Recommendations from a new traffic sign maintenance handbook funded by the Local Road Research Board could save Minnesota road agencies as much as $41 million over three years, according to one researcher. Each traffic sign costs from $150 to $250 to install plus $20 per year for maintenance, and the average township has 180 signs. In a pilot implementation of these new guidelines in Stevens County, nearly a third of traffic signs were found to serve no useful purpose and could be safely removed.

Better Sign Management Will Save Minnesota Millions

Recommendations from a new traffic sign maintenance handbook funded by the Local Road Research Board could save Minnesota road agencies as much as $41 million over three years, according to one researcher. Each traffic sign costs from $150 to $250 to install plus $20 per year for maintenance, and the average township has 180 signs. In a pilot implementation of these new guidelines in Stevens County, nearly a third of traffic signs were found to serve no useful purpose and could be safely removed.

Another area of spending is sign replacement when retroreflectivity (how visible signs are to drivers at night) falls below federally mandated levels. Previously local governments didn’t have much guidance on how often to replace signs beyond the typical 12-year manufacturer’s warranty. MnDOT’s policy for its 400,000 signs has been to replace them every 18 years. However, research into how retroreflectivity actually degrades has shown that signs can be left in place safely for 20 years. In fact, they may actually retain their retroreflectivity for 30 years or more, but current sign materials haven’t been in use long enough to be sure.

The new handbook updates guidance from 2010 in light of new Federal Highway Administration requirements that local agencies must develop a sign management plan and ensure that retroreflectivity standards are met. The handbook will help local agencies assess the condition of their signs as well as develop and implement a plan tailored to their communities.

Read about the new handbook in the Crossroads blog and in Technical Summaries 2014RIC20 and 2014-20.

MnDOT Library Earns Five Awards in Five Years

The MnDOT Library ended 2014 by receiving the Innovation in Action award from the Minnesota Chapter of the Special Libraries Association. This award heralded the library’s work on the 2013 MnDOT Library Valuation/Return on Investment (ROI) study, which found the library saves $1.90 for every $1 spent. (The Special Libraries Association’s Transportation Division also recognized the ROI study last year.)

Library Director Sheila Hatchell said staff members have been recognized five times since 2010, including their efforts to promote redesigned space, update resources and increase outreach. A complete list of the awards the library has received is available at mndot.gov/library/awards.html.

**Portable Weigh-in-Motion System Provides Low-Cost Screening**

Traffic & Safety — Heavy freight vehicles can damage local roads, and transportation officials need to know where this type of traffic occurs to plan road improvements and enforce weight limits. Weigh-in-motion systems can provide valuable data but are usually permanent and costly, requiring intrusive pavement cuts or boring to install.

Local Road Research Board-funded research has resulted in a portable WIM system that can be installed with tape and anchors in less than 40 minutes and costs significantly less than a permanent system. Field tests have established the system’s accuracy in measuring traffic volumes, vehicle speeds and vehicle classes, and two of these systems are now available for local agency use. Technical Summary 2015-03

“Permanent weigh-in-motion systems can be cost-prohibitive. With this portable system, the sensors are about $10,000 per pad, and the system is a lot more flexible.”

—Benjamin Timerson, Transportation Data and Analysis Program Manager, MnDOT Office of Transportation System Management

**Industry Cluster Analysis for Better Transportation Planning**

Policy & Planning — New MnDOT research sheds light on the role transportation plays in the state’s economic competitiveness and highlights the unique challenges faced by some of the state’s major industry clusters. Researchers used the U.S. Cluster Mapping tool, developed last year by Harvard Business School, to select competitive industries in Minnesota for analysis, such as the forest products cluster in Duluth, the health services cluster in Rochester, the granite cluster in St. Cloud and the recreational vehicle cluster in northwestern Minnesota. Interviews with representatives from these industries were combined with other available data to produce detailed analyses of their transportation needs, which will be valuable for statewide and regional planning efforts. Technical Summary 2015-02

**Timber Bridge Life Spans Extended with Innovative Inspection Devices**

Bridges & Structures — State-of-the-art inspection techniques could extend the life of Minnesota’s timber bridges. The state has more than 2,000 bridges that contain structural timber, which can deteriorate in ways that are difficult to detect with traditional inspection techniques. For example, sounding a bridge with a hammer may not detect decay caused by fungi or insect attack, damage deep inside the wood or decay in its early stages. MnDOT-sponsored research into new inspection techniques has recommended the use of specialized equipment: a moisture meter, where more moisture means more risk of decay; a stress wave timer, where slower waves traveling through timber mean more deterioration; and three models of resistance microdrill (pictured above), which measure the wood’s resistance to a small-diameter (about 3mm) drill bit to identify decay, voids or termite damage. Technical Summary 2015-01

View MnDOT demonstration videos for some of these inspection techniques at mndot.gov/research/videos.html.

**Salt-Tolerant Roadside Sod Reduces Pollution**

Environmental — Road salt is important for keeping Minnesota roads clear of ice and snow, but it can damage or kill roadside grass. This is not just an eyesore; healthy vegetation is needed to absorb stormwater runoff so that deicing chemicals don’t flow into water sources. Researchers have developed a new grass mix that will better withstand salt exposure, dry and hot conditions, and other issues. The mix has been incorporated into MnDOT’s roadside turfgrass specifications and is now being planted on roadsides across Minnesota. Technical Summary 2014-46

View MnDOT demonstration videos for some of these inspection techniques at mndot.gov/research/videos.html.
Early Preventive Maintenance Extends Asphalt Pavement Life

Blending Fines into Existing Loose Gravel Costs Less Than Regraveling

**Materials & Construction**—Gravel roads are damaged when rainfall or traffic erodes the fine particles that bind the gravel together, leaving large rocks on the pavement surface. This condition can lead to rutting, potholes, ridges that channel water and, ultimately, road failure. While this sort of damage is typically handled by regraveling, it’s expensive to haul appropriate gravel to many parts of Minnesota. Researchers tested a process to inexpensively rejuvenate these roads by blending small fines into the existing gravel and found that when a suitable binder is available more cheaply than local aggregate, the practice is viable and economically sound. Additional monitoring of treated roads is still needed to ensure that performance holds up over the long term. *Technical Summary 2015-04*

Transportation Research Syntheses

Transportation Research Syntheses are short-turnaround research projects that summarize research activity and practices among state departments of transportation. To view these documents or request a TRS from MnDOT Research Services & Library to answer your questions about a transportation topic, visit mndot.gov/research/transportation-research-syntheses.html.

MnDOT Learns the State of the Art in Driver Fatigue Monitoring

**Traffic & Safety** — MnDOT staff is required to complete a wide range of driving tasks, and MnDOT is interested in determining how fatigue affects an individual’s ability to drive safely. A review of recently published research examined the characteristics of driver fatigue and the methods, tools and technologies used to predict, diagnose and monitor it. These ranged from simple-to-use field tests of drivers before they begin their shifts to in-vehicle systems that monitor drivers’ heart rates, brain waves or eye blinks. *Transportation Research Synthesis 1501*

Other Recent TRSs

**TRS 1413:** New Approaches for Roundabout Lighting to Enhance Pedestrian Safety

**TRS 1502:** Coordination Between State Transportation Agencies in Multi-State Metropolitan Planning Areas: A Survey of State Practice

**TRS 1503:** Benefits and Costs of Increasing Truck Load Limits: A Literature Review

**TRS 1504:** Summer Maintenance Operations Reporting: A Survey of State and National Practice

**TRS 1505:** Future Impact on Minnesota Transportation Revenue Collection of Commercial Fleet Conversion from Diesel Fuel to Natural Gas

Materials & Construction—Pavement surface treatments such as fog seals and chip seals, which cover the existing surface with an asphalt emulsion that sometimes includes gravel, are low-cost alternatives to pavement reconstruction, especially when applied early enough in a pavement’s life. New research helped determine the optimal timing for such treatments by identifying how environmental aging affects the pavement’s stiffness and strength, and how applying these treatments slows the aging process. Five states and the Federal Highway Administration collaborated in this effort, which involved field and laboratory tests monitoring nearly a decade of pavement aging. *Technical Summary 2014-45*
Calendar

3/18 LRRB Meeting, Minneapolis
4/1 TRIG Meeting, Arden Hills
4/6 CTS Annual Meeting and Awards Luncheon, Minneapolis
4/15–17 2015 Minnesota Airports Conference, St. Cloud
5/13 Minnesota Roadway Maintenance Training and Demo Day, Rosemount
5/20–21 CTS Transportation Research Conference, St. Paul

Contact

Research 651-366-3780
research.dot@state.mn.us
Library 651-366-3791
library.dot@state.mn.us

Follow Us Online

Website: mndot.gov/research
Blog: mntransportationresearch.org

Produced by CTC & Associates LLC