



INDIANA DEPARTMENT OF TRANSPORTATION

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Bridge Inspection Memorandum No. 19-04

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TO: All Inspection Personnel and Consultants

FROM: /s/Andrew Fitzgerald

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Bridge Inspection
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**Bridge Management
Division**

SUBJECT: Channel Surveys

REVISES: Bridge Inspection Manual – Section 1-2.10

EFFECTIVE: Immediately

1-2.10 Channel Surveys

1-2.10(01) Purpose

Scour is the movement of channel bed material by the action of moving water. This movement may result in degradation (i.e., erosion of material), as well as aggradation (i.e., accumulation of material). These changes in the channel bed may lead to bridge instability and are generally identified by profiling the channel bottom. Comparison of previous profiles is typically needed

to detect and assess scour. Plotting the underwater measurements of the stream bottom and probing bridge foundations are two of the most important aspects of inspecting a bridge for scour.

Channel cross section data is used to evaluate trends in channel bottom movement and to compare channel bottom elevations to footing elevations. Indiana has two levels of Channel Survey: basic and in-depth.

1-2.10(02) Precision

For all Basic Channel Surveys, the elevation of the waterline must be referenced to a bridge element (such as top of railing or coping, etc.). For In-depth Channel Surveys, the elevation of the waterline should be referenced to a known elevation on the bridge.

1-2.10(02)a For a Basic Channel Survey, bottom elevations are required:

1. At the upstream fascia, locate enough points between substructure units to identify any problems or deficiencies. As a minimum, three points are required for a typical one span structure. Typically the elevations are taken at substructure units, at mid-span, and at the ends of the bridge depending on the contours of the channel and the overall width of the channel. The notes of how to layout the survey must be stored in BIAS. Once the survey method and points are determined, the process can be repeated on future Routine Inspections. Create a bridge profile sketch and plot the channel survey profile on the sketch. It is recommended that the BIAS Scour Channel Profile Tab be used to plot the data gathered. However if this tool is not used, the plotted channel data must still be uploaded into BIAS, and attached to the Routine Inspection Report.
2. Bridges that are metal pipes or concrete boxes (with bottoms), do not require a Basic Channel Survey. If a scour hole exists at an inlet or outlet, report to Maintenance to have filled with rip rap.

1-2.10(02)b For an In-depth Channel Survey, bottom elevations are required:

1. Around each substructure unit in the water at enough points to identify any problems or deficiencies.
2. Between substructure units along the centerline of the bridge, or between twin bridges at enough points between substructure units to identify any problems or deficiencies. A minimum of three points between each substructure and one point at each substructure is required.
3. At the upstream fascia, at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.

4. At the downstream fascia at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.
5. 100 feet upstream at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.
6. 200 feet upstream at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.
7. 100 feet downstream at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.
8. 200 feet downstream at enough points between substructure units to identify any problems or deficiencies. A minimum of one point at each substructure and three points between each substructure is required.
9. At additional locations, if required, to adequately determine the thalweg of the waterway.
10. As needed when an unusual change in the channel has been identified.

When the bridge length is less than 100 feet, the upstream and downstream profiles should be taken at locations equal to the bridge length and twice the bridge length.

Every in-depth Channel Survey Inspection will follow a Plan of Action. The Plan of Action must include:

1. A time table for conducting the survey.
2. The personnel requirements for the survey.
3. A list detailing what is required to be surveyed.
4. The required access equipment.
5. The required traffic control.

Water depth measurements should be recorded to the nearest tenth of a foot. Scour evaluations are typically based on changes in elevations greater than 0.5 foot since most channel bottoms are irregular surfaces with random cobbles, debris, and sand ripples.

The water surface elevation should be referenced to a known elevation or reference point on or near the bridge.

The individuals taking the profiles need not be bridge inspectors. However, the profiles must be reviewed and compared to known substructure elevations and past profiles by the Inspection Team Leader.

1-2.10(03) Frequency

Channel Surveys are performed concurrently with many of the required inspections of a bridge over water. After the initial basic Channel Survey is completed, additional Channel Surveys shall be performed every two years during a Routine Inspection, unless an Underwater Inspection is scheduled for the bridge. In that case, the In-Depth Channel Survey done by the divers shall suffice. However, a basic Channel Survey may be required after large flood events or when channel changes have occurred. A basic Channel Survey is required for all Initial Inspections, and as required in the Scour Plan of Action for Scour Critical Bridges.

An In-Depth channel survey is performed during all underwater inspection unless directed otherwise by the SPM.