Special bridge inspections underway

In 1987 a disastrous bridge failure on the New York Thruway led to a nationally mandated routine bridge inspection program. More recent failures have brought requirements for additional inspections and evaluations, especially for scour-critical and fracture-critical bridges. There is also a diving program in which any bridge over water that stays five feet deep or more all year round will be inspected by divers.

High velocity flows, as in floods, can wash or scour away the support material under bridge foundations. Because the damage is underwater, and the holes are often camouflaged by sediment, scour can be difficult to detect. The Coalinga Bridge on I-5 collapsed in March 1995 during a large flood. Scour appeared to be a contributing factor.

Determining scour damage requires detailed analysis by hydraulic, structural, and geotechnical engineers. However, local officials in Wisconsin have been asked to identify bridges with the potential for scour problems.

Gerry Krumdick of WisDOT's Bridge Maintenance Section is leading the state's scour-critical bridge identification effort. County highway departments were to submit a screening worksheet identifying bridges with potential scour problems this spring. Final scour evaluation is to be completed by 1997 under a federal program. If underwater inspection is needed, federal aid will pay for 80% of the cost.

To identify potential scour problems, inspectors can look for changes in the stream profile. A stream that is considerably deeper than at the last inspection may indicate degradation or scour, especially around bridge piers. Inspectors can also use a probe to check for scour holes or soft material in the streambed around the piers. New monitoring devices are being tested as well. The FHWA hydraulic engineering circulars (HEC) 18 and 20 have detailed background material on scour analysis.

Any structural change in a bridge may also indicate weakened foundations possibly from scour, according to Peter Lagasse, Senior Vice President of Ayres Associates engineering consultants. "Settlement of the piers or deck, or misalignment of the rail can be an indicator," he says. Through the FHWA National Highway Institute, Lagasse teaches workshops on scour and bridge inspection for state transportation agencies around the country.

Repairs for scour include reinforcing bridge piers with rock riprap or, in extreme cases, replacing the bridge.

Bridges with no records for the foundation type also pose a challenge. There are many such bridges in the state. Local officials are encouraged to pay special attention to these bridges during the next bridge inspection cycle, and after any major flood events.

Resource materials are available to help local officials and inspectors. These include the FHWA Technical Advisory 1540.23 and a new bridge inspection coding guide. (Item 113 relates to scour evaluation.) Inspectors should also pay attention to items 60 (substructure), 61 (channel), 71 waterway adequacy, and 92 and 93 (critical features underwater).

Scour is the suspected cause of a March 1995 bridge collapse on I-5 in California. Seven people died.

Fracture-critical bridges

Fracture-critical bridges are those with two or fewer main members supporting them. Wisconsin is also participating in a special inspection of fracture critical bridges. Federal funding (80%) is also available for the next round of fracture critical inspections.

"We always inspect fracture critical bridges carefully," says Bob Sindelar Dodge County Highway Department Engineer. "A lot of them are being replaced for other reasons like age, bad abutments, limited load capacity, or being too narrow. We have some overhead truss bridges that were bought used and brought in here in 1913! They're at the top of our replacement list."

For more information on scour critical and underwater inspections, contact your WisDOT District office or your county highway department.

PONTIS software for bridges

PONTIS, a PC computer-based management system for bridges, began being tested on selected state highway bridge data last May. By the end of 1996, when the system is in use statewide, counties and other local authorities will be able to use it to store, update and report their bridge data.

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Bridge management software

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"The program has degeneration curves that we can use to predict deterioration of a bridge. The manager can do 'what if' scenarios," says Daniel Fedderly, St. Croix County Highway Commissioner and chair of the Wisconsin County Highway Association's bridge committee. By contrast, the National Bridge Inventory (NBI), the existing bridge inspection data system, simply inventories inspection results.

Although inspection procedures will remain pretty much the same, PONTIS records more detail. For example, where NBI records the general condition of a bridge's substructure, PONTIS stores ratings for individual beams. Once the program has data from several inspection cycles, it will use that history of ratings to project deterioration of the bridge or its members.

"The goal of the management software is to help us use our bridge funds most efficiently," says Stan Woods, state bridge engineer for WisDOT. For example, current guidelines recommend putting one overlay on a bridge deck, then replacing the whole deck after the first overlay wears out. Data from PONTIS may be able to show that the deck is still solid and needs only another overlay.

In 1995 WisDOT district bridge staff will be working with and refining the inspection procedures and the program while University of Wisconsin engineers validate the deterioration models. "We will try to have PONTIS in place for the 1996 inspections which are due January 1, 1997," says Woods.

For more information about PONTIS contact your WisDOT district office.

Cinder chips

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and has more sharp edges. As a result it grabs and holds the asphalt better than pea gravel, especially on the newer water soluble emulsions.

"There's a big difference in cleanup," says Toby Opheim, City of Madison Streets Department Operations Manager. "We pick up less than half as much of the cinder chips as we did with pea gravel." Less excess means fewer complaints and less waste.

Madison tested the material in 1993 on some road sections. "It held up terrifically in the winter, so we decided to go with it for the entire sealcoat program last year," says Opheim.

Being black gives the cinder chips another advantage: better winter snow melting on sunny days. Striping paint stands out better against the black background and the road looks "new" longer. There's also less dust and the sharper edges mean less hazard for bicyclists because the chips are more stable and have better embedment.

Cinder chips are economical. They are both less expensive per ton, and weigh less per yard. Dane County paid $4.95 per ton for cinder chips last year compared to $5.80 per ton for pea gravel. It weighs about 2000 pound per yard compared to 2600 for pea gravel. At those figures, it costs about 35% less.

"Besides," says Steve Haag, "this is a form of recycling. Sooner or later we will deplete the gravel supplies and here is a product that can substitute for it."

For more information on Madison's seal coating program, contact Toby Opheim at 608/246-4535. For more information on Dane County's seal coating program contact Steve Haag at 608/266-4012.

Reader Response

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