

SECTION 02725

SEWER LINES IN TUNNELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Handling, transporting, and installing sewer line in primary lined tunnels.

1.02 UNIT PRICES

- A. The length of the sewer installed in primary lined tunnels will be measured by linear foot along the center line of the completed sewer, center line to center line of manholes, as designated on the Drawings, and to the end of stubs or termination of the pipe; and to the inside face of lift stations and treatment plant works. The installation of sewer within the limits of a structure other than manholes will not be considered for measurement and payment at the unit price bid.
- B. Payment for the installation of the sewer in primary lined tunnels constructed according to Section 02310 - Tunnel Excavation and Primary Liner will be authorized by the Owner's Representative in three parts. Pay estimates for partial payments will be made as measured above according to the following schedule:
 - 1. An estimate for 65 percent payment will be authorized when the Contractor's excavation and primary liner installation is complete.
 - 2. An estimate for 100 percent payment will be authorized when the sewer pipe installation and grouting is complete.

1.03 SUBMITTALS

- A. Submittals shall be made in accordance with all provisions and sections of these specifications.
- B. Provide a brief description of method of transporting carrier pipe into the tunnel; method of hoisting and positioning pipe; method of jointing and aligning pipe; and blocking plan.
- C. Submit buoyant force calculations, bulkhead design, and blocking details. The calculations shall include an analysis of the stresses and deformation induced on the carrier pipe. Have the submittal signed and sealed by a Professional Engineer registered in the State of Texas.

- D. Submit the as-built survey as described in Document 02732 - Acceptance Testing for Sanitary Sewers to the Owner's Representative prior to substantial completion.

PART 2 PRODUCTS

2.01 PIPE MATERIAL AND FITTINGS

- A. The sewer pipe may consist of centrifugally-cast fiberglass pipe (FRP), vitrified clay pipe (VCP), polyvinyl chloride (PVC) pipe, high density polyethylene (HDPE) pipe, plastic-lined reinforced concrete pipe (RCP), plastic-lined or epoxy lined ductile iron pipe (DIP) or combinations of these. Storm sewers do not require lining.
- B. Contractor shall be responsible for selecting appropriate pipes and pipe joints to safely carry the loads imposed during construction.

2.02 CENTRIFUGALLY-CAST FIBERGLASS PIPE

- A. Provide centrifugally-cast fiberglass pipe, joints, and fittings in accordance with Section 02618 - Centrifugally-Cast Fiberglass Pipe.

2.03 POLYVINYL CHLORIDE PIPE

- A. Provide PVC pipe, joints and fittings in accordance with Section 02620 - PVC Pipe.

2.04 HIGH DENSITY POLYETHYLENE PIPE

- A. Provide HDPE pipe, joints and fittings in accordance with Section 02619 - HDPE Pipe.

2.05 DUCTILE IRON PIPE

- A. As approved for pipe jacking applications, ductile iron pipe lined with polyethylene, polyurethane, or ceramic epoxy, and fittings to be in accordance with Section 02610 - Ductile Iron Pipe.

2.06 PLASTIC LINED REINFORCED CONCRETE PIPE

- A. Provide reinforced concrete pipe, joints and fittings in accordance with Section 02615 - Reinforced Concrete Pipe.

2.07 ANNULAR GROUT

- A. Provide for grouting of the annular space between pipe and tunnel liner as specified in Section 02330 - Tunnel Grout.

PART 3 EXECUTION

3.01 INSTALLATION TOLERANCES

- A. Prior to installing the sewer pipe, verify that the primary liner has been constructed so that the sewer pipe may be placed in conformance with specified tolerances.
- B. Tolerances from lines and grades shown on the Drawings for the sewer pipe installed in the primary liner are plus or minus 6 inches in horizontal alignment and plus or minus 1-1/2 inches in elevation. Should misalignment of the primary liner preclude installation of the sewer pipe to the tolerances specified, notify the Owner's Representative.

3.02 PIPE HANDLING

- A. Handle and transport pipe into the tunnel in a manner that prevents damage to the pipe, joints, gaskets, and any plastic liner. Do not install pipe damaged during placement operations. Contractor may propose repair procedures for review and approval of the Owner's Representative.

3.03 TUNNEL CLEANUP

- A. Prior to pipe placement in the tunnel, remove temporary tunnel utilities, such as electrical and ventilation. Remove loose material, dirt, standing water, and debris prior to pipe placement.
- B. Temporary steel construction tracks or steel pipe skids may be left in place if they do not interfere with alignment of the sewer pipe or interfere with final placement of the annular grout.

3.04 INVERT PIPE SUPPORT

- A. Provide support adequate to establish final pipe grade. Support may include screeded concrete, steel beam, or other method as designated by the Contractor's Engineer. Secure the pipe support to the pipe or primary liner. If concrete is used for pipe support, cure it a minimum of 12 hours prior to setting pipe.

3.05 JOINING PIPE IN TUNNELS

- A. Join pipe segments to properly compress the gaskets and allow for the correct final positioning of the pipe for line and grade. Closely align pipes by bringing them loosely together by means of hydraulic jacks, locomotives, pipemobiles, or winches.

Once pipes have been loosely joined, pull them home by means of a hydraulic tugger or other similar method suitably protecting pipe and joints against damage. Impact jointing such as ramming with locomotives or other mechanical equipment is not permitted.

3.06 BLOCKING PIPE IN TUNNEL AND BULKHEADS

- A. Install a pipe blocking system. The pipe blocking shall position the sewer pipe in the tunnel to allow a minimum of 4 inches of grout to be placed between the sewer pipe and the tunnel primary liner or casing.
- B. Secure blocking rigidly in place without dependence on wedges so that it cannot be dislodged during pipe placement and grouting operations.
- C. Construct bulkheads to withstand imposed grout pressure without leakage. Provide adequate venting for bulkheads.

3.07 ACCEPTANCE TESTING

- A. Perform an as-built survey on installed sewer pipe. Take invert elevations at each pipe joint. Take two diameter readings, at right angles, randomly at an average of 20 feet spacing or less in non-rigid pipe.
- B. Test for leakage by low-pressure air methods in accordance with Section 02732 - Acceptance Testing for Sanitary Sewers.

END OF SECTION