

SECTION 02600 - PIPELINE CONSTRUCTION

City of San Diego, CWP Guidelines

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NTS: This Section is intended for use on gravity and pressure pipeline projects in trenches. It is not intended for trenchless projects. Further, this Section is biased toward interplant and collection system projects instead of yard piping on treatment plant sites. It can be customized for yard piping projects by editing.

This Section requires inclusion of one or more pipe sections from Division 2.

Consider adding either Standard Detail C-193 or C-194 to the Contract Documents to clarify trenching terminology, dimensions, and backfill material types. Coordinate bedding depth, bedding and backfill material requirements, and compaction requirements with the recommendations of the Geotechnical Report.

Further, in areas where differential settlement is anticipated, consider increasing the number of joints available to articulate by shortening the length of individual sections of pipe in such areas. See Standard Detail No. C-195.

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PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

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

1.2 RELATED SECTIONS

- A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

- 1. Section 01530 Protection of Existing Facilities
- 2. Section 02140 Dewatering
- 3. Section 02200 Earthwork
- [4. Section 02666 Water Pipeline Testing and Disinfection]
- [5. Section 02730 Sanitary Sewerage System Testing]
- [6. Section 02900 Landscaping]

1.3 STANDARD SPECIFICATIONS

- A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply

with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 SHOP DRAWINGS AND SAMPLES

- A. In addition to the requirements of Section 02200 and the pipe material specifications, the following shall be submitted in compliance with Section 01300.
 - 1. Post-installation videotape and inspection reports.
 - 2. Line layout and marking diagrams which indicate the specific number of each pipe and fitting and the location of each pipe and the direction of each fitting in the completed line. In addition, the line layouts shall include: the pipe station and invert elevation at all changes in grade or horizontal alignment; the station and invert elevation to which the bell end of each pipe will be laid; all elements of curves and bends, both in horizontal and vertical alignment; and the limits of each reach of restrained and/or welded joints, or of concrete encasement.
 - 3. Shop drawings and design calculations for joint restraint systems using reinforced concrete encasement of pressure pipe and fittings.
 - 4. Drawings and calculations for thrust blocks.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. **Delivery of Materials:** Products shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer. Materials delivered onsite without an approved submittal for verification shall be rejected and payment withheld.
- B. **Storage:** Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.
- C. **Protection of Equipment:** Equipment shall be boxed, crated, or otherwise protected from damage and moisture during shipment, handling, and storage. Equipment shall be protected from exposure to corrosive fumes and shall be kept thoroughly dry at all times. Pumps, motors, drives, electrical equipment, and other equipment with anti-friction or sleeve bearings shall be stored in weather tight storage facilities prior to installation. For extended storage periods, plastic equipment wrappers shall not be used to prevent accumulation of condensate in gears and bearings. Gears and bearings to be stored for extended periods shall be containerized suitable for export shipment.

1.6 FACTORY INSPECTION AND TESTING

- A. The CONTRACTOR shall be responsible for all costs associated with inspection and testing of materials, products, or equipment at the place of manufacture. This shall include costs for travel, meals, lodging, and car rental for [two] OWNER-designated inspectors for the number of days indicated to complete such inspections or observations, if the place of manufacture, fabrication and factory testing is more than fifty (50) miles outside the geographical limit of the City. The CONTRACTOR shall not be responsible for salary or salary-related costs of the inspectors. The CONTRACTOR shall comply with the requirements of Section 01400.

PART 2 -- PRODUCTS

2.1 PIPE AND APPURTENANCES

- A. Provide pipe materials, coatings and linings, and appurtenances of the sizes and types indicated on the Drawings and comply with [Section 02616 - Reinforced Concrete Pipe, Rubber Gasket Joint][Section 02617 - Reinforced Concrete Pipe][Section 02618 - Reinforced Concrete Pressure Pipe][Section 02620 - Reinforced Concrete Pressure Pipe, Steel Cylinder Type][Section 02622 - Pre-tensioned Concrete Cylinder Pipe][Section 02630 - Ductile Iron Pipe][Section 02642 - Small Polyethylene Non-Pressure Pipe] Section 02644 - PVC Non-Pressure Pipe][Section 02646 - PVC Pressure Pipe][Section 02650 - Steel Pipe, Mortar Lined and Mortar Coated][Section 02651 - Steel Pipe, Lined and Coated][Section 02653 - Fabricated Steel Pipe and Specials][Section 02614 - Vitrified Clay Pipe][Section 02640 - Fiberglass Reinforced Polyester Mortar Pipe].

2.2 FILL AND BACKFILL MATERIAL

- A. Fill and backfill materials shall be in accordance with Section 02200.

PART 3 -- EXECUTION

3.1 PREPARATION

- A. **Traffic:** Conform to requirements of Section 01550.
- B. **Utility Relocation:** Notify the CONSTRUCTION MANAGER of property which must be relocated of existing public utilities and franchise holders which must be relocated and the reasonable time for doing so. The OWNER will contact the utility or franchise holder and request relocation. Relocation and protection of existing utilities which are the CONTRACTOR's responsibility shall be in accordance with Section 01530.
- [C. Before submitting joint shop drawings, where the proposed piping will connect to existing piping, the CONTRACTOR shall excavate the point of connection to verify size, layout, and depth. Prepare a sketch of the proposed point of connection for submittal with the joint shop drawings. The CONTRACTOR shall give the CONSTRUCTION MANAGER a minimum of two hours to inspect the existing piping before backfilling.]

[3.2 DEWATERING

- A. Install and operate according to Section 02140 a continuous dewatering system capable of maintaining the ground water level [2] feet below the excavated trench bottom. Only well points located on both sides of the trench shall be used for dewatering, unless otherwise approved by the CONSTRUCTION MANAGER.
- B. Operate the dewatering system 7 days per week, 24 hours per day with water level as indicated above until backfilling is completed.
- C. Field-determined departures from the dewatering plans may necessitate adjustments to the trench shoring and bracing methods to achieve soil stability. Adjustment shall be at no additional cost to the OWNER.]
- D. Dewatering shall prevent softening of the bottom of excavations or formation of "quick" conditions. Dewatering shall not remove native soils. All loose soil shall be removed and recompacted in accordance with Section 02200.

3.3 EXCAVATION

- A. Unless indicated otherwise, excavation [and overexcavation] shall be in accordance with Section 02200.
- B. Trench width shall be as indicated.
- C. Stabilize the trench subgrade by compaction to 95 percent relative density. Where trench bottom has been over-excavated, compact the bedding to 95 percent in 1-foot thick layers.

3.4 LAYOUT AND HANDLING

- A. **Handling of Pipe and Accessories:** Pipe shall be lifted in such a manner as to minimize bending and prevent damage to the pipe. During transport, pipe shall be supported to prevent distortion or damage to the pipe. When not being handled, pipe shall be stockpiled on timber cradles or properly prepared ground with all rocks larger than 3 inches eliminated. All pipe, fittings valves and accessories shall be carefully lowered into the trench in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. The CONTRACTOR shall smooth out any burrs, gouges, or weld splatter and repair other defects prior to laying the pipe. Any pipe section, including coatings and linings, that becomes damaged as a result of handling or stockpiling shall be replaced with a new unit or repaired at the discretion of the CONSTRUCTION MANAGER at no additional cost to the OWNER.

[3.5 DIVERSION PUMPING

- A. Where the proposed piping will connect to existing piping which is in sewage service, install and operate bulkheads, plugs, piping, and diversion pumping equipment to maintain sewage flow and to prevent backup or overflow.
- B. Design diversion piping, joints, and accessories to withstand 50 psi.
- C. No sewage shall be diverted into any open area outside of a sanitary sewer.
- D. In the event of spill or overflow, immediately stop the overflow and take action to clean up and disinfect the spillage area to original condition. Promptly notify the CONSTRUCTION MANAGER.]

3.6 INSTALLATION

- A. **General:** Pipe shall be installed in accordance with the pipe manufacturer's recommendations and the applicable provisions of SSPWC Subsection 306-1.2, and the requirements herein.
- B. Interferences
 - 1. CONTRACTOR shall protect and maintain all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the WORK in compliance with Section 01530. 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 such utility structures. Unless otherwise indicated, this WORK shall be performed at no additional cost to the OWNER.
 - 2. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the

CONSTRUCTION MANAGER may direct a change in the alignment or the grades. Such change 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.

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NTS: In areas where differential settlement may occur during backfill placing and compaction, consider requiring the CONTRACTOR to perform an "as-laid" survey in those areas to verify the pipe is within line and grade tolerances after placing and compacting backfill.

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- C. **Line and Grade Tolerance:** Each section of pipe shall be laid in the order and position shown on the laying schedule. Unless indicated otherwise, the pipe shall be laid to the design line and grade, within approximately one inch plus or minus. No tolerance is permitted on pipes designed for zero slope.
- D. **Curved Alignments:** Where curved alignments are indicated, deflecting the joints will be allowed only in accordance with the written instructions of the pipe manufacturer and these specifications. Where a smaller radius of curvature is required than can be accommodated by deflecting the 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.
- E. Cutting and machining of the pipe shall only 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.
- F. The CONTRACTOR shall install all pipe, fittings, closure pieces, bends, reducers, wyes, tees, crosses, outlets, manifolds, and other steel plate specials, bolts, nuts, gaskets, jointing materials, and all other appurtenances as indicated and as required to provide a complete and workable installation. No pipe or appurtenance shall be installed when the interior or exterior surfaces show cracks or other defects that may be harmful as determined by the CONSTRUCTION MANAGER. Damaged interior and exterior surfaces shall be repaired to the satisfaction of the CONSTRUCTION MANAGER or a new undamaged pipe or appurtenance shall be provided.
- G. Pipe laying operations shall be stopped and dewatering operations shall be adjusted to prevent the pipe from floating due to water entering the trench from any source. The CONTRACTOR shall reinstall all affected pipe to its specified condition and grade.
- H. 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 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 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.
- I. Immediately before placing each section of pipe in final position for jointing, the bedding shall be checked for firmness and uniformity of surface.
- J. Pipe shall be laid directly on the bedding material. No blocking will be permitted and the bedding shall form a continuous, solid bearing for the full length of the pipe. Excavate to facilitate removal

of handling devices after the pipe is laid. 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 bands. Excavation shall be adequate to permit access to the joints for bonding operations and for application of coating on field joints.

- K. Backfilling and compaction shall comply with Section 02200 and the pipe specifications.

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NTS: Consider the following subparagraph in soils where vibratory methods of pile removal may cause a problem.

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- L. Sheet piling used for shoring shall extend at least [2] feet below the bottom of the trench. After completion of the pipe, it may be removed by cutting at least 12 inches above the top of the pipe. No vibratory methods for pile removal will be accepted, and piling lower than 12 inches above the top of the pipe shall be left in place.

- M. Lay section of pipe with the bell end upgrade.

- N. Except for short runs which may be permitted by the CONSTRUCTION MANAGER, sections of pipe shall be laid in a sequence moving in an upgrade direction on grades exceeding 10 percent. Pipe which is laid in a downgrade direction shall be blocked and held in place until sufficient support is furnished by the following pipes to prevent movement.

- [O. Where indicated, concrete thrust blocks shall be provided.]

3.7 FIELD TESTING

- A. Field testing shall be in accordance with Section [02666][02730].

3.8 CORROSION CONTROL

- A. **Joint Bonding/Test Stations:** Except where otherwise indicated, all joints shall be bonded in accordance with the details indicated. The CONTRACTOR shall furnish all materials required for joint bonding and test station installations. The pipe shall be cleaned to bare bright metal at the point where the bond is installed. The pipe manufacturer shall be responsible for determining and implementing a suitable procedure and schedule for installation of bonding—field versus factory versus combination—in such a manner that the corrosion resistance of the lining and coating is not degraded by the bonding process. It may involve welding joint bonding pads, or welding the bonding wires in the factory before applying the lining and coating specified and/or may involve patching impaired areas in the factory or the field.

To accommodate attachment of the joint bonding pad, which is used to eliminate damage to the interior pipe lining—polyurethane and fusion-bonded epoxy—during the alumino-thermal welding, 2½" x 2" x **d**" thick pads of the same metal as the pipe shall be welded on both ends of the pipe prior to lining and coating. Following field welding of the bond wires to the pipe, the exterior coating shall be repaired per Section 15025. The CONTRACTOR shall use the proper size of alumino-thermal welding charge for installing the joint bonding wires.

3.9 POST-INSTALLATION TELEVISION INSPECTION

- B. Prior to final acceptance of newly constructed gravity sanitary sewers, perform flushing and closed

circuit television inspection. Flushing shall include collection, removal, transportation, and disposal of any sand, debris, and liquid wastes to legal disposal sites.

- C. Perform closed-circuit television inspection according to SSPWC 500-1.1.5 and the following.
 - 1. Camera shall pan all manholes to document manhole conditions. [Camera operator shall slowly pan each service connection and where sewer transitions from one pipe material to another.]
 - 2. Video cassette capacity shall be adequate to record inspection of at least one complete pipe segment between manholes. Recording of a single segment shall not extend to more than one video cassette.
 - 3. No sewage flow is allowed in the gravity sanitary sewer while performing post-installation television inspection.
 - D. Submit video tapes in VHS format, recorded at Standard Play (SP). Two permanent labels are required. One label shall be placed on the spine and the other on the face of the video tape.
 - 1. Cassette spine information
 - a. CONTRACTOR Name
 - b. Project Name
 - c. Tape Number
 - d. Date Televised
 - e. Date Submitted
 - 2. Cassette face information
 - a. Name of street
 - b. From Manhole Number
 - c. To Manhole Number
 - d. Pipe Length
 - e. Project Name
 - f. Tape Number
 - E. For each video tape prepare a complete TV Inspection Report which is a written log of pipe conditions [and service connections], indexed to a footage counter which shall be visible on the screen when viewing the videotape.
- 3.10 SITE RESTORATION
- F. Backfill and compact soil in accordance with Section 02200.
 - G. Place subgrade and base materials in accordance with Section 02200.
 - H. Replace damaged pavement, curbs, gutters, and sidewalks, shrubs, and trees as indicated in SSPWC Subsection 306-1.5.2.
 - [D. Provide hydro-seeding in areas indicated. Grade surface as indicated on the Drawings. Provide a minimum of 4 inches of topsoil and apply hydro-seeding according to Section 02900.]
 - [E. Provide sodding in areas indicated. Grade surface as indicated on the Drawings. Provide a minimum of 4 inches of topsoil and place sod in disturbed areas in accordance with Section 02900.]

** END OF SECTION **