

SECTION 02100 - PIPELINE CONSTRUCTION

PART 1 - GENERAL

1.1 WORK INCLUDED IN THIS SECTION

- A. The WORK of this Section includes providing requirements for pipelines, including pipe, joints, specials, and appurtenances, complete and in place.

1.2 SUBMITTALS

- A. The following shall be submitted in compliance with Section 01300.

- 1. Shop Drawings

- a. Post-installation videotape and inspection reports.
- b. Detailed line layout and marking diagrams which indicate the specific number of each pipe and fitting and the location of each pipe and direction of each fitting in the completed line. In addition, the line layouts shall include:
 - 1. The pipe station and top of pipe elevation at all changes in grade or horizontal alignment.
 - 2. The station and top of pipe elevation to which the bell end of each pipe will be laid.
 - 3. All elements of curves and bends, both in horizontal and vertical alignment.
 - 4. The limits of each reach restrained and/or welded joint, or of concrete encasement.
- c. Drawings for joint restraint systems.
- d. Drawings of thrust blocks.
- e. Construction staking field survey notes and cut sheets.

- 2. Design calculations

- a. Design calculations for joint restraint systems using reinforced concrete encasement of pressure pipe and fittings.
- b. Design calculations for thrust blocks.

1.3 INSPECTION

- A. Factory Inspection

- 1. All pipe may be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards as supplemented by the requirements herein.
- 2. Where the pipe specifications indicate, the DISTRICT and/or the CONTRACTOR shall perform inspection of pipe, or coatings, or linings.

3. The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture.
4. If the factory location is more than 50 miles from the job site, the CONTRACTOR shall be responsible for the meal, travel, and lodging costs for two DISTRICT designated inspectors for the number of days necessary to complete such inspections. The CONTRACTOR shall not be responsible for salary or salary related costs for either individual.

PART 2 - PRODUCTS

2.1 PIPE AND APPURTENANCES

- A. Pipe materials, coatings and linings, and appurtenances of the sizes and types indicated on the Drawings shall comply with all applicable Specification Sections.

PART 3 - EXECUTION

3.1 GENERAL

- A. The DISTRICT shall be notified of property which must be relocated and of existing public utilities and franchise holders which must be relocated and the reasonable time for doing so. The DISTRICT shall contact the utility or franchise holder and request relocation.
- B. The CONTRACTOR shall be responsible for the relocation and protection of existing utilities.
- C. The CONTRACTOR shall protect and maintain all underground and surface utility structures, drains, and other obstructions encountered in the progress of the WORK specified herein.
- D. All sections of the WORK to be done shall be staked in the field in a manner consistent with the lines and grades as shown on the plans. The DISTRICT shall have no responsibility for any staking unless the WORK is contracted directly with the DISTRICT and staking is covered in the Special Provisions of the contract between the DISTRICT and the CONTRACTOR. All staking shall be based on top of pipe. The CONTRACTOR shall examine carefully all construction stakes and by visual inspection of stakes, string lines and headers set therefrom, interpret and confirm that the line and grade information is in accordance with the plans. If there is an apparent error or lack of understanding as to what is meant by staking, the CONTRACTOR shall request an interpretation of staking before proceeding with the WORK.

3.2 DEWATERING

- A. Install and operate a continuous dewatering system capable of maintaining the groundwater level 2 feet below the excavated trench bottom.

- B. Only well points located on both sides of the trench shall be used for dewatering, unless otherwise approved by the DISTRICT.
- C. The dewatering system shall be operated 7 days per week, 24 hours per day with water level as indicated above until backfilling is completed.
- D. As field conditions necessitate, adjustments to the trench shoring and bracing methods to achieve soil stability adjustments shall be made at no additional cost to the DISTRICT.

3.3 EXCAVATION

- A. Trench width shall be in accordance with the provisions of Standard Drawings as supplemented by the requirements herein.
- B. Trench subgrade shall be stabilized by compaction to 95 percent relative density.
- C. Where trench bottom has been over-excavated, bedding shall be compacted to 95 percent in 1-foot thick layers.

3.4 INSTALLATION

- A. Pipe shall be installed in accordance with the pipe manufacturer's recommendations, applicable provisions of SSPWC, and the requirements referenced herein.
- B. Where indicated that the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, or pipes, the obstruction shall be supported until it is relocated, removed, or reconstructed by the CONTRACTOR in cooperation with owners of utility structures.
- C. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after the laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of the each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.
- D. The CONTRACTOR shall smooth out any burrs, gouges, or welded splatter and repair other defects prior to laying the pipe.
- E. Immediately prior to placing each section of pipe in final position for jointing, the bedding shall be checked for firmness and uniformity of surface.
- F. Pipe shall be laid directly on the bedding material. No blocking shall be permitted and the bedding shall form a continuous, solid bearing surface for the full length of the pipe. Excavation shall be adequate to facilitate removal of handling devices after pipe is laid.
- G. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings and to facilitate placement of grout bonds. Excavation shall be adequate to permit access to the joints.

- H. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the DISTRICT may direct a change in the alignment or the grades. Such changes shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by the pipe manufacturer. No joint shall be misfit any amount which will be detrimental to the strength and integrity of the finished joint.
- I. Wherever possible, pipe shall be laid with the bell end up.
- J. The CONTRACTOR shall install all pipe, fittings, closure pieces, bends, reducers, wyes, tees, crosses, outlets, manifolds, and other specials, bolts, nuts, gaskets, jointing materials, and all other appurtenances as indicated and as required to provide a complete and workable installation.
- K. No pipe or appurtenances shall be installed when the interior or exterior surfaces show cracks or other defects that may be harmful as determined by the DISTRICT. Damaged interior and exterior surfaces shall be repaired to the satisfaction of the DISTRICT or a new undamaged pipe or appurtenance shall be provided.
- L. Where curved alignments are indicated, deflecting the joints shall be permitted only in accordance with the written instructions of the pipe manufacturer and these specifications.
- M. Where a smaller radius of curvature is required than can be accommodated by the deflecting joints, sections of pipe with beveled ends may be laid unless fabricated bends are indicated. Maximum joint deflection and maximum bevel for different pipe sizes and joint designs shall be in accordance with the pipe manufacturer's recommendations and these specifications.
- N. Cutting and machining of the pipe shall be in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe, produce ragged, uneven edges or otherwise impair the condition of the pipe.
- O. Sheet piling used for shoring shall extend at least 2 feet below the bottom of the trench. After completion of pipe laying, it may be removed by cutting at least 12 inches above the top of the pipe. No vibratory methods for pile removal shall be accepted, and piling lower than 12 inches above the top of the pipe shall be left in place.

3.5 THRUST BLOCKS

- A. Thrust blocks shall be constructed where shown on the plans and where directed by the DISTRICT in accordance with the DISTRICT's Standard Drawings. In general, thrust blocks will be placed at all angles greater than 5 degrees, at changes in pipe size, at fittings, at hydrant ells, and at valves.
- B. The area and design of the bearing surface shall be as per the DISTRICT's Standard Drawings or approved design calculations.
- C. The bearing surface shall be against undisturbed ground in all cases, except where unstable conditions are encountered. In unstable conditions, the bearing surface shall be

as directed by the DISTRICT.

- D. Unless otherwise directed by the DISTRICT, the blocking shall be placed so that the pipe and fitting joints are accessible for repair.
- E. Metal harness of tie rods and pipe clamps shall be used to prevent movement if shown on the plans or directed by the DISTRICT.
- F. Exposed steel rods and clamps shall be coated per the requirements of Section 04000, Paintings and Coatings.
- G. Reinforcing steel tie-down rods shall be used on all line valves.
- H. The depth of thrust blocks below valves shall conform with the size of the valve and shall be cut into the side of the trench a minimum of 12 inches on each side.
- I. Concrete for thrust blocks shall be Class 450-C-2000.

3.6 SLOPE PROTECTION

- A. Cutoff walls shall be required where ground profile over the pipeline exceeds a 20 percent slope (20 feet vertical in 100 feet horizontal). Cutoff walls shall be constructed in accordance with the San Diego Area Regional Standard Drawings or as approved by the DISTRICT.
- B. In areas shown on the plans, slope protection terraces shall be constructed. Terraces shall be terraces or ditches constructed at approximately 30 degrees to the centerline of the pipe with a maximum spacing of 50 feet. The exact pattern and spacing shall be determined in the field by the DISTRICT to give the required protection.

3.7 SITE RESTORATION

- A. Backfill and compacted soil shall be in accordance with the provisions of the reference standards as supplemented by the requirements herein.
- B. Place subgrade and base materials in accordance with the provisions of the reference standards as supplemented by the requirements herein
- C. Damaged pavement, curbs, gutters, and sidewalks, shrubs, and trees shall be replaced as indicated in SSPWC "Green Book" Standard Specifications For Public Works Construction Subsection 306-1.5.2.

3.8 WARNING/IDENTIFICATION TAPE

- A. Warning/Identification tape shall be installed to identify location of underground utilities and to act as a warning against accidental excavation of buried utilities. Warning/Identification tape shall be used on all underground water and recycled water mains, and all related appurtenances. Warning/Identification tape shall also be used on cathodic protection wiring systems.

- B. Tape shall be an inert, non-metallic plastic film formulated for prolonged underground use that will not degrade when exposed to alkalis, acids and other destructive substances commonly found in soil.
- C. Tape shall be colored to identify the type of utility intended for identification. Printed and tape message and tape color shall be as follows:

<u>Printed Message</u>	<u>Tape Color</u>
Caution: Waterline Buried Below	Blue
Caution: Recycled Buried Below	Purple
Caution: Cathodic Protection Cable Buried Below	Red

- D. Tape shall be minimum .004”thick x 6” wide with a printed message on one side.

3.9 TRACER WIRE

- A. Tracer wire shall be installed on all buried water and recycled water mains and services for the purpose of providing a continuous signal path used to determine pipe alignment after installation.
- B. Tracer wire shall be #10 AWG solid copper UF type wire with cross-linked polyethylene insulation. The insulation shall be a white in color. Tracer wire shall be selected from the Approved Material List.
- C. Wire splices (at pipe tees, crosses and laterals) shall be accomplished using a direct bury silicone-filled capsule tube with standard wire nut or silicone-filled wire nut connectors of the appropriate size selected from the Approved Material List.

3.10 BLOWOFF ASSEMBLIES

- A. Blowoff assemblies shall be furnished and installed at the locations shown on the plans and at all low points or locations required by the DISTRICT in accordance with the DISTRICT’s Standard Drawings for removing water or sediment from the pipeline. Blowoff assemblies shall be sized as shown below:
 1. 2-inch blowoff assembly – pipeline sizes 10-inch and smaller.
 2. 4-inch blowoff assembly – pipeline sizes 12-inch through 16-inch.
 3. 6-inch blowoff assembly – pipeline sizes 18-inch and larger.
- B. The assembly shall be installed at the ends and at low points in the pipe or as shown on the Approved Plans. The pipeline tap for the blowoff assembly shall be no closer than 18 inches to a valve, bell, coupling, joint, or fitting unless it is at the end of the main.
- D. Blowoff assemblies shall not be connected to any sewer, submerged in any stream, or installed in any manner that will permit back siphoning into the distribution system. Blowoff assemblies shall not be placed along curbs, gutters or other areas where water surface runoff may submerge the assembly.

3.11 DISINFECTION AND PRESSURE TESTING

- A. Water mains, services, and appurtenances shall be disinfected and pressure tested in accordance with Sections 02600 and 02610, respectively.

END OF SECTION