

Tech Transfer Spotlight

Project Information

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Technology Transfer Event

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Program

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Bridge scour conference shares knowledge and innovations

The National Cooperative Highway Research Program's Domestic Scan (NCHRP Project 20-68A) on bridge scour risk management brought more than 30 national bridge scour experts together for a week in July 2016 to examine ways to prevent and remediate bridge scour. To help disseminate these experts' knowledge and innovations to professionals in Michigan, MDOT's bridge management engineer, who was also chair of the NCHRP scan team, worked with the Michigan Tech Research Institute (MTRI) to plan and host a one-day conference in Lansing in October 2017 dedicated to bridge scour risk management.

Problem

Bridge scour, the erosion of soil and rock from around bridge piers and abutments or from banks and beds of a river channel, is the most common cause of bridge failure nationwide. One of the most important aspects of bridge design is accurate prediction of scour effects so foundations or countermeasures can be built to withstand these eroding forces over the life of the structure. After several scour-related bridge failures in the 1980s, the National Cooperative Highway Research Program (NCHRP) supported research projects to quantify and model the mechanisms of bridge scour and develop effective countermeasures. These [research projects](#) resulted in a trove of new and valuable knowledge. NCHRP's Domestic Scan Program also supported further



The Bridge Scour Technology Transfer Event was held on Oct. 5, 2017, at MTRI. Forty MDOT participants were joined by nearly 40 professionals representing other Michigan transportation agencies, organizations and consultants.

investigation of this problem through Scan 15-02 – [Bridge Scour Risk Management](#).

Research

The scan team of seven joined 24 other bridge scour experts – structural engineers, hydrologists and other technical professionals – from 17 states for a weeklong

“Many dedicated professionals at MDOT and other agencies across the state are working to help keep Michigan’s bridges safe by managing and mitigating the risks of bridge scour.”

Rebecca Curtis, P.E.
Project Manager

workshop and peer exchange in July 2016. They closely examined the practices of states, counties, metro areas, municipalities and other transportation agencies to identify and document successful approaches to reducing flooding and scour risk through the judicious use of countermeasures. The scan also considered innovative methods that bridge owners use to assess structural vulnerability or scour susceptibility.

The scan team’s findings were captured in a two-page [handout](#). As a next step, the scan team’s chair, MDOT Bridge Management Engineer Rebecca Curtis, wanted to accelerate the transfer of new knowledge and innovative technology to bridge professionals in Michigan. She proposed and helped plan and promote a one-day conference to present the issues and tools discussed in the NCHRP scan to bridge scour professionals from MDOT and other Michigan agencies. The Bridge Scour Technology Transfer Event, organized by the MRTI, was held in Lansing in October 2017.

Technology Transfer to Michigan Professionals

Bridge scour and other technological experts from state DOTs, the Federal Highway Administration (FHWA), the United States Geological Survey, and other

researchers in the field led 14 presentations for nearly 80 participants representing MDOT, local agencies and contractors. The sessions were wide-ranging, covering five general areas: 1) scour procedures and risk analysis, 2) modeling and analysis, 3) scour monitoring and field inspection, 4) countermeasure design, construction and sustainability, and 5) scour plans of action. Monitoring was the focus of five sessions, including sessions on multi-beam sonar and bathymetric survey boat methods. A discussion of FHWA’s future scour design approaches gave participants a look ahead.

The workshop’s final presentation described MDOT’s current efforts and future plans of action to mitigate bridge scour. The agency has been engaged in careful and systematic evaluation of bridges statewide since 2008.

The workshop’s central recommendation was that transportation agencies should continue to track and implement bridge scour risk management advancements, especially by taking advantage of 3-D scour modeling. At the conclusion of the event, eight themes had emerged, focusing on the value of:

1. Understanding uncertainty in scour risk management.
2. Online tools and databases, such as web-based [data portals](#), [scour monitoring tools](#), and [bathymetric data platforms](#).
3. New methods for predicting and measuring scour.
4. Advanced scour modeling, including 3-D analysis and remote sensing.
5. Better culvert monitoring.
6. New countermeasures, such as [matrix riprap and spur dikes](#).
7. Numerical scour modeling, which is emerging as FHWA’s preferred method over physical scour modeling.
8. Scour plans of action, which promote an effective response to flooding.

Value

The conference demonstrated that Michigan has a sizable cohort of knowledgeable and engaged professionals addressing bridge scour. With more than 40 participants at the technology transfer event, MDOT now has a group of professionals with a better understanding of scour-related issues and tools, and Michigan is emerging as a leader in the field of innovative and effective bridge scour risk management. By investigating, evaluating and mitigating the effects of bridge scour throughout the state, MDOT’s bridge professionals are extending the service lives and enhancing the safety of Michigan’s bridges.

Research Administration

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Presentations from the Bridge Scour Technology Transfer Event are available at <https://mdotjboss.state.mi.us/SpecProv/getDocumentById.htm?docGuid=075bf417-43bc-42be-a4e7-c9b6d6b4a15c>.

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