the right to authorize said changes in pipeline grades, and Contractor shall trench and lay pipeline accordingly, ALL AT NO ADDITIONAL COST TO THE DISTRICT.

All pipeline within public roadways shall be installed with no less than 48" of cover below road grade (or projected existing road grade, in case of embankments) unless otherwise shown on the Drawings or approved by the Engineer.

I. PVC Waterlines

(1) Bedding Pipe

Each section of pipe shall be lowered into the trench in a manner that will prevent injury to the pipe, or joints and shall be carefully bedded to provide continuous bearing and prevent uneven settlement. The inside of the pipe shall be clean and free from foreign material of any kind before being installed.

For PVC pipe and ductile iron pipe with mechanical joints, the gasket shall be placed in the groove of the bell. Lubricate the spigot end into the bell and force into position per manufacturer's recommendation.

(2) Laying and Jointing PVC C909

Trenches shall be in a reasonably dry condition when the pipe is laid. Necessary facilities shall be provided for lowering and properly placing the pipe sections in the trench without damage. The pipe shall be laid carefully to the lines and grades given and the sections shall be closely jointed to form a smooth flow line. Where no grades are given, pipe shall be laid in a smooth continuous grade between connections to other mains, blowoffs

and/or air release valves with a minimum cover of 48". Immediately before placing each section of pipe in final position for jointing, the bedding for the pipe shall be checked for firmness and uniformity of surface.

(3) Field Hydrostatic Test (PVC)

For convenience of testing, the pipeline may be divided into sections and each section tested separately. All pipe shall be tested to the pressure rating of the pipe and not less than the pipe's pressure rating:

C909 PVC Class 235 Test Pressure: 235 psi

C909 PVC Class 305 Test Pressure: 305 psi

If any leakage is evidenced in the testing of the pipeline, the various sections of the pipeline shall be isolated for testing between available valves, or between bumpheads located as approved by the District. The maximum allowable leakage for PVC pipe shall be six (6) gallons per day per mile of pipe per inch of pipe inside diameter. If the leakage exceeds this amount, the section being tested will be considered defective. The Contractor shall determine the points of leakage, make the necessary repairs and perform another test. This procedure shall be continued until the leakage in each section falls below the allowable maximum for that section of pipeline.

Leakage shall be determined by metering the water injected into the pipeline while under the required pressure. The Contractor shall submit to District before and after the test the gate and meter used so that these devices may be tested by District.

The Contractor shall provide all calibrated meters for measurement of leakage, all bump heads or skillets, piping, calibrated gages, pumps and other equipment, all water not furnished by District, and all power and labor necessary for the performance of pressure tests satisfactory to the District. The Contractor shall furnish all necessary equipment and labor to fill each section of pipeline tested and for pumping the water from one test section to another as may be necessary for obtaining and maintaining the required

water pressure and for filling the entire pipeline with water after the conclusion of the testing, as hereinafter provided.

The Contractor, at their own expense, shall do any excavation necessary to locate and repair leaks or other defects which may develop under test, including removal of backfill already placed, shall replace such excavated material, and shall make all repairs necessary to meet the required water tightness after which the test shall be repeated until the pipe meets the test requirements. All tests shall be made in the presence of the District. After the pipe has successfully met all test requirements specified herein, the entire pipeline shall be filled with water and so maintained until the completion of the contract unless otherwise ordered by the District.

(4) Thrust Restraint

Thrust restraint shall be accomplished by the use of restrained joints as specified in Basic Specifications, Section B.

J. Measurement and Payment

(1) Pipe

Contractor shall understand that pipeline lengths are approximate and are to be used for establishing unit bid prices and extensions for comparison of bids. UNLESS OTHERWISE STATED IN THE "SPECIAL REQUIREMENTS", all payments shall be based upon said unit bid prices applied to the net centerline pipeline length (station difference - or length shown on drawings) installed by Contractor and shall include all specials, tees, bends, fittings, etc., except when shown otherwise on Bidding Sheet.

The District shall approve pipeline length used for payment purposes. The District reserves the right to increase or decrease the amount of pipeline indicated on Drawings and Bidding Sheet, with no change in Contractor's unit bid price.

Contractor shall include under pipeline unit bid prices, all costs to completely perform all contract work, including but not limited to, the construction of thrust blocks, locator wire along non-metallic pipelines,

shoring methods and materials, and supplying barricades or other safety devices, except costs which are specifically required to be included under separate bid item numbers on Bidding Sheet.

(2) Pipeline Appurtenances

All pipeline appurtenances, including air valve installations, blowoff installations, fire hydrant installations, main line valve installations, side outlet valve installations, blind flange installations, valve marker installations, guard post installations, slope protection cut-off wall installations, slope protection cut-off ditch installations, pedestal mounted terminal housing installations for direct burial cable used and for cathodic protection use, specified connections, specified appurtenances, etc., are shown in detail on Standard Drawings attached in back of these Specifications or are described in the Specifications and/or Drawings. Contractor shall understand and agree that District may elect to eliminate all or a portion of said installations and that they shall receive payment in amount bid therefore, only for those installations they actually constructs.

2. WELDING SPECIFICATIONS

A. General

All welding operators shall be qualified under the Standard Qualification Procedure of the American Welding Society and all applicable provisions of the latest edition of "Structural Welding Code" (ANSI/AWS D1.1) published by the American Welding Society are incorporated into this Specification. Contractor shall adhere to all Cal-OSHA, American Welding Society, American National Standards Institute and local agency safety regulations (including fire) regarding all welding operations.

The District shall have the right at any time to call for and witness making of test specimens by any welder in accordance with these Specifications, and the expense of such tests shall be borne by Contractor.

The provisions of these sections do not apply to the fabrication of pipe or special fittings in conflict with AWWA Standard Specifications for pipe.

All hand welding in both shop or field shall be done by welders certified in accordance with ASA B31.1 latest (AWWA C206-latest).

All welds shall be made by an electric shielded arc method of welding.

Plates shall be held in correct position. Abutting edges shall be properly prepared. Each deposited layer of welded metal shall be thoroughly cleaned before additional metal is applied to its surface. Finished weld bead shall be central to the seam, and the finished joint shall be free from depressions, undercut edges, burrs, irregularities resulting from welding, other than normal bead necessary.

All welds shall be a type that will produce complete fusion with base metal and shall be free from cracks, oxides, and gas pockets within the limits set forth under these Specifications. If the automatic welding machine does not obtain a fusion weld that will penetrate through to the inside of the pipe and protrude beyond the contour of the plate surface, an inside pass shall be made in the root of the groove on the inside of the pipe. Chipping out of the weld in the root of the groove will be required when deemed necessary by the District.

If welding is stopped for any reason, special care shall be taken when welding is resumed to obtain complete penetration between welded metal, plate, and welded metal previously deposited, and if flux is used, it must be redistributed before work is resumed.

The height of the outside weld bead above the contour of the plate surface shall be measured and shall be not less than 1/16-inch. Heights of the outside weld bead above the contour of the plate surface exceeding l/8-inch shall be removed by grinding or chipping.

Welds found deficient in dimensions but not in quality shall be enlarged by additional welding after thorough cleaning of the surface of previously deposited metal and adjoining plate. However, if work performed since making a deficient weld has rendered the weld inaccessible or has caused new conditions which would make such reinforcement dangerous or ineffective, the original conditions shall be restored by removal of welds, members, or both, before enlarging the deficient weld, or the deficiency shall be compensated by additional work as prescribed by the District.

Welds considered by the District to be deficient in quality or made contrary to any mandatory provision of these Specifications shall be removed by chipping or melting and shall be remade. The weld metal shall be removed throughout its depth to expose clean base metal, but if a strictly local deficiency, the weld need not be removed throughout its entire length, provided that sufficient amount shall be removed to ensure that sound weld metal only remains. A cracked weld shall be removed throughout its length.

When removing part or all of a weld by cutting or chipping, such cutting or chipping shall not extend into the base metal beyond the depth of weld penetration. When removing part or all of a weld by melting, care shall be taken not to burn or otherwise injure the base metal. After the melting operation, burned metal shall be removed to clean, sound metal.

Overheated weld metal and any overheated base metal adjoining same shall be removed and replaced by new weld metal properly applied. However, if the plate is so badly or extensively injured by overheating that it cannot satisfactorily be replaced by weld metal, such additional work as prescribed by the District shall be performed, all at their own expense, with no additional compensation.

All longitudinal, spiral, and girth seams of straight pipe sections, and special sections when practicable, shall be welded with an automatic welding machine. If requested, sample welds shall be submitted to the District for testing in accordance with these Specifications. Approval of such tests shall be required prior to welding of pipe.

Hand welding will be permitted only when it is impracticable to use an automatic welding machine.

Fillet welds shall have full penetration into the corner. Excessive cutting back of the edges of fillet welds is a defect and shall be repaired. Butt welds shall be made by adding weld metal to both sides of the joint, and the underside of the weld in groove shall be chipped out, removing all slag and unsound metal, containing a clean surface for the application of weld metal; in making butt and fillet welds, weld metal shall be deposited in successive layers, so there will be as many passes as there are complete multiples of 1/8-inch in the plate thickness, provided there shall be a minimum of two passes.

B. Field Welded Pipe Joints

Welded field joints in steel pipe shall be lap welded unless otherwise shown. Welders shall be certified in accordance with the American Standard Code for Pressure Piping (ASA B31.l) or the "Standard for Field Welding of Steel Water Pipe Joints" (AWWA C206). 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:

Plate Thickness Inches	**Fillet Weld Minimum Number of Passes**
3/16	2
l/4	2
5/16	3
3/8	3
13/32	3
7/16	4
15/32	4
l/2	4
More than l/2	l for each l/8 of an inch

Each pass, except the final one shall be thoroughly bobbed or peened to relieve shrinkage stresses and 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. Under-cutting along the side will not be permitted.

3. PAINTING SPECIFICATIONS

The Contractor shall provide all labor, material, and equipment necessary for completion of all painting work specified in these Specifications and Drawings.

The Contractor shall deliver all painting materials to the work site in the original containers with seals unbroken and unmutilated and with labels attached. All paints and coatings shall be in compliance with all South Coast Air Quality Management District requirements including volatile organic chemicals (VOC). Containers shall not be opened until after they have been inspected by the District.

Material for prime coat shall be produced by a "District Approved Manufacturer".

Material for finish coat shall be automotive grade synthetic industrial enamel, produced by a "District Approved Manufacturer" unless specifically stated otherwise in these Specifications or Drawings.

The Contractor shall submit a color chart to the District, who will select the finish colors.

All work shall be done by thoroughly qualified painters in a neat, workmanlike manner. All work which shows carelessness or lack of skill in the execution or is defective due to any other cause will be rejected and repainted to the satisfaction of the District, at the expense of the Contractor.

Unless otherwise specified, paint shall be applied by brush or spray.

Paint shall be applied only on thoroughly clean, dry surfaces. Paint shall not be applied in extreme heat, cold, damp, or humid weather or in dust or smoke-laden air.

All exposed iron and steel work, including piping and valves, etc., shall be prime painted at the shop. After installation, said materials shall be cleaned and all welds, tool marks, etc., shall be touched up with primer and given two coats of finish enamel.

Prepared material shall be used without cutting or addition of any material whatsoever, except as directed by the manufacturer and approved by the District. Each coat must be thoroughly dry before application of the next coat.

If brushes are used, they shall have sufficient body and length of bristle to spread the paint in a uniform coat. Paint shall be evenly spread and thoroughly brushed out and with no residual brush marks remaining. On surfaces which are inaccessible for brushing, the paint shall be applied by spray or by sheepskin daubers or other means necessary to obtain a proper thickness of paint as approved by the District.

If a spray method is used, the operator shall be thoroughly qualified in the use of the equipment required. Air compressors employed in spray painting shall be equipped with a suitable trapping device to keep water, oil, and other impurities from entering the air lines. Runs, sags, thin areas, or other imperfections in the paint coat shall be considered as cause for rejection, and the Contractor shall be required to make all necessary corrections to the satisfaction of the District.

Paint materials shall be kept sealed or covered when not in use. Oily rags or waste shall be kept in covered containers and disposed of at frequent intervals.

The Contractor shall be held responsible for protecting freshly painted surfaces from accumulation of dust, dirt, water, or other foreign materials, whatever the cause or source. Any damaged surfaces shall be wiped clean, sanded, or stripped to a clean, dry condition and repainted to the satisfaction of the District.

The Contractor shall protect all parts of the work site against disfigurement by their operations. Tarps and cloths shall be placed where required to protect floors and equipment from spatter and droppings. Electric switch plates, lighting fixtures, hardware, glass, vehicles, etc., shall be removed, covered or otherwise protected from disfigurement by the painting operations. The Contractor shall clean or otherwise restore any spattered surfaces to the satisfaction of the District.

4. CONCRETE WORK

A. General

Concrete shall be composed of portland cement, natural aggregates, and water proportioned to produce required strength and well mixed into required consistency.

Portland cement concrete for thrust blocks, cradles, encasements, and structures shall be composed of portland cement, fine aggregate, coarse aggregate and water proportioned and mixed in accordance with the requirements of Section 90 of the State of California Department of Transportation Standard Specifications, except as may be herein modified.

Concrete for cradles and encasements, and all other concrete structures, shall be constructed to the lines and grades and in accordance with the design shown in the details on the plans.

Prior to placing any concrete, the Contractor shall submit to the District the design mix proposed to be used. Said mix shall set forth the weights of cement, sand, coarse aggregate and the amount of water to be used. (Source of supply shall also be furnished to the District.) The proposed mix shall be approved by the District prior to placing any concrete.

B. Portland Cement Concrete Classification

Concrete Class	Compressive Strength @ 28 days (psi)	Sacks of Cement/CY
"AA"	4,000 (650-CW-4000)	7
"A"	3,000 (560-C-3250)	6
"B"	2,500 (520-C-2500)	5
"C"	2,000 (450-C-2000)	4

The amount of free water used in concrete shall not exceed 312 pounds per cubic yard, plus 20 pounds for each required 100 pounds of cement in excess of 564 per cubic yard.

Additional cement and a modified concrete mix, as approved by Engineer, will be required for situations requiring pumping of concrete.

(1) Class "AA" 4,000 psi (650-CW-4000) concrete application:

- Precast manhole bases
- Reinforced pipe encasements
- Concrete floors and equipment pads for wells, pump stations, and lift station facilities

(2) Class "A" 3,000 psi (560-C-3250) concrete application:

- Pipe supports and equipment pads
- Nonreinforced pipe encasements
- Slope protection cutoff walls
- Nonreinforced encasement sewer lateral tapping

(3) Class "B" 2,500 psi (520-C-2500) concrete application:

- Valve can concrete collars
- Shear ring thrust blocks
- Chain link fence and gate posts
- Concrete pads and collars for precast manholes
- Sewer sampling station pads

(4) Class "C" 2,000 psi (450-C-2000) concrete application:

- Marker posts
- Fixed and removable guard posts
- Pipe thrust blocks

- Air valve and blow-off pads
- Fire hydrant pads
- Water sampling station pads

5. PAVEMENT REMOVAL AND REPLACEMENT

A. General

Pavement removal and replacement for all public roads, including aggregate base and temporary paving where required, shall comply with all the requirements of the agency issuing the Encroachment Permit. In roads established under formation of a special road district, the specifications of the Encroachment Permit shall apply. Any private roads and streets, including driveways, in which the surface is removed or damaged, shall be restored to the original grade and crown by the Contractor. Removed or damaged sections shall be restored with the type of improvements (or better) conforming to that which existed at the time the Contractor entered upon the work.

It shall be the responsibility of the bidder to satisfy themselves as to the existing pavement sections prior to submitting their bid.

Full compensation for temporary and permanent resurfacing, including the replacement of base material as required, shall be included in the unit bid price for pavement removal and replacement per linear foot of mainline trench. Any required pavement removal and replacement for services, fire hydrants, air valves, or other appurtenances shall be considered included in the bid price for the various items, and no additional compensation shall be made therefore.

B. Pavement Cutting

Pavement shall be cut to a straight edge parallel to the pipe alignment prior to excavation. Method of pavement cutting shall be as specified by the Agency having jurisdiction. Under no circumstances shall excavation be started prior to scoring of pavement. If the adjacent pavement is disturbed during the Contractor's operation, the pavement shall be recut on a straight line to remove the damaged pavement before resurfacing. Portland cement concrete pavement and sidewalk shall be saw cut. Pavement cutting shall be considered included in the bid price for

pavement removal, disposal, and replacement, and no additional compensation shall be made therefore.

C. Permanent Trench Pavement

The permanent trench pavement shall be in accordance with the Agency having jurisdiction. If not specifically addressed by the road agency's permit, the existing pavement shall be saw cut and the permanent trench base paving shall be constructed to be flush with existing so that the asphalt concrete is smooth, true to grade and cross section thus providing an even driving surface without undulations The completed base paving surface shall be provided as described herein whether an asphalt concrete cap is specified or not specified. Should an asphalt concrete cap be required, Contractor shall grind down the base paving prior to placement of the A.C. cap.

D. Asphalt Concrete Cap

Where required by the agency issuing the Encroachment Permit or other agency having jurisdiction, an asphalt concrete cap shall be placed along the length of the trench. The installation of the asphalt concrete cap shall be in accordance with the specifications and policies of the agency having jurisdiction. Where the asphalt concrete cap is not specifically stated in the applicable permit or on the drawings, and when directed by the District, the minimum cap shall be a grinded 0.10-foot thick, 12-foot wide section centered over the center of the trench, or the traveled way, and pulled with a "Barber Greene" or equivalent.

Full compensation for placement of asphalt concrete cap, where required, shall be included in the unit bid price per linear foot of mainline trench. Any required asphalt concrete cap for house connection laterals or other appurtenances shall be considered included in the bid price for the various items, and no additional compensation shall be made.

6. STEEL FLANGES, BOLTS, NUTS AND GASKETS*

Flanges for steel pipe shall conform to requirements for ASA 150-lb. flanges and flanged fittings or ASA 300-lb. flanges and flanged fittings, as noted on Drawings. All

* Flanges shall be as per Specifications, except that at the option of the Contractor A.S.A. 150-lb. flanges may be changed to Class "E" steel plate flanges per Table 3 of AWWA C207-Latest.

flanges shall be forged steel welding-neck or slip-on flanges. Dimensions and drilling of flanges for steel pipe shall conform to ASA 150 or 300, respectively, steel pipe flanges and flanged fittings, and all flanges shall be attached with bolt holes straddling vertical axis of pipe, unless otherwise shown on Drawings. Flanges and their attachment to pipe shall conform to applicable requirements of latest edition of API-ASME Code for Unfired Pressure Vessels. Welding-neck flanges shall be bored to same inside diameter as adjoining pipe.

Bolts shall be heavy hexhead machine per ASTM A307, Grade B. Nuts shall be heavy hex and conform to ASTM A563 (ASME B18.2.2). Washers shall be provided on both nut and bolt sides and shall be of the same material as the nuts. Studs with nuts on both ends shall be furnished wherever close clearances make removal and replacement of fixed head bolts difficult. Bolts and studs shall be of such lengths that not less than two or more than four threads shall project through nut when nut is drawn tight. All bolts, studs, or cap screws used in tapped holes shall be of sufficient length to provide an engagement of length of threaded portion of not less than nominal diameter of bolt for steel nor less than one and one-half times the diameter for cast iron fittings.

Unless stainless steel nuts and bolts are used, each steel/iron type fitting below grade shall be equipped with one (1) sacrificial zinc anode cap per every 4-in diameter. Said cap shall be “protecto-cap” or District approved equal.

Slip-on flanges shall be welded along the inner seam surrounding the pipe diameter as well as along the outside pipe and flange interface.

Gaskets for flanged joints shall be 1/16 inch thick compressed non-asbestos sheet, produced by a "District Approved Manufacturer". Flat-faced flanges shall be provided with full face gaskets with bolt holes prepunched. Raised-face flanges shall be provided with ring gaskets.

7. ELBOWS, SIDE OUTLETS, TEES, BUTTSTRAPS, CROSSES

For steel pipe, all elbows, side outlets, top outlets, tees, crosses, etc., shall be furnished by the Contractor and shall be shop fabricated in accordance with AWWA C208 (latest); except the minimum radius for all bends shall not be less than 2.5 times the nominal diameter of the pipelines. Whenever the Contractor must perform minor amounts of field fabrication, they will be required to do all fabrication in a manner such that the lining and wrapping/coating may be repaired by hand to a quality equal to the shop applied lining and

wrapping/coating. Buttstraps, shearrings, etc. shall be per the applicable Standard Drawings, the Drawings, or applicable AWWA Standards or Manuals.

Service outlets shall be constructed in accordance with the Standard Drawing.

Wherever collar reinforcement is required, both the collar and the plain-end of the flanged x p.e. (plain-end) outlet shall be preshaped to mate with curvature of the main line pipeline, and both the collar and the flanged x p.e. (plain-end) outlet shall be welded into place.

All collar and wrapper reinforcing shall be in accordance with the Standard Drawing and with the following reinforcement guides:

A. District's Standard for Outlet Reinforcement.

B. Steel Pipe, Design and Installation, AWWA Manual M-ll, latest.

C. An equal pipeline manufacturer's reinforcing guide, as approved by Engineer.

D. API-ASME Code for Unfired Pressure Vessels for Petroleum liquids and gases.

If case of conflict, the highest and most stringent standard shall govern.

8. TACKWELDED AND WELDED JOINTS - INSTALLATION

All rubber gasket joints shall be bond welded in accordance with the District standards, unless an alternate method is approved by the District.

The pipe manufacturer shall direct the Contractor on the method of welding the fully welded joints, or the cut-to-fit joints, in order that the joints shall not pull apart or leak when subjected to design pressures stated herein.

9. CONNECTIONS TO EXISTING WATER SYSTEM

Unless otherwise stated in the Special Requirements, Contractor shall furnish and install connections to the existing water systems at locations shown on Drawings**.** Prior to connecting to the existing water system, the Contractor shall "pothole" the connection location(s) and provide this information along with "Shop Drawings" of the proposed

fitting(s) to the District for approval prior to the fabrication of said fitting(s). The Contractor shall perform all work required including any necessary field measurements, cuts-to-fit, temporary connections, and field fabrications to meet existing conditions.

Contractor shall install the proposed pipelines about 3' to 4' short of the connection points to the existing pipelines. Hydro-static/leakage tests SHALL NOT be performed against closed valves that separate the proposed system from the existing system.

Connections SHALL NOT be made between existing District pipelines and proposed pipelines until successful hydrostatic/leakage and disinfection testing of the proposed pipelines has been completed. Upon successful completion of the hydrostatic/leakage and disinfection testing and only upon approval by the District, final connections can be made to the existing pipelines. The pipeline material and appurtenances utilized to make the final connections shall be "swabbed" with a high strength chlorine solution. Minimum dosage in parts per million (ppm) to be determined by District.

The Contractor shall be fully responsible for providing all labor, materials, and equipment to de-water existing pipelines to make the connections or for any other purposes as required. Compensation for such de-watering activities shall be made per the various bid items and no additional compensation shall be made therefore. Contractor shall construct all said connections so that any down-time of existing water systems, due to connection work, shall occur during normal working hours as directed by District.

Contractor shall cooperate with District in scheduling said connections.

District will operate all existing valves necessary for Contractor to accomplish said connection work.

10. FILLING, TESTING, AND CHLORINATION

The Contractor shall fill all contract pipelines (through an approved and certified backflow device furnished by the Contractor) with construction water and may obtain said construction water through hydrants, blow-offs, etc.

The Contractor shall hydrostatically test all contract pipelines, as detailed in the Basic Specifications, to at least 150% of the specified pipe class.

The Contractor shall chlorinate all contract pipelines, as detailed in the Basic Specifications.

Payment by the District to the Contractor for all filling, testing, and chlorination work required under these Specifications SHALL BE INCLUDED IN THE BID PRICES FOR PIPELINE CONSTRUCTION PER THE BIDDING SHEET.

11. PROTECTION OF DOMESTIC WATER MAINS FROM CONTAMINATION

The Contractor shall protect all domestic water mains from contamination by any existing septic tank and/or leach line facilities, etc., which may be adjacent to the jobsite, and payment to the Contractor for any special construction required shall be made per the Extra Work Provisions of the General Conditions herein. Said special construction shall be approved by the District and the State Health Department.

12. FIELD HYDROSTATIC TEST AND LEAKAGE TEST

Upon completion of laying, joining, and backfilling, and after pipe lengths comprising the line ARE NOT LESS THAN 14 DAYS OLD, and prior to resurfacing, pipeline**,** including all appurtenances (e.g., fire hydrants, services, air valves, etc.) shall be hydrostatically tested per the manufacturer's recommendations. Water required to maintain test pressure shall be measured by meter or other means acceptable to District. Contractor shall provide all necessary thrust restraint required for the hydrostatic testing.

THE MEASURED LEAKAGE SHALL NOT EXCEED 10 GALLONS PER INCH DIAMETER PER MILE PER 24 HOURS. Should leakage exceed this amount, the section being tested will be considered defective and Contractor shall determine points of leakage, make necessary repairs, and conduct a second test. This procedure shall be continued until leakage equals or is less than the allowable mini-mum. Note: No leakage is allowed for welded steel pipe with fully welded joints.

Contractor shall provide calibrated meters for measurement of leakage, necessary bulkheads, piping, gauges, pumps, power, and labor, and do and furnish everything necessary for making all tests required, at the Contractor's own expense, and shall furnish to District copies of all tests performed. The District will provide the pressure gauge to be utilized for pressure testing purposes.

Steel pipe shall be pressure tested to at least 150% of the pipe class rating; i.e. Class 150 = 225 psi test pressure, as measured near the low point of the section of pipe being tested.

PVC C909 pipe shall be tested to the pipe class rating; i.e. Class 235 = 235 psi Class or 305 = 305 psi test pressure, as measured near the low point of the section of pipe being tested.

The hydrostatic test shall be conducted on sections of pipeline as directed by District. CONTRACTOR SHALL RECEIVE NO ADDITIONAL COMPENSATION OTHER THAN THAT STATED IN BIDDING SHEET FOR TESTING LINES. CONTRACTOR SHALL PAY THE DISTRICT FOR INSPECTION TIME FOR ALL RETESTS.

Care shall be taken to see that all air vents are open during filling. After section has been completely filled, it shall be allowed to stand under slight pressure for a sufficient length of time to allow escape of air from any air pockets. During this period all fittings, specials, manholes, and connections shall be examined for leaks. If any are found, they shall be stopped, using a method approved by District. REQUIRED TEST PRESSURE SHALL THEN BE APPLIED AND MAINTAINED FOR THE 4-HOUR PERIOD. Contractor, at their own expense, shall do all excavation necessary to locate and repair leaks or other defects which may develop under test, including removal of backfill already placed and shall replace such excavated material and shall make all repairs necessary to meet the required water tightness, after which test shall be repeated until pipe meets test requirements. ALL TESTS SHALL BE MADE IN THE PRESENCE OF DISTRICT OR DISTRICT'S REPRESENTATIVE. After pipe has successfully met test requirements, as specified, entire pipe shall be filled with water and so maintained until completion of the contract, unless otherwise ordered by District.

Pipe manufacturer and Contractor shall be responsible for any defects in materials and workmanship in manufacture and installation of pipe which may be revealed by such test and shall pay all costs of materials, labor, or other costs incidental to making necessary repairs or replacements resulting from such defects, in accordance with these Specifications.

13. DISINFECTING PIPELINES

Contractor shall furnish all equipment, labor, material, and water for proper disinfection of pipelines. Disinfection shall be accomplished by chlorination after lines have been tested for leakage but before they have been connected to existing system. Prior to chlorination, mains shall be thoroughly flushed out. The new mains shall be cleaned

and flushed prior to disinfection. 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 the necessary arrangements to attain the minimum velocity. The Contractor shall take due precaution in providing for adequate drainage from the site.

Contractor shall submit filling, disinfection and flushing procedures to District for review. It is the responsibility of the Contractor to dispose of the flushed water from the project area. The Contractor is responsible for any damage as a result of flushing operations. This includes but not limited to: dechlorination of chlorinated water, obtaining written approval from adjacent property owners affected by flushing operations, safety, protection of storm drain inlets, etc. Contractor shall obtain discharge permit for De Minimus water flows from the California Regional Water Quality Control Board as detailed in these specifications.

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. Dechlorination prior to flushing is required. The cost of said dechlorination shall be the responsibility of the Contractor.

The Contractor shall provide adequate drainage from the site.

The entire pipeline, including all valves, fittings, hydrants, service laterals, and other accessories, shall be disinfected in accordance with the specifications provided herein.

A five percent (5%) concentration of hypochlorite disinfection solution shall be applied with a State certified chlorine injection device. Chlorinating agent shall be applied at locations selected by District and as prescribed by them. DOSAGE APPLIED TO WATER WITHIN PIPELINE SHALL BE AT LEAST 50 PPM.

Chlorinated water shall be retained in pipeline long enough to destroy all non-spore-forming bacteria. This period shall be at least 24 hours. After chlorine-treated water has been retained for required time, CHLORINE RESIDUAL AT PIPE EXTREMITIES AND AT OTHER REPRESENTATIVE POINTS SHALL BE AT LEAST 25 PPM. Pump bowl assemblies shall not be exposed to harmful chlorine dosages and/or detention times.

Following chlorination, all disinfection water shall be thoroughly flushed from the pipeline.

Should initial treatment fail to produce satisfactory disinfection of the pipeline as evidenced by the chlorine residual and/or the bacteriological test results, the chlorination procedure shall be repeated until acceptable results are obtained. Contractor shall use caution in discharging any highly chlorinated water, and shall be responsible for obtaining any necessary permission and permits from regulatory agencies. If required, the Contractor shall apply a reducing agent to the solution to neutralize residual chlorine or chloramines remaining in the water at their expense.

Bacteriological tests required by the Health Department shall be taken by the District, and conducted by a laboratory selected by and paid by the District (paid for by the Developer for private projects). All costs for any retesting that may be required shall be paid by the Contractor. All retesting shall conform to District requirements.

Unless otherwise specified herein, minimum requirements for disinfection and bacteriological testing of new pipelines shall be in accordance with ANSI/AWWA C651-14 except as modified herein; and the location and number of all tests shall be determined by the District, with approval by the State Health Department. A minimum of two (2) consecutive passing bacteria samples (absent for Coliform, absent for e. coli, and HPC $\leq$ 200) are required by the District. The first set of samples shall be taken 24 hours after pipeline is completely flushed and water in said pipeline has been at rest without any water flows. The second set of samples shall be taken 24 hours after first set of samples were taken and water in said pipeline has been at rest without any water flows. No connections to District's existing water system shall be made until certified test results, in writing for both sets of samples are provided to District for review and approval.

Once District provides approval for connections to District water system, Contractor can make connections. One sample will be taken immediately following completion of connection and energizing of existing line and connection within the vicinity of the connection and second sample taken 24 hours later in same location. This procedure shall be repeated at all proposed connection locations.

14. CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, SANTA ANA REGION 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 the District. Because of demand on existing water system, the District may require Contractor to flush the pipeline over several days, in the evenings, weekends, or holidays.

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

Discharged water shall meet chlorine residual levels established by the appropriate State Water Quality Control Board. Dechlorination prior to flushing may be required, the cost of which shall be paid by the Contractor.

15. CORROSION PROTECTION

Where indicated on the Drawings, cathodic protection test stations and/or flange insulation kits with test stations shall be constructed in accordance with the applicable District Standards. Payment for installation of cathodic protection test stations and/or flange insulation kits with test station shall be per the unit bid price indicated on the Bidding Sheet for each installation, and no additional compensation shall be made therefore.

16. TAPPING

Connections to existing pipelines shall be made with the installation of tees or wrappers as designated on the plans. The connection sequence shall be as follows: The existing pipeline shall be drained; the tee or wrapper with valving shall be installed; and District approval of the connection shall occur prior to the re-filling of the existing pipeline.

In certain instances, and only where approved in writing by the District, wet tapping will be allowed as follows:

A. Water Mains

Where connections to existing water mains are made by wet tapping, the Contractor shall perform all required excavation and shall furnish the tapping saddle and gate valve. The District, or a District authorized contractor (Kopel or approved equal), will install the tapping saddle and gate or plug valve and make the wet tap. The Contractor shall pour the thrust block, backfill, complete all compaction of backfill, make closure, set the gate "can" and cover, make all necessary pavement repairs and complete the installation in accordance with the Plans and these Standards.

B. Water Laterals

Where connections to existing water mains are made by wet tapping, the Contractor shall furnish and install all necessary material and perform all required hand and machine excavation, backfill and pavement repair. The District or a District authorized Contractor will perform the actual wet tapping only.

17. VIDEO INSPECTION (CML/CMC WATERLINES)

Upon completion of the installation and backfill of the water pipeline, appurtenances, services, etc. and prior to filling the pipeline with water for the pressure test, the Contractor shall notify the District that the pipeline system is ready for video inspection. Said notification shall be made at least five (5) working days in advance of the actual video inspection date. The video inspection will be made by a video inspection company approved by the District and hired by the Contractor Video Inspection shall be made in the presence of the District or District's representative. Prior to the video inspection, the contractor shall be responsible to provide the following items:

A. Clean water pipelines free of all dirt, rock, debris, etc.

B. Labor and equipment necessary to excavate the pipeline and provide camera access ports. Access ports shall not exceed 1000 feet in spacing and shall be located at all bends in excess of 22°. Also, labor and equipment necessary to repair the access ports to the satisfaction of the District.

C. Drivable truck access to each access port within the system to be videoed.

D. Provide all traffic control methods required.

Should any of the aforementioned items not be in compliance by the time the video inspection is to occur, the Contractor shall be subject to compensating the District for all costs incurred.

Full compensation to the Contractor for complying with the above requirements shall be considered as included in the contract lump sum provided for such work and no additional allowance will be made therefore.

Upon completion of the video for the subject waterlines, the Contractor shall reconnect the piping and backfill all access ports. The video inspection company will provide the District with a copy of the video via USB flash drive or digital transmittal and a written report detailing the condition of the interior of the mainline and joints. Subsequent to review of the video inspection and report by the District, the District will notify the Contractor that the Contractor may then proceed with the filling, testing, and disinfection of the pipeline; or the District will provide a list of corrective measures that must occur prior to acceptance.

Should remedial activities be necessary, the reconstruction methodology shall be approved by the District prior to commencement of the work. Upon completion of the remedial construction, the Contractor shall once again notify the District that the waterlines are ready for a video inspection. The District reserves the right to re-video any portions of the water system they determine may have been affected by the reconstruction work activities. Further, all related costs including but not limited to reconstruction materials, labor, equipment, video inspection, District and other agency inspection, and administrative costs shall be borne by the contractor.

VIDEO INSPECTION COMPANY REQUIREMENTS

(Closed Circuit Television Inspection - CCTV)

1. Rotating lens camera with articulating head.

2. Scanning capabilities of 360°.

3. Operative in 100% humidity conditions.

4. Lighting for the camera shall minimize reflective glare.

5. Lighting and camera quality shall be suitable to provide clear, in focus picture of the entire periphery of the pipe for all conditions.

6. Camera focal distance shall be adjustable through a range from 6" to infinity.

7. Remote reading distance (footage) counter shall be accurate to one percent (1%) over the length of the particular section being inspected.

8. The camera, television monitor, and other components of the color video system shall be capable of producing a minimum of 350 line resolution.

9. Documentation consisting of a copy of the video inspection (via USB flash drive or digital transmittal) and a written report detailing the condition of the mainline and joints shall be submitted to the District inspector immediately following the video inspection. Each video file shall be labeled with the project or subdivision name, number and pipe run numbers it contains. District will also accept the following formats: Thumb Drive and Cloud Service.

10. <u>All video equipment used for domestic water systems shall be certified for domestic waterline inspection only and shall never have been utilized in a non-potable system</u>.

11. The CCTV camera operator shall stop at each defect and pipe joint and televise the entire joint with the pan and tilt feature on the head of the camera, initially, in a complete counterclockwise direction followed by a complete clockwise direction. If a defect is found, the CCTV operator will "home up" the camera prior to defining the defect and determining it's size and location. The CCTV operator will also stop and record <u>any</u> questionable item such as a stain, crack, paint mark, shadow found or character change in a pipe being inspected. In other words, the CCTV operator must stop, record and note anything questionable no matter how minor. The Engineer, as defined by JCSD Standard Specifications, not the CCTV operator, will decide if a questionable item is a "problem event" when that Engineer reviews the video inspection.