

SECTION 02670

UTILITY POLYETHYLENE CONTAINMENT PIPE SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Trenching and other excavation.
- B. Ground water control.
- C. Pipe bedding.
- D. Installation of containment pipe and appurtenances.
- E. Backfill and compaction of backfill.
- F. Dust alleviation and control.
- G. Cleanup and restoration of surface in improved areas.
- H. Supplying all labor, materials, equipment and apparatus not specifically mentioned herewith or noted on the plans, but which are incidental and necessary to complete the work specified.

1.02 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the general designation only.
- B. American Society for Testing and Materials (ASTM) Publications:
 - D-638 Standard Test Method for Tensile Properties of Plastics.
 - D-790 Standard Test Methods for Flexural Properties of unreinforced and reinforced Plastics and Electrical Insulating Materials.
 - D-1248 Specifications for Polyethylene Plastics Molding and Extrusion Materials.
 - D-1505 Test Methods for Density of Plastics by Density Gradient Technique.
 - D-1603 Test Method for Carbon Black in Olefin Plastics.
 - D-1693 Test Methods for Environmental Stress Cracking Ethylene Plastics.

D-2774	Standard Recommended Practice for Underground Installation of Thermoplastic Pipe
D-3015	Standard Practice for Microscopical Examination of Pigment Dispersion in Plastic Compounds.
D-3035	Standard Specification for Polyethylene (PE) Plastic Pipe (SDRPR) Based on Controlled Outside Diameter.
D-3261	Standard Specifications for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
D-3350	Specifications for Polyethylene Plastic Pipe and Fittings Materials.

1.03 QUALITY ASSURANCE

- A.** All Work Shall be done to the satisfaction of the representative of the Geotechnical Consultant and shall meet the approval of the City Engineer.
- B.** Class of pipe requirements shown or called for on the plans shall be the minimum acceptable.
- C.** Submit manufacturer's data on the pipe material, fittings and service material.
- D.** The City Engineer may require manufacturer's certificates showing conformance with this specification with any shipment of materials to the job site.

1.04 JOB CONDITIONS

- A.** Note and conform with conditions and requirements indicated and specified under Section 02202 of these Specifications.
- B.** Contractor shall conduct operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians and to adjacent property owners or tenants.

PART 2 - PRODUCTS

2.01 PIPE MATERIALS

- A.** The polyethylene containment pipe shall be Plexco Polyethylene, or equal, conforming to ASTM D-1248 with a PE 3408 designation. The size of pipe, SDR and pressure rating shall be as designated on the plans.
- B.** The Contractor shall install pressure-sensitive tape noting the intended use for the inner carrier pipe. Adhesive-backed Pipe Labeling Tape shall be PVC Plastic tape manufactured specifically for direct placement onto pipe, cable or conduit for warning and identification. Tape shall be a minimum of 2.2 mils, an adhesive strength of 26 psi, and with tensile strength of 32 lb. per inch of width. Tape

shall be of the type provided in rolls, color coded for the utility involved with warning and identification imprinted in bold letters continuously and repeatedly over entire tape length. Code and letter coloring shall be permanent, unaffected by moisture or other substances contained in trench material.

- C. All pipe lengths shall be butt fused by means of a heat fusion process in accordance with ASTM D-3261.
- D. All fittings shall be of the same material as the mainpipe and shall be joined to the main pipe by means of a heat fusion process in accordance with ASTM D-3261.
- E. The polyethylene containment pipe shall be supplied with "spider" supports sized with spacing as recommended by the pipe manufacturer for support of the carrier pipe.

2.02 LEAK DETECTION VAULTS

- A. Leak detection vaults shall be precast reinforced concrete with poured in place reinforced concrete bottoms of the form and dimensions shown and detailed on the plans and shall conform to the requirements of ASTM Designation C478. Concrete used for leak detection vaults, bases and thrust blocks shall be Class "A" shall conform to Section 02550 of these Specifications.
- B. Containment pipe connections to leak detection vaults shall be PE fusion welded flanged connections with rubber gaskets and 316 SS anchor bolts and nuts.
- C. Frames and covers for leak detection vaults shall be gray iron castings of the form and dimensions shown and detailed on the plans and shall conform to the requirements of ASTM Designation A48 for Class 30B castings. Frames and covers shall be match marked in sets which have been machined after fabrication to provide a firm and continuous seat. All castings shall be thoroughly cleaned and coated with commercial quality asphaltic varnish prior to delivery.
- D. Reinforcement for leak detection vaults and bases shall be deformed steel bars conforming to Section 02550 of these Specifications.
- E. All exposed reinforcing bars required for thrust blocks and anchors shall be fusion epoxy coated conforming to Section 02661 of these Specifications, or stainless steel with equivalent load carrying capabilities as specified for deformed steel bars.
- F. Mortar for precast leak detection and cone section joints shall consist of one (1) part Portland cement conforming to the requirements of Section 02550 of these Specifications, with two (2) parts of mortar sand by volume. Sand shall be well graded and of such size that all will pass a No. 8 sieve. Mortar materials shall be mixed to a consistency suitable for making joints on concrete pipe and all mortar shall be used within thirty (30) minutes after mixing water has been added. Admixtures shall not be added to mortar without the prior approval.

2.03 PIPE BEDDING AND BACKFILL MATERIAL

- A. Shall conform to Section 02202 of these Specifications.

PART 3 - EXECUTION

3.01 TRENCHING, BACKFILL AND SHORING

- A. Shall conform to Section 02202 of these Specifications.

3.02 CONTAINMENT PIPE INSTALLATION

- A. Installation: Pipe and appurtenances shall be installed in accordance with the best practice, and in conformance with the applicable requirements of the manufacturer's handbooks. All pipes shall be laid on a bed prepared by handwork, dug true to line and grade, to furnish a true and firm bearing for the pipe throughout its entire length.
- B. Joints between plain ends of polyethylene pipe shall be made by butt fusion when possible. The pipe manufacturer's fusion procedures shall be followed at all times as well as the recommendations of the Fusion Machine Manufacturer. The wall thickness of the adjoining pipes shall have the same DR at the point of fusion.
- C. On each day butt fusions are to be made, the first fusion of the day shall be a trial fusion. The trial fusion shall be allowed to cool completely, then fusion test straps shall be cut out. The test strap shall be 12-inches or 30 times the wall thickness in length (minimum) an 1-inch or 1.5 times the wall thickness in width (minimum). Bend the test strap until the ends of the strap touch. If the fusion fails at the joint, a new trial fusion shall be made, cooled completely and tested. Butt fusion of pipe to be installed shall not commence until a trial fusion has passed the bent strap test.
- D. Socket fusions shall be tested by a bent strap test as described by the pipe manufacturer. The pipe manufacturer shall provide visual guidelines for inspecting the butt, saddle and socket fusion joints.
- E. Handling: Pipe shall be carefully handled during hauling, unloading, and placing operations, so as to avoid breakage or damage. Strap-type slings shall be used for lifting and placing; no chains or hooks will be permitted. Broken or damaged pipe or appurtenances will be rejected, and shall thereupon be removed from the work and replaced.
- F. Alignment: All pipe shall be accurately laid in conformity with the prescribed lines and grades as established by the City Engineer. Each length shall be jointed to the preceding section as specified, and after said jointing has been completed, there shall be no movement of the pipe in subsequent operations.
- G. Cleaning: Before each new length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. When pipe laying is not in progress, all open pipe ends shall be satisfactorily closed with watertight plugs.

- H. Bearing: Pipe in the trench shall have continuous uniform bearing along its bottom, except at bell holes. Before lowering pipe into the trench, the Contractor shall remove all stakes, debris, loose rock and other hard material from the bottom of the trench.
- I. Positioning: After the final positioning, pipe shall be held in place in the trench with backfill material placed equally on both sides of the pipe at as many locations as required to hold the pipe section in place. After joints are completed, the backfill material shall be redistributed and compacted as herein required.
- J. Closure: At the end of each day and when work is not in progress, all open ends of pipe installed in the line shall be satisfactorily closed with watertight plugs.

3.03 CONNECTIONS

- A. Unless separately listed on the bid schedule, Contractor shall make all required connections to existing facilities and improvements at no additional cost, and compensation for such work shall be deemed as included in the price bid for pipe installation.

3.04 STRUCTURES

- A. Structures and appurtenances shall be installed at the location and to the lines and dimensions shown on the plans and detail drawings, and as established by the City Engineer. Structures shall be installed in conformance with the applicable requirements of Section 71-1.07 of the State Standard Specifications. Precast structures shall be accurately assembled with full mortar bed joints.
- B. Frames for leak detection vaults in paved areas shall be accurately placed flush with and in the plane of the finish pavement. Tops of structures in unpaved areas shall be constructed to the grades shown or called for on the plans and established by the City Engineer. Leak detection vault frames in new roadway subgrade shall be brought to finish pavement plane and grade immediately after paving operations. All leak detection vault frames in paved areas shall be secured by means of concrete frame anchor slabs as shown and detailed on the plans and detail drawings.

3.05 CLEANUP

- A. Upon completion of containment pipe construction operations, all lines, vaults, and other structures shall be thoroughly cleaned of dirt, rubbish, debris and obstructions of any kind to the satisfaction of the City Engineer, and the entire work site shall be cleaned of all waste, rubbish, and construction debris of any nature.

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