

SUBSECTION 5.02

HIGH DENSITY POLYETHYLENE (HDPE) CORRUGATED AND SMOOTH LINED THERMOPLASTIC PIPE SPECIFICATION: (FOR GRAVITY FLOW DRAINAGE PIPE APPLICATIONS)

1. Description:

For the City of Amarillo and the ETJ Areas, this item shall govern for the furnishing and installing of all High Density Polyethylene (HDPE) Corrugated and Smooth-Lined Pipe and / or materials for constructing of culverts, side road pipes, storm sewers, stubs, and all related connections and fittings, all of which shall conform to ASTM F 2306, latest edition. The pipes shall be of the sizes, types, and dimensions shown on the plans, and contained in this specification. In addition, it shall include all connections and joints to new or existing pipes, storm sewer manholes, inlets, headwalls, and other appurtenances as may be required to complete the work.

2. Materials:

Unless otherwise specified on the plans or herein, thermoplastic pipe and joint fittings shall conform to the following:

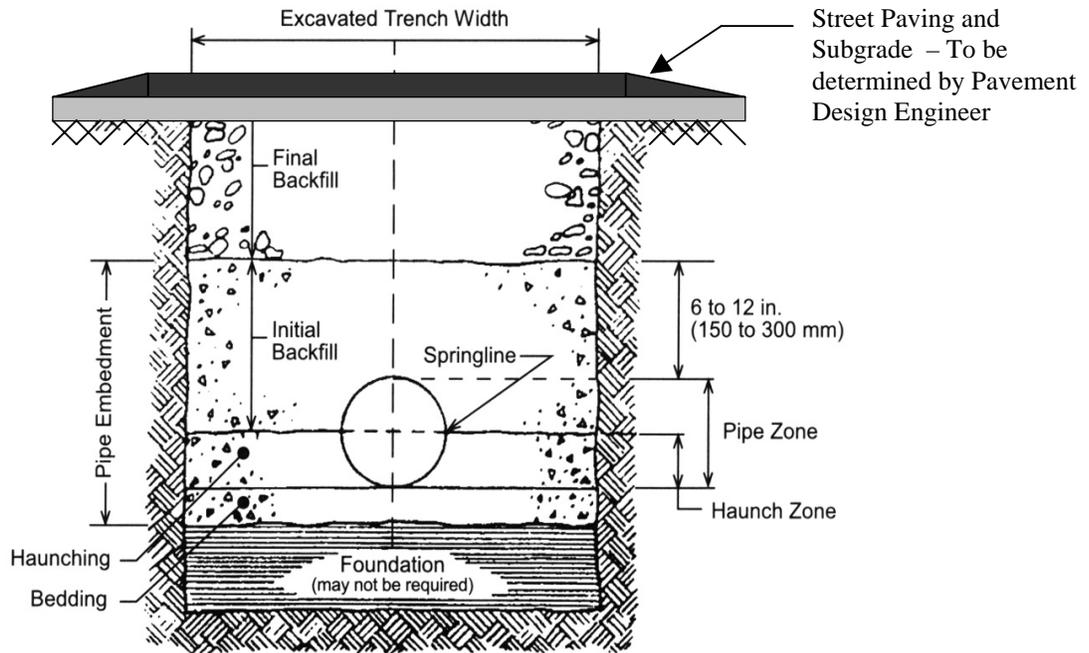
- A. High Density Polyethylene (HDPE) Corrugated and Smooth Lined Pipe & Fittings shall be manufactured in accordance with requirements of ASTM F 2306, latest edition. Type S: This pipe shall have a full circular cross section, with an outer corrugated pipe wall and a smooth inner wall.
- B. High Density Polyethylene (HDPE) Corrugated and Smooth Lined Pipe shall be manufactured from virgin PE compounds which conform with the requirements of cell class 435400C as defined and described in ASTM D 3350.
- C. Minimum Pipe Stiffness (PS) at five percent deflection shall be as described in ASTM F 2306, Section 6.3 when tested in accordance with ASTM D 2412.
- D. All HDPE Corrugated and Smooth Lined Pipe shall be certified through the AASHTO National Transportation Product Evaluation Program (NTPEP) 3rd Party Certification program.
- E. For storm sewer installations in the City of Amarillo and ETJ areas, the minimum acceptable pipe size shall be 18” diameter.

3. Installation:

Installation shall be in accordance with ASTM D 2321, “Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications”.

All contractors and inspectors shall be trained and certified by the manufacturer prior to installing HDPE pipe. A copy of the training certification and proof of insurance shall be provided to the City Engineer before any work shall commence. Upon completion of these requirements the contractor will be considered for the City of Amarillo Approved HDPE Installers List.

Figure 1: Definitions of Terms for Backfill in Trench Condition:



A. General Installation Requirements:

Thermoplastic pipe shall be unloaded and handled with reasonable care. Pipe shall be placed in the bed starting at the downstream end. Trenches shall be excavated in such a manner as to insure that the trench sidewalls will be stable under all working conditions.

Trench walls shall be sloped or supported in conformance with generally accepted standards of safety, including TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Item 402, Trench Excavation Protection and Item 403, Temporary Special Shoring. Only as much trench as can be safely maintained shall be opened. Trenches with thermoplastic pipe in place shall be backfilled as soon as practicable, but no later than the end of each working day.

Trench details, including foundation, bedding, haunching, initial backfill, final backfill, pipe zone, and trench width are shown in Figure 1.

For storm sewer installations in the City of Amarillo and ETJ areas, all specifications regarding pipe sizes, pipe slopes, velocities, design runoff frequency, design runoff procedures, pipe connections, alignment, etc... shall be in full compliance with Section 5 of the City of Amarillo Storm Water Management Criteria Manual.

B. Trench Widths:

Trench width shall be in accordance with ASTM D2321 and shall be sufficient to ensure working room to properly and safely place and compact haunching and other backfill materials. Minimum trench width shall not be less than 1.25 times the pipe outside diameter plus 12 inches, (1.25 x O.D. + 12"). On multiple pipe barrel runs the clear distance between pipes shall be 0.50 times the pipe diameter, ($\frac{1}{2}$ x Diameter).

C. Bedding and Backfill:

Bedding material shall meet the requirements of ASTM D2321 Class I or Class II material. A minimum of 6" of bedding shall be provided prior to placement and shall be loosely compacted. Bedding material size shall be 1½" maximum granular material. Initial backfill material shall meet the same requirements as the bedding material and shall extend to 6 inches above the top of the pipe.

Final backfill material shall meet the requirements of ASTM D2321 Class II or Class III material. All initial and final backfill material shall be placed in 6 inch lifts and compacted to a minimum 90% Standard Proctor Density. The contractor shall provide density reports and a Proctor on materials as requested by the City of Amarillo project representative. The descriptions for Class I, II and III material are as shown below:

Class I - Angular crushed stone or rock, dense or open graded with little or no fines (1/4 inch to 1 1/2 inches in size)

Class II - Clean, coarse-grained material, such as gravel, coarse sands and gravel/sand mixtures (1 1/2 inches maximum in size).

Class III - Coarse grained material with fines including silty or clayey gravels or sands. Gravel or sand must comprise more than 50 percent of the Class III material (1 1/2 inches maximum size).

In areas not supporting a complete roadbed or paving section, the final backfill material may consist of the natural topsoil and / or other natural material originally excavated from the site. In these areas, the backfill shall be placed in uniform layers and compacted to meet the density requirements as shown in the plans. Backfill material with large lumps or material that cannot be spread evenly may be rejected.

Flowable backfill in accordance with TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges, Item 401, is acceptable for the requirements for bedding material, as well as final backfill material for this specification.

D. Minimum Cover:

The minimum cover is 18 inches below the bottom of stabilized Subgrade for HS-25 Live Loads (from 18” to 42” Pipe Diameters) and 24 inches below the bottom of stabilized Subgrade for larger diameter structures (from 48” to 60” Pipe Diameters).

For the City of Amarillo and the ETJ areas, it is recommended that all pipe shall be placed a minimum of 24 inches below the bottom of stabilized Subgrade in order to reduce the potential for conflicts with other utility systems. Variances from the minimum cover requirement must be submitted in writing to the City Engineer and approved by the City Engineer prior to commencing construction.

Extreme care should be taken when heavy construction equipment loads cross the pipe trench during construction. If the passage of construction equipment over an installed pipeline is necessary during construction, compacted fill in the form of a ramp shall be constructed to a minimum elevation of three (3.0’) feet over the top of the pipe. Any damaged pipe shall be replaced at the contractor’s expense.

E. Installation Deflection:

At the Engineer’s discretion, all pipe exceeding 7.5% deflection (as per AASHTO Section 30) may require replacement or re-compaction at the contractor’s expense when measured or inspected not less than 30 days following completion of installation. Deflection is defined per ASTM D 2321.

The Contractor shall provide Video Camera (CCTV) inspection on 100% of the pipelines installed. The test shall be conducted at least 30 days after the installation of the pipeline. Mandreling of the pipe may be accepted as a suitable alternative for pipeline inspection and deflection testing, in lieu of CCTV inspection.

F. Joints:

Joints shall be installed such that the connection of pipe sections will form a continuous line free from irregularities in the flow line. All installations within City of Amarillo right-of-way shall require watertight joints that meet a 74kPa (10.8 psi) laboratory test per ASTM D3212 and utilize a bell and spigot design with a gasket meeting ASTM F477.

G. High Groundwater:

In installations where high groundwater is encountered, a soil filter fabric shall be installed, as per manufacturer’s recommendations, around the initial backfill material unless sufficient fill cover can be provided over the pipe. In flowable fill or high groundwater installations, pipe shall be restrained as per manufacturer’s recommendations.

4. Measurement and Payment:

This item shall be measured for payment by the installed linear foot. Such measurements shall be made between the ends of the barrel along its flow line. For multiple pipes, the measured length shall be the sum of the lengths of the barrels, measured as described above. Pipe shall be paid for at the contract unit price per installed linear foot, complete in place, as provided by the proposal and contract.

The contract price per installed linear foot shall be the total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the work including excavation, backfill, and disposal of surplus materials in accordance with the plans and these specifications.