



Illinois Department of Transportation

2300 South Dirksen Parkway / Springfield, Illinois / 62764

March 31, 2009

CIRCULAR LETTER 2009-07

BRIDGE SCOUR SUPPLEMENT

COUNTY ENGINEERS/SUPERINTENDENTS OF HIGHWAYS
MUNICIPAL ENGINEERS/DIRECTORS OF PUBLIC WORKS
CONSULTING ENGINEERS

Pursuant to the March 22, 2007 and November 30, 2007 Bureau of Local Roads and Streets Circular Letters 2007-05 and 2007-21, we are providing additional guidance to assist in determining the appropriate Scour Critical Evaluation code, Illinois Structure Information System (ISIS) Item 113, to aid in developing a Scour Plan of Action (POA) if necessary, and for scour evaluation during preliminary design. These circular letters can be found on the Illinois Department of Transportation website at <http://www.dot.il.gov/blr/manuals/infoclist.html>.

As indicated in the two Circular Letters referenced above, the department's goal is to have all structures in the National Bridge Inventory (NBI) that cross waterways evaluated for scour. A POA must be completed for all structures determined to be scour critical, or that have scour countermeasures requiring follow-up observations, by the end of **Calendar Year 2009**.

The requirements of the National Bridge Inspection Standards (NBIS), which include scour evaluation, are now receiving increased attention from the Federal Highway Administration (FHWA). The need for Scour POAs is mandated in the Code of Federal Regulations, Title 23, Part 650, Subpart C. Agencies failing to comply with these federal mandates may be subject to sanctions which could disallow use of federal funds for future projects.

Screening and Reevaluating Existing Structures

The scour rating for each structure crossing a waterway should now be reviewed, verified and screened for obvious errors. Circular Letter 1996-07, dated April 22, 1996, required all such structures to be evaluated for scour by December 31, 1996. However, there are still several structures in the inventory with an Illinois Structure Information System (ISIS) Item 113 rating of "6," indicating the structure has not yet been evaluated for scour potential. Delinquent scour evaluations must be performed by May 31, 2009. If a structure has not been evaluated for scour by that date, Item 113 will be coded "3 – scour critical" and a Scour Plan of Action must be prepared by the end of the year as described above.

Based on their year of construction, it is apparent many of these structures were designed after the requirements for accommodating scour in the design were implemented. Bridge designs including scour began in Illinois in about 1991, and we expect that structures constructed since about 1995 should therefore have been designed for scour. The Scour Critical Evaluation rating for these structures should likely be coded as either a "5" or "8" if no scour problems exist.

Structures found on competent rock and closed bottom culverts with a scour rating of "6" may be coded "8." Likewise, single span pile bent spill-thru abutment structures with rip-rapped embankment cones should receive a scour rating of "8" if there are no observed scour problems.

For many structures, a review of photographs, design plans, and previous scour analyses is all that is required to verify an appropriate scour rating. For most remaining structures, the Bridge Scour Assessment Procedure (BSAP) is an acceptable, simplified scour assessment procedure for existing local agency bridges. It should be noted, however, that in order to use historical scour performance criteria, there must be documentation that there has not been significant scour for the documented 100-year flood event. This should include stream profile and cross sections at the bridge as necessary to document changes in the geomorphology. Additional information on the BSAP program can be found in Section 3.7 of the Structural Services Manual.

If structures are reevaluated analytically, the analysis should be accomplished using the 2004 USGS Regression Equations, as indicated in Circular Letter 2008-05, dated May 5, 2008. In addition, with new analyses, substantial reductions in calculated scour may be realized using the geotechnical adjustments provided in Bridge Manual Section 2.3.6.3.2. In some cases, this has resulted in removal of a structure from the scour critical list, thereby obviating the need for a POA.

Scour Plan of Action

In order to comply with the NBIS, structures with Item 113 rated "3" or less, and those structures with a rating of "7," must have a scour POA on file. Information regarding the development of the POA is provided in the aforementioned Circular Letters, as well as in the Structure Services Manual.

In order for the POA to be viable, it must be a plan which can be implemented. For example, many POAs indicate the structure should be monitored during a flood event. However, if a local agency has several structures requiring monitoring during flood events but has only limited personnel with adequate experience, it may not be feasible to monitor all the structures in a timely manner. In these situations, it may be reasonable to consider closing roads passing over scour critical bridges during flood events until the structures can be adequately inspected and deemed safe for vehicular traffic.

An outline for a "Scour Critical Bridge – Plan of Action" and instructions for using the outline are provided in the Structure Services Manual and Form BBS 2680. This form must be approved and signed by the bridge Program Manager and maintained in the bridge file.

Recording and Reporting

As stated earlier, the department's goal is to have all NBI structures crossing over waterways evaluated for scour and POAs completed by the end of the 2009 calendar year. We request the local agencies submit updates to the Scour Critical Evaluation (Item 113) rating to the District Bureau of Local Roads and Streets. The Scour Evaluation Study, and POA if applicable, should be maintained in the local agency's bridge file. We ask that these documents not be submitted to the department at this time. However, the POAs and documentation may be requested for review by the department and will be evaluated during future QA/QC reviews.

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Local agencies should provide periodic updates to the district office on the scour evaluations and POA development, including the number of POAs completed and the number remaining.

Preliminary and Final Design

In order to assist in the correct coding of scour information, the *Scour Critical Evaluation Coding Report*, located in Section 3.7 of the Structural Services Manual, must be included with the Preliminary Bridge Design and Hydraulic report and with any modifications to the scour evaluation. This will help to ensure new and reconstructed structures are adequately addressed for the effects of scour and are coded properly in the ISIS. This requirement is effective immediately.

Foundations should be designed to provide full factored or allowable resistance available to resist strength limit state loadings for discharges up to and including the 100-year flood event. In addition, nominal or ultimate resistance must be provided for discharges up to and including the 500-year flood event using a resistance factor or factor of safety equal to 1.0.

Scour information, including the Design Scour Elevation Table, should be provided on the design plans as directed in Section 2.3.6.3.2 in the Bridge Manual. The scour elevations provided in this table are the basis for scour design at piers and abutments. This table on the plans allows maintenance and inspection personnel to more easily ascertain the applicability and consequences of observed scour to the structure's stability.

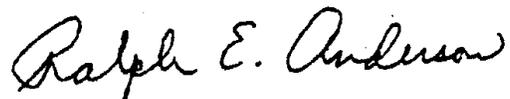
When the scour elevations extend below pile encasements or bottom of footings, the piles shall be designed, both geotechnically and structurally, to withstand the applied loadings without the presence of foundation soils above the given elevations. Calculations of nominal required bearing and estimated pile length must include the resistance of the soils above the design scour elevation, present during driving, while neglecting it in determining the factored, allowable or lateral resistance, to account for the loss of soil during a flood event.

If you have any questions regarding this Circular Letter, please contact Jack Elston at (217) 785-8748 or jack.elston@illinois.gov.

Sincerely,



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