

Appendix C High Density Polyethylene Pipe (HDPE) Guideline

HDPE is available in 300mm (12 in), 375mm (15 in), 450mm (18 in), 600mm (24 in), 750mm (30 in), 900mm (36 in), 1050mm (42 in), 1200mm (48 in) diameters.

Advantages of HDPE:

HDPE is lightweight; easy to handle; hydraulically efficient; easy to cut; unaffected by brackish water, chemicals, and corrosive elements found in soils; produced in 6m (20 ft.) lengths; and is somewhat flexible, thus permitting smooth curvilinear installation.

Design Considerations:

Only HDPE smooth interior (Type S or Type D) shall be utilized. This type is hydraulically efficient and reportedly easier to install, since it is more rigid than the corrugated interior version.

Designers must recognize that a buried plastic pipe is a composite structure made up of a plastic ring and the soil envelope, and that both materials play a vital part in the structural integrity of the plastic pipe. In contrast, a buried reinforced concrete element is less influenced by the soil envelope.

- The successful performance of HDPE depends upon proper bedding, backfill and care in installation.
- The initial cost should not be the only basis for culvert material selection. The most economical culvert is one which has the lowest total annual cost over the design life of the structure.
- HDPE can easily be damaged during excavation activities for items such as underground utilities. Although field repairs can be accomplished using repair couplers available from the manufacturer, the designer needs to assess the overall risk of damage associated with other excavation activities before HDPE is selected.
- Minimum cover shall be established by the engineer based on an evaluation of specific site conditions. In the absence of pipe strength calculations, the minimum cover above the pipe shall be at least 0.9m (3 ft) or one pipe diameter (whichever is larger). The minimum cover should be maintained before allowing vehicles or heavy construction equipment to traverse the pipe trench.
- Maximum cover should be limited to 2.5m (8 ft) (measured to top of pipe).
- Pipe strength calculations in accordance with AASHTO Standard Specification for Highways and Bridges, Section 18 (ASD) or AASHTO LRFD Bridge Design Specifications Section 12 are required for the following installations:
 1. Installations subject to vehicle loads
 2. Fills greater than 2.5m (8 ft) (measured to top of pipe)
 3. Fills less than 0.9m (3 ft) (measured to top of pipe)
 4. Adverse soil conditions
 5. High water table
- Because HDPE pipe is relatively lightweight, buoyancy forces, especially at the culvert inlet, may be a concern. Anchorage in the form of a headwall, slope paving or other stabilization methods may be necessary.

- HDPE is susceptible to fire damage, especially at outfall locations. Therefore, fire damage may result due to an adjacent grass fire. Overall, the likelihood of damage is considered low.
- Since proper bedding and backfill are vital to a successful installation, diligent construction and inspection is needed.
- Installation shall conform to Section 6.5.1 of the Department's Standard Specifications.
- The design or construction engineer may elect to specify a Type II bedding installation when native backfill material is judged to be inadequate for use.
- Vibratory compaction of backfill can cause HDPE to shift and therefore appropriate measures and monitoring during installation are necessary. Normally, visual inspections are adequate to confirm the installation is acceptable. However, a mandrel test may be requested by the engineer when it is necessary to confirm the acceptability of an installation.
- When specifying HDPE pipe, designers must consider loads from construction vehicles **as well as those experienced during construction staging operations.**

Applications:

- The use of HDPE can be considered in the following locations:
 1. Temporary installations
 2. Areas remote from the traveled portions of pavements
 3. Medians
 4. Parking lots, (where vehicular traffic is light to moderate and truck traffic is light)
 5. Longitudinal installations on local and collector routes within the shoulder areas
 6. Slope drains
 7. Areas with little or no underground utility involvement
 8. Where parallel underground utility work is not likely in the foreseeable future
(Where parallel underground utility work is likely, the designer must be aware that it is possible to disrupt the supporting soil envelope adjacent to the pipe, which in turn can compromise the structural integrity of the pipe/soil system)