



# INDIANA DEPARTMENT OF TRANSPORTATION

*Driving Indiana's Economic Growth*

## Design Memorandum No. 12-02 Technical Advisory

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**TO:** All Design, Operations, and District Personnel, and Consultants

**FROM:** /s/ Crystal M. Weaver  
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Bridge Design, Inspection, Hydraulics, and Technical Support Division

**SUBJECT:** Pipe Lining

**ADDS:** *Indiana Design Manual Section 31-4.05(06)*

**EFFECTIVE:** Immediately

### A. Introduction

Pipe lining is a technique for rehabilitating a culvert in poor condition where replacement is difficult. Pipe lining can be used for a circular or deformed culvert. The common types of pipe lining used for a circular culvert are solid-wall high-density polyethylene (HDPE) pipe, profile-wall HDPE pipe, profile-wall polyvinyl-chloride (PVC) or a cured-in-place (CIPP) system. The types used for a deformed culvert are oval-shaped solid-wall HDPE pipe or CIPP. See *INDOT Standard Specifications Section 725* for more information. Pipe-lining considerations include the following.

1. The structure barrel should be relatively straight, not significantly damaged, and basically intact.
2. The backfill around the structure should be free from large voids.
3. There should be sufficient room to work from at least one end of the existing structure.

4. The structure is in a location where a road closure is impractical.

## **B. Design Criteria**

1. A structure may not increase backwater over existing conditions, unless the increase is contained within the right of way and the outlet velocity is less than 13 ft/s.
2. Riprap scour protection should be used as described in *Indiana Design Manual* Section 31-3.04(03).
3. An HY-8 hydraulic analysis of each proposed pipe liner should be completed.
4. The smooth-interior hydraulic design will be based on a minimum Manning's  $n$  value of 0.012.
5. The largest possible liner should be used though a smaller liner can be hydraulically adequate.
6. Because of cost, a CIPP liner should be considered only if other liner choices cannot be applied. A CIPP liner should be used only in an existing structure with an equivalent diameter of 96 in. or less.
7. A CIPP liner will reduce the existing structure size as follows.
  - a. For an equivalent diameter of 24 in., the diameter is reduced by 1 in.
  - b. For an equivalent diameter of 27 in. through 48 in., the diameter is reduced by 2 in.
  - c. For an equivalent diameter of 54 in. through 72 in., the diameter is reduced by 3 in.
  - d. For an equivalent diameter of 78 in. through 96 in., the diameter is reduced by 4 in.
8. Deviation from the design criteria described above will require a design exception subject to Office of Hydraulics approval.

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