



INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

Design Memorandum No. 17-07 Policy Change

April 12, 2017

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

FROM: /s/Mark A. Bailey
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Bridges Division

SUBJECT: Hydraulic Design for Small Structures, Bridges, and Inlets

REVISES: *Indiana Design Manual (IDM) Sections 203-2.02(02), 203-2.02(11), 203-2.02(14), 203-3.03(02), 203-4.04(03), 203-4.04(07), 203-4.04(09), and 203-4.04(16), and Figures 203-2A and 203-2B*

EFFECTIVE: Immediately

The Department has updated the design policy for small structure (culvert and pipe) and bridge replacement projects and for storm inlets. The referenced IDM sections have been revised to reflect these updates. Previously submitted or approved small structure and bridge hydraulic designs need not be resubmitted.

The design policy for storm inlets has been updated to require flanking inlets at sag points and the use of a clogging factor for certain inlet types. Designers should review designs in process for compliance.

Editorial revisions have been incorporated at a number of locations to clarify existing design guidance. Additional hydraulic design resources can be found on the Department's Office of Hydraulics webpage at <http://in.gov/indot/3595.htm>.

The revised sections have been incorporated into the on-line version of the IDM. Notable updates are summarized below.

IDM Revisions – Small Structure Replacement

IDM 203-2.0 Small Structure and IDM 203-2.01 Introduction

- The Department recently defined the span lengths that classify a structure as either a culvert or a pipe for asset management purposes. The Section 203-2.0 heading has been revised from “Culvert” to “Small Structure” to reflect the SPMS work type that is associated with culvert and pipe projects.
- For the hydraulic design of small structures, both culverts and pipes have the same design criteria, regardless of nomenclature or headings in the Chapter.

IDM 203-2.02(02) Allowable Headwater (AHW)

- The “In-Kind Culvert Replacement” policy has been extended to include all small structure replacements.
- The maximum backwater for a culvert replacement is 3 ft or the existing backwater, whichever is less. For example, if the existing structure has a backwater of 1 ft, the replacement structure may have a backwater of 1 ft or less. If the existing structure has a backwater greater than 3 ft, the replacement structure may have a backwater of 3 ft or less.

The backwater must be evaluated in conjunction with other criteria which may affect the structure sizing.

- Consultant submittals to the Office of Hydraulics for culvert replacement projects are required to include the software data files. If HY-8 is used to analyze the culverts, the consultant report should also indicate which version of the program is being used.

IDM 203-2.02(11) Culvert Replacement

This section has been deleted and pertinent information moved to Section 203-2.02. Subsequent sections have been renumbered accordingly.

IDM 203-2.02(14) Pipe or Box-Extension Structure-Sizing Process

This section was structured to emphasize that extending the structure cannot result in an increase to the existing headwater elevation unless it can be contained within right-of-way or within the upstream channel.

IDM Revisions – Bridge Replacement

The maximum allowable backwater calculation is now based on the backwater of the existing structure. Reference to the Q_{100} have been revised to the 1% EP event. Subsections for upstream structure impacts and bridge configuration have been added.

IDM 203-3.02 Bridge Policy

This section has been created to align with the presentation of information in the Small Structure section of the chapter. Information formerly under Design Procedure and Criteria (Bridge Sizing) has been moved to this section.

203-3.02(01) Allowable Backwater

Additional language has been added to clarify establishing the natural condition as well as calculating the maximum backwater. Allowable backwater for an existing bridge replacement is as follows.

1. If the existing backwater is greater than 3 feet, then the proposed backwater should be less than or equal to 3 feet.
2. If the existing backwater is between 3 feet and 0.14 feet, the proposed backwater should be less than or equal to the existing backwater.
3. If the existing backwater is less than 0.14 feet, the proposed backwater should be less than or equal to 0.14.
4. A flood easement can be considered upstream of the bridge to allow for greater than 0.14 ft of backwater. See item 1 above.

The backwater must be evaluated in conjunction with other criteria which may affect the structure sizing.

IDM Revisions – Inlet Spacing

IDM 203-4.04(03) Inlet Spacing and Spread

A clogging factor of 50% is now specified for inlet spacing computations. This factor is not required where the inlet types provide a curb box as a backup, where Type P inlets are specified or at sag locations where flanking inlets will be provided.

IDM 203-4.04(09) Sag Vertical Curve and Flanking Inlets

- Sag points for a curb and gutter section or for a median barrier rail should be provided with Type 5 or 15 inlets.
- Flanking inlets are now required for all sag locations, including median ditches or other open conveyances. Flanking inlets for open conveyances may not be required where the potential ponding would not impose a significant risk to the roadway or where there is an overflow to another location with the capacity to accommodate the additional flow.

IDM 203-4.04(16) Bridge Deck Drainage

A clogging factor of 50% is required for all inlets on a bridge deck instead of the assumption that every other inlet is clogged.

Questions regarding hydraulic requirements for small structures, bridges, and inlet design should be directed to Mark Bailey at mbailey1@indot.in.gov. Additional hydraulic design resources can be found on the Department's Office of Hydraulics webpage at <http://in.gov/indot/3595.htm>

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