



INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

Design Memorandum No. 09-27 Technical Advisory

December 4, 2009

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

FROM: Anthony L. Uremovich
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SUBJECT: Culvert Sumping

ADDS: *Indiana Design Manual Section 31-3.04(07)*

EFFECTIVE: May 12, 2010, Letting, for Recurring Plan Detail 723-R-569d
Sept. 1, 2010, Letting, for Recurring Special Provision 723-R-568

A. General Requirements

Sumping a drainage structure consists of placing the structure invert elevation and scour protection at a specified depth below the waterway or stream flowline to satisfy the IDEM Water Quality Section 401 permit requirements. This sumping allows the natural movement of stream bed material through the structure. Sumping should be provided for each structure over one of the Waters of the United States.

1. Three-Sided Structure. The sump depth should be 18 in. (450 mm) for a stream bed of sand, 12 in. (300 mm) for a stream bed of other soil, or 3 in. (75 mm) for a stream bed of rock or till. The stream bed and scour protection should be as shown on Recurring Plan Detail 723-R-569d, attached hereto. A base slab should be used only if the geotechnical report identifies flowline-area soil that will not support riprap. No increase in structure size is required due to sumping. The sump area will not require backfill as part of the contract work, but will be allowed to fill in naturally over time.

2. Pipe or Box Structure. Such a structure should be sumped as shown on Recurring Plan Detail 723-R-569d and Figure 09-27A.

English Units

| Structure Diameter or Span, S (ft) | Sump Required for Stream Bed of Sand (in.) | Sump Required for Stream Bed of Other Soil (in.) | Sump Required for Stream Bed of Rock or Till (in.) |
|--------------------------------------|--|--|--|
| < 4 | 6 | 3 | 3 |
| $4 \leq S < 12$ | 12 | 6 | 3 |
| $12 \leq S < 20$ | 18 | 12 | 3 |

Metric Units

| Structure Diameter or Span, S (m) | Sump Required for Stream Bed of Sand (mm) | Sump Required for Stream Bed of Other Soil (mm) | Sump Required for Stream Bed of Rock or Till (mm) |
|-------------------------------------|---|---|---|
| < 1.2 | 150 | 75 | 75 |
| $1.2 \leq S < 3.6$ | 300 | 150 | 75 |
| $3.6 \leq S < 6.1$ | 450 | 300 | 75 |

PIPE OR BOX STRUCTURE SUMP REQUIREMENT

Figure 09-27A

If the required sump exceeds 3 in. (75 mm), the structure diameter or rise may need to be increased by the sump value. The structure's design capacity should be checked to determine if such increase is required. If a pipe end section or riprap is required, these should be sumped to the same depth as the structure. The sump area of the structure and end section or riprap will not require backfill as part of the contract work, but will be allowed to fill in naturally over time.

Scour-protection limits should be shown on the plans. Quantities for geotextile and riprap, or a base slab, should be determined and shown in the Structure Data table for each applicable structure. Appropriate columns have been incorporated into the Structure Data table. Such quantities are pay quantities, and therefore should be incorporated into other pay quantities of geotextile, riprap, or concrete.

B. Contract Documentation

Recurring Plan Detail 723-R-569d should be called for through the August 4, 2010, Letting. It will become a series of INDOT *Standard Drawings* beginning with the September 1, 2010, letting. Recurring Special Provision 723-R-568 should be called for through the August 2011 letting. It will be incorporated into the INDOT *Standard Specifications* beginning with the September 2011 letting.

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Attachments

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