



TECHNICAL SUMMARY

Technical Liaison:

Joe MacPherson, MnDOT
Joseph.MacPherson@state.mn.us

Project Coordinator:

Farideh Amiri, MnDOT
Farideh.Amiri@state.mn.us

Principal Investigator:

Brian Wasserman, Minnesota State
University, Mankato

LRRB PROJECT COST:

\$25,000



The SMC requires that even materials such as guardrails be tested in the laboratory, which can be an unnecessary expense for smaller projects.



RESEARCH SERVICES

OFFICE OF POLICY ANALYSIS,
RESEARCH & INNOVATION

Reduced Materials Testing Requirements for Low-Volume Road Projects

What Was the Need?

To ensure the performance and longevity of Minnesota highways, MnDOT requires that samples of materials used in highway construction undergo inspection or laboratory testing. The minimum sampling and testing required for these materials is described in MnDOT's [Schedule of Materials Control](#) (SMC).

The SMC is used not only for MnDOT projects, but also for projects by city and county agencies that have received funds for construction under the [State Aid for Local Transportation \(SALT\) program](#). However, local projects are usually smaller in scope and involve roads with much lower traffic volumes than the state highways for which SMC requirements were designed. Consequently, the SMC might call for more testing than is necessary for projects on low-volume roads, leading to significant unnecessary costs for local agencies. Research was needed to review the applicability of SMC requirements to SALT projects.

What Was Our Goal?

The objective of this project was to review existing SMC requirements in order to establish reduced materials testing rates for low-volume road projects without an unacceptable increase in risk and to create draft SMC specifications specifically tailored to SALT projects.

What Did We Do?

In November 2010, researchers conducted an online survey and an identical paper-and-pencil survey of field inspectors, project engineers and contractors about the SMC for low-volume roads. Of the total respondents to the online survey and paper survey, 33 were field inspectors, 56 were project engineers and eight were contractors.

Researchers then reviewed the MnDOT Office of Audit's annual audit of material control practices from June 2008 to June 2009. They also reviewed the pass-fail rates and costs of testing for several material items to evaluate the risk associated with changing various materials testing requirements. The source of this data was MnDOT's Lab Information Management System program.

What Did We Learn?

Survey results suggested that the MnDOT SMC can be impractical for the kinds of smaller projects conducted under SALT. Respondents noted that some results from currently required testing may take longer to get back from the lab than it takes to complete some smaller construction projects, making the results unusable. Respondents also expressed frustration at the redundancy of requiring inspections and testing for products that come from certified, qualified or approved sources. Further, it may take a long time to inspect materials that are low cost and low risk, making little sense from a cost-benefit perspective. For this reason, many survey respondents would skip testing in the least critical categories of erosion control and landscaping if regulations allowed. However, mainline paving and structural concrete items were viewed as critical and in need of continued inspection.

The Schedule of Materials Control for low-volume roads developed in this project reduces materials testing rates for state-funded local projects, mitigating their costs without compromising quality.

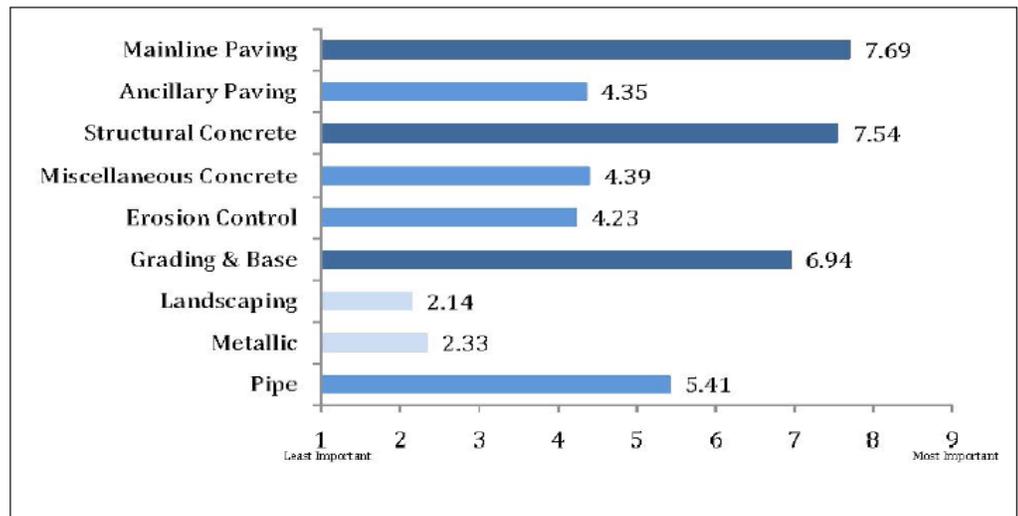
“An MnDOT project might have hundreds of thousands of dollars in tree plantings where a city project might have a few thousand. The question was whether it made sense for such smaller projects to conduct testing that is more costly than it would be to replace the materials being tested.”

—Joe MacPherson,
MnDOT State Aid
Construction Engineer

“This project will lower costs for local agencies without a decline in service to the public.”

—Brian Wasserman,
Assistant Professor,
Minnesota State
University, Mankato
Department of
Construction
Management

Produced by CTC & Associates for:
Minnesota Department
of Transportation Research Services
MS 330, First Floor
395 John Ireland Blvd.
St. Paul, MN 55155-1899
(651) 366-3780
www.research.dot.state.mn.us



Survey respondents thought landscaping and metallic materials (including guardrails) to be least in need of inspection, while mainline paving, structural concrete, and grading and base ranked highest in need of inspection.

Review of the audit of material control practices showed that nine MnDOT Trunk Highway projects and nine local agency projects were audited. Results of the audit indicate that MnDOT and SALT substantially complied with applicable project requirements. The audit recommended that SALT implement a plan to ensure cities and counties follow the MnDOT SMC, making clear the need either to follow published SMC guidelines or change them.

A review of materials testing pass-fail rates revealed that the asphalt cement failure rate was less than 1 percent and the emulsion failure rate was 1.8 percent, with the cost for repair or replacement substantially less than the costs incurred by mandating testing of asphalt cement across all local projects. The total costs associated with SMC testing guidelines for these categories were more than \$146,000 in 2010.

These results confirm that the smaller project scope and shorter timeline of SALT projects warrant a different set of guidelines than the current SMC. Researchers developed a new SALT SMC for low-volume roads tailored specifically to the construction project risks encountered by local agencies. These guidelines incorporate feedback from MnDOT, local agency representatives and the construction industry, and include changes that remove some testing and inspection requirements and make others less stringent.

What's Next?

The SALT SMC for low-volume roads is currently applicable to state-funded local projects, but not to projects that are federally funded or in the state trunk right of way. MnDOT will continue to evaluate the effectiveness of the new SMC to verify that there is no decline in service to the public, and eventually consider extending it to all state and federally funded projects. As technologies change, the document will continue to evolve with input from county and city representatives and MnDOT's materials laboratory.

This Technical Summary pertains to the LRRB-produced Report 2012-17, "Material Testing Rates for Low-Volume Roads," published June 2012. The full report can be accessed at <http://www.lrrb.org/PDF/201217.pdf>.