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## Pipe Selection

**General.** When selecting pipe types for pipe culverts and storm drains, consider all available pipe products that are judged to be of satisfactory quality and equally acceptable on the basis of engineering and economic analyses.

**Pipe Types.** Pipe types available for consideration are corrugated metal, reinforced concrete, and thermoplastic. Requirements are as follows:

- Requirements for **corrugated metal** pipe are defined in Standard Specification Item 460, "Corrugated Metal Pipe." There are no specific restrictions on the use of corrugated metal pipe on TxDOT projects.
- Requirements for **reinforced concrete** pipe are defined in Standard Specification Item 464, "Reinforced Concrete Pipe." There are no specific restrictions on the use of reinforced concrete pipe on TxDOT projects.
- Requirements for **thermoplastic** pipe (i.e. Poly Vinyl Chloride (PVC) Pipe, High Density Polyethylene Pipe (HDPE), and Polypropylene Pipe) are defined by the Phase I Restrictions under Restricted Use of New Pipe Culverts (see below) and the [Statewide Special Specification 4122](#). Thermoplastic pipe is a new pipe material that requires end treatments as specified in the [Statewide Special Specification 4122](#).

**Selection Criteria.** Base selection of pipe type for a culvert or storm drain system on strength, hydraulic conductivity, constructability, and durability using the following criteria:

- Evaluate strength and hydraulic conductivity using published methods and values.
- Evaluate constructability based on experience on previous projects, assessing such factors as transportation, handling and setting of pipe, issues regarding backfilling and compaction, and overall ease of installation.
- Evaluate durability using soil testing and methods outlined in the NCHRP 474: Service Life of Culverts manual on the TxDOT Pipe Design and Durability web page:  
<https://www.txdot.gov/business/resources/pipe-design.html>

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The [TxDOT Pipe Design and Durability](#) web page contains additional information on evaluating different pipe types.

**Selection Responsibility.** Where products are determined to have different engineering and economic properties, a specific product or products may be selected for a project. A TxDOT District or Area Office may develop and document pipe selection criteria for all products in their specific region. Otherwise, the project designer is responsible for selecting a pipe type or types that satisfy the required engineering properties for the specific project.

**Evaluation of New Pipe Culvert Materials.** New pipe materials will be evaluated based on the material type, design methodology, and construction/installation method(s). New pipe material submittals will be sent to TxDOT's Research and Technology Implementation Division by filling out the Product Evaluation Request Form on the TxDOT's New Product Evaluation website: <https://www.txdot.gov/business/resources/evaluation.html>

The submittal should include the following items:

- An overview of the pipe, including system theory and development history.
- Laboratory and testing data supporting the theory.
- Detailed design procedures including sample calculations for trench installations with a surcharge load. The surcharge load will be applied at: a) 2 feet; b) 4 feet; c) 8 feet; and d) 12 feet above the crown of the pipe.
- Durability (corrosion, construction damage, environmental) design procedure(s) for the pipe.
- Example service life calculations for the pipe.
- A detailed construction/installation manual.
- Case histories of the use of the pipe on highway projects.

The Bridge Division will review the submittal. After resolution of any comments, the Bridge Division will approve the new pipe material for use on TxDOT projects following the restrictions presented in the next section. Once a new pipe material has gone through the various phases it will be accepted for general use on TxDOT projects.

**Restricted Use of New Pipe Culverts.** After a new pipe material has been evaluated and found to be satisfactory, it will be placed into a "restricted use" status. The purpose of the restriction phases is to allow TxDOT to evaluate the product both for its ability to successfully compete in a competitive bid situation as well as its ability to be installed correctly and successfully by TxDOT contractors and inspectors. Additional product-specific restrictions may be added if analysis indicates a need.

## **Phase I**

New products will initially be considered under Phase I restrictions.

### Phase I Restrictions:

- Roadways with current ADT less than 2,000 per lane.
- Inside pipe diameters no greater than 36 inches.
- Multiple pipe installations will be limited to a maximum of two adjacent pipes.
- Fill heights over pipe from 2 feet to 12 feet. Minimum fill height for private driveways may be reduced to 1 foot.
- Installations to be cross-drainage or side-drainage culverts. The purpose of this restriction is to allow post-construction inspection and evaluation of the pipe installation without having to enter manholes or other closed systems. Closed storm sewer systems are specifically disallowed under this restriction.

## **Phase II**

Products will be considered for Phase II restrictions when the following criteria have been satisfied:

1. Six projects have been won in a competitive bid following the Phase I Restrictions. Projects may be either TxDOT construction or maintenance projects in which the pipe product was included as an alternate with at least one other pipe type. Projects in which the product was bid alone, allowed as an option, change ordered or provided in some other manner will not be counted.
2. Six projects have had the pipe installed under Phase I Restrictions. Pipe installations shall be completed and functioning satisfactorily. These six projects do not have to be the same six described above. Projects installed by TxDOT maintenance forces or contractors that obtained the pipe through other than the competitive bid process described above may be considered. Projects considered acceptable will be at the sole discretion of TxDOT.

### Phase II Restrictions:

- Roadways with current ADT less than 5,000 per lane.
- Inside pipe diameters no greater than 48 inches.
- Multiple pipe installations will be limited to a maximum of three adjacent pipes.
- Fill height restrictions will be modified based on the specific pipe type and properties.
- Installations to be cross-drainage or side-drainage culverts. The purpose of this restriction is to allow post-construction inspection and evaluation of the pipe installation without having to enter manholes or other closed systems. Closed storm sewer systems are specifically disallowed under this restriction.
- Pipe materials may be used for driveway pipes in this phase without restriction. However, Districts may choose not to include restricted pipe types in heavy commercial or industrial driveway installation.

### **Phase III**

Products will be considered for Phase III restrictions when the following criteria have been satisfied:

1. Eight additional projects have been won in a competitive. Projects may be either TxDOT construction or maintenance projects as described in Phase II.
2. Eight additional projects have had the pipe installed. Pipe installations shall be complete and functioning satisfactorily. These eight projects are required to be won in competitive bid as described above. Projects may be either TxDOT construction or maintenance projects as described in Phase II.

#### Phase III Restrictions:

- Roadways with current ADT less than 10,000 per lane.
- Inside pipe diameters no greater than 48 inches.
- Multiple pipe installations will be limited to a maximum of four adjacent pipes.
- Fill height restrictions will be modified based on the specific pipe type and properties.
- Closed storm sewer systems are allowed in this phase.

### **Phase IV (Unrestricted)**

Products will be considered for Phase IV (unrestricted) when the following criteria have been satisfied:

1. Twelve additional projects have been won in a competitive bid. Projects may be either TxDOT construction or maintenance projects as described in Phase III.
2. Twelve additional projects have had the pipe installed. Pipe installations shall be complete and functioning satisfactorily. These twelve projects are required to be won in competitive bid as described above. Projects may be either TxDOT construction or maintenance projects as described in Phase III. At least five of the projects must be closed storm sewer type projects that utilize manholes, junction boxes and inlets.