**High Friction Surface Treatment reduces crashes at crash-prone areas**

Each year, approximately one quarter of highway fatalities in the United States occur at or near horizontal curves. While many factors contribute to these crashes, at some locations, the deterioration of pavement surface friction is a major contributing factor.

The introduction of High Friction Surface Treatment (HFST) technology now provides an overlay option that supplies more friction than traditional overlays, and holds that friction property for a much longer time. Additionally, HFST can be customized to specific roadway safety needs at site-specific locations.

**What is HFST?**

High Friction Surface Treatments place a thin layer of specially engineered, durable, high-friction aggregates as a topping on resins or polymers—usually urethane, silicon, or epoxy—with a binder. These aggregate systems have long-lasting skid resistance while also making the overlay much more resistant to wear and polishing. The resin or polymer binder combination locks the aggregate firmly in place, creating a rough, durable surface capable of withstanding everyday roadway demands, such as heavy braking and even snowplowing.

HFST restores pavement surfaces where high traffic volumes have worn down existing pavement surface aggregates and can also serve as an alternative that compensates for inadequate geometric designs (such as sharp curves and/or substandard or variable superelevations).

The available HFST products use aggregates that are polish- and wear-resistant and reduce

High-friction treatment continued on page 5

**Videos demonstrate sander calibration**

Four new videos are available that demonstrate how to operate, calibrate, and upload software for the FORCE America 6100 sander controls. The videos were made in cooperation by the Minnesota Department of Transportation (Maintenance and Video Services offices and the Oakdale Maintenance shop) and FORCE America.

“Agencies can use the videos to learn how to operate and calibrate the 6100 model, which is relatively new,” says Kathy Schaefer, instructor for the Circuit Training and Assistance Program (CTAP). “MnDOT will be purchasing FORCE America sander controls in the future, and I’d estimate that about 90 percent of local agencies currently use FORCE America controllers.”

FORCE America, based in Burnsville, Minnesota, is a leading supplier of motion and control systems in North America.

Calibration continued on page 7
Gravel road management synthesis identifies tools

The LRRB conducted a study to understand the gravel road management needs of Minnesota local agencies. The synthesis includes:

- Process summary
- Summary of local and national survey findings
- Matrix of existing gravel road management tools used in the U.S.

Procedure: To evaluate the system’s effectiveness, traffic counts were taken before and after the system’s installation. The initial count was collected in March 2012, and the system was installed in September 2012. Two weeks after the initial installation, the blinking LEDs were realigned to optimize their brightness for drivers.

Results: The city has received numerous positive comments about the system. Driver compliance in yielding the right-of-way to pedestrians using the mid-block crossing has increased by 12 percent, bringing total compliance to nearly 100 percent. In addition, the percentage of jaywalkers and pedestrians experiencing long waits at the crossing has decreased. No additional system maintenance has been required, and the system has performed well in the cold, snowy Minnesota weather. The city did discover that community outreach to residents was necessary to maximize use and understanding of the system.

Approximate cost: $79,500

Implementation: Installation of the system was completed in September 2012, and final pedestrian counts and evaluations were completed in May 2013. The system continues to be operational at the mid-block crossing on Silver Lake Road at 34th Avenue NE.

Status: Complete LTAP
Uncontrolled Crossings (in conjunction with markings and signs)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Recommended Locations</th>
<th>Staged Pedestrian Yield Rate</th>
<th>Unstaged Pedestrian Yield Rate</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center Median with Refuge Island</td>
<td>• Decreases pedestrian crossing distance • Provides higher pedestrian visibility • Reduces vehicle speeds approaching the island • Reduces conflicts • Increases usable gaps • Reduces pedestrian exposure time</td>
<td>• May make snow removal more difficult • May be a hazard for motorists • Small islands not recommended on high-speed roadways (&lt;40 mph)</td>
<td>Wide, two-lane roads and multilane roads with sufficient right-of-way</td>
<td>34%</td>
<td>29%</td>
<td>Variable depending on length</td>
</tr>
<tr>
<td>School Crossing Guards</td>
<td>• Inexpensive • Provides higher pedestrian visibility • Highlights when a pedestrian crossing is being used</td>
<td>• May require trained staff or local law enforcement, especially on high-speed and high-volume roadways</td>
<td>At school locations</td>
<td>NR</td>
<td>86%</td>
<td>$&lt;500</td>
</tr>
<tr>
<td>Pedestrian Crossing Flags</td>
<td>• Inexpensive • Provides higher pedestrian visibility • Highlights when a flag is held in a noticeable location</td>
<td>• No effect at night • Requires pedestrians to actively use a flag • Can be easily removed/stolen • Shorter crossings are preferred</td>
<td>Downtown/urban locations • High pedestrian volume locations • Across low-speed (&lt;45 mph) roadways</td>
<td>65%</td>
<td>74%</td>
<td>$3,000–$8,000</td>
</tr>
<tr>
<td>Warning Sign with Edge Mounted LEDs</td>
<td>• Highlights a crossing both at night and during the day</td>
<td>• Requires pedestrian activation • Minimal to no effect on speed</td>
<td>In conjunction with in-road warning lights • Downtown/urban conditions</td>
<td>NR</td>
<td>28%</td>
<td>$20,000–$40,000</td>
</tr>
<tr>
<td>In-Road Warning Lights</td>
<td>• Highlights a crossing both at night and during the day • Provides higher driver awareness when a pedestrian is present</td>
<td>• Snowplows can cause maintenance issues • No effect when road surface is snow covered • Requires pedestrian activation</td>
<td>Downtown/urban conditions</td>
<td>NR</td>
<td>66%</td>
<td>$12,000–$18,000</td>
</tr>
<tr>
<td>Pedestal Mounted Pedestrian Flashing Signal Beacons</td>
<td>• Provides higher driver awareness when a pedestrian is present</td>
<td>• Requires pedestrian activation • Not advisable on multilane streets • Not shown to reduce crashes</td>
<td>Low-speed school crossings • Two-lane roads • Mid-block crossing locations</td>
<td>NR</td>
<td>57% (two-lane, 35 mph)</td>
<td>$75,000–$150,000</td>
</tr>
<tr>
<td>Pedestrian Overhead Flashing Signal Beacons</td>
<td>• Provides higher driver awareness when a pedestrian is present</td>
<td>• Requires pedestrian activation</td>
<td>Multilane roadways • Mid-block crossing locations • Lower speed roadways</td>
<td>active 47% passive 31%</td>
<td>active 49% passive 67%</td>
<td>$12,000–$18,000</td>
</tr>
<tr>
<td>Rectangular Rapid Flash Beacons (RRFBs)</td>
<td>• Provides higher driver awareness when a pedestrian is present • Increases yielding percentage • Increases usable gaps • Reduces probability of pedestrian risk taking • Can be seen from 360 degrees</td>
<td>• Requires pedestrian activation</td>
<td>Supplement existing pedestrian crossing warning signs • School crossings • Mid-block crossing locations • Low- and high-speed roadways</td>
<td>84%</td>
<td>81%</td>
<td>$12,000–$18,000</td>
</tr>
</tbody>
</table>

NR = No research found on effect to yielding rate

Factors, including the average daily vehicle count, number of pedestrians, number of lanes, and average vehicle speed, it helps agencies rate a crossing for pedestrian service, and includes a flow chart and several worksheets to assist in data collection and decision making. The data collection worksheets are also available for download as Excel spreadsheets, which automatically complete the evaluation calculations based on entered data.

Bolton & Menk led the development of the guidebook, based on an evaluation procedure in the 2010 Highway Capacity Manual, input from a technical advisory panel, and video data of pedestrian crossings collected by researchers at the University of Minnesota’s Minnesota Traffic Observatory.

The guidebook is designed around an 11-step evaluation process that engineers can use to evaluate an uncontrolled pedestrian crossing location in a systematic way. Based on the results of the evaluation, users can identify what level of treatment is appropriate for their location, ranging from in-street crossing signs to overhead flashing beacons to traffic calming devices such as curb bump-outs. For each potential treatment option, the guidebook includes information on advantages, disadvantages, recommended locations, and cost (see example table below).

“The guidebook does a great job of synthesizing three or four other available manuals into one easy-to-use document,” says Mitch Bartelt, former pavement marking engineer at MnDOT and a member of the project’s technical advisory panel. “It gives engineers one place to go for the information they need when they’re trying to decide on the best crossing solution. And because it’s Minnesota-specific, it also captures the unique laws that govern pedestrians and crosswalks in our state.”

Mark Maloney, public works director for the City of Shoreview and a workshop attendee, says the information presented will be useful for practitioners at the local level.

“It’s challenging for local government transportation professionals to consistently apply the definitions and language used in state statutes concerning pedestrians and crosswalks, especially given the emotion that typically accompanies the topic,” Maloney says. “The training and the guidebook itself will be especially helpful in guiding fact-based decisions concerning the types and locations of pedestrian crossings on local roadway systems.”

—Christine Anderson, LTAP editor

Uncontrolled Crossings Treatments (in conjunction with markings and signs)
Surface treatment for bridge decks quick…and sticky

Sometimes solutions to age-old problems like maintaining the driving surface of a bridge can get sticky. Civil engineering researchers at the University of Minnesota Duluth have been testing alternatives to traditional concrete or asphalt wear courses by instead adhering a variety of small aggregates to the decks of 11 bridges in Minnesota using a thin layer of epoxy. The resulting ultra-thin bonded wear courses (UTBWC) measure a half-inch or less in thickness compared to conventional concrete or bituminous overlays of 2 inches or more. The ultimate goal is to develop a surface treatment that improves driving safety with higher surface friction and better protects the bridge structure by sealing out damaging moisture and deicing chemicals.

According to UMD civil engineering student Rob Kostick, epoxy overlay systems, which are applied like a chip-seal, reduce dead load on a bridge due to the lighter weight, offer much higher surface friction created by the macrotexture of aggregates, provide a protective seal to keep out water and soluble chlorides, and have faster cure times that allow traffic within a couple of hours of construction.

The purpose of the MnDOT-funded research project is to conduct a comparative assessment of epoxy overlay systems by studying how are they performing in the field and determining if they provide the benefits claimed.

During construction, the bridge deck is sandblasted first with a rough texture to ensure the epoxy bonds well. Epoxy is applied using a hose with a spray nozzle and spread using a brush. Right away, aggregate is blown with large hose onto the epoxy and is not adjusted further. Typically, two layers of aggregate are placed at one time. “The construction is pretty simple,” Kostick said. “It can mostly be done off of one or two trucks.”

As part of the project, the researchers made visits to the 11 bridge sites located around the state; conducted field testing to measure the bond, seal, and strength of each epoxy overlay system; tested the quality of the aggregates used with each system; and analyzed crash data involving each of the sites.

The systems studied used a tight range of smaller-sized, very strong aggregates and included five types: four PolyCarb (basalt, flint, and taco-nite) and one SafeLane, the most coarse type used. Each of the 11 bridge sites employed one of four different proprietary epoxy overlay systems: PolyCarb, SafeLane, NovaChip, and Transpo T48.

So far, one set of field visits to the bridges has been conducted, and two more site visits are planned. Overall, the researchers found that all overlay systems are performing satisfactorily. They tested each site for permeability, torque bond, and friction using the sand-patch test to determine mean texture depth. They also examined data from surface friction testing performed by MnDOT using the KJ Law Trailer.

“It’s properly sealing the deck,” Kostick observed. “You’re not getting the water infiltration that you’d see with conventional overlays.” In addition, he reported that they found sufficient bond strength between bridge decks and the overlay systems.

After installation, the friction numbers for the overlay surface at each bridge increased significantly (some so high they didn’t register), but have steadily decreased in the five years since due to wear and tear. Snow plow blades cause heavy abrasion on these wear courses, commonly removing aggregate particles and sometimes removing entire pieces of the system near expansion joints.

Such damage has adverse effects on the friction numbers and life expectancy of such systems.

The research team also analyzed 10 years of crash data from the Minnesota Department of Public Safety for each bridge site. The data included dates as well as weather and surface conditions.

The researchers found noticeable reductions in crashes on most of the bridges, but they were unable to link the drop to the installation of the epoxy overlay systems. For the most part, crash rates were reduced at similar rates to bridge decks without these systems.

They also discovered snow and ice can diminish the effectiveness of the system. “As the snow accumulates and is packed down by cars,” Kostick said, “it takes away the ability of the system to function with its high friction because the macrotexture is filled with the snow.”

Kostick added that the cost of the epoxy overlay systems range from $3.50 to $10 per square foot. By comparison, a 2-inch concrete overlay runs about $4.20 per square foot.

The hope is that through analysis of the field performance, durability, and associated costs the research team will be able to conclude whether ultra-thin bonded wear courses are a sustainable and cost-worthy investment for use in cold weather climates such as the state of Minnesota.

The research team, led by assistant professor Eshan Dave and including assistant scientist Jay Dailey, will wrap up the study next year.

—Michael McCarthy, LTAP editor

Timber bridge videos show inspection methods

Across Minnesota, hundreds of wooden bridges are reaching the end of their lifespans, but counties don’t know which ones to repair and which ones to replace. While current inspection methods adequately identify areas of advanced decay, they do a poor job of detecting early decay or internal deterioration, especially in the timber substructure.

MnDOT’s Research Office has posted videos demonstrating two proven timber bridge inspection tools—resistance microdrills and stress wave timers—that counties can use to see past the surface of a timber bridge and identify the actual amount and area of internal rot. The videos are courtesy of the Natural Resources Research Institute at the University of Minnesota Duluth.

One video shows bridge inspectors using resistance drilling. Resistance drills locate cracks and voids and determine the amount of rot in a bridge member by measuring the level of resistance when a needle is drilled into the bridge.

The other video shows bridge inspectors using a stress wave timer. Stress waves travel faster through sound, high-quality wood than they do through deteriorated, low-quality wood. By measuring the time it takes for a stress wave to travel through a timber piling or other bridge member, an inspector can evaluate its internal condition.

MnDOT and the LRRB are also developing a customized inspection manual and standardized inspection protocols. A second LRRB project, led by Iowa State University, is developing cost-effective repair techniques that counties can use to lengthen a bridge’s service life. Stay tuned for updates.

—LTAP

(Adapted from an article by Shannon Fiecke, MnDOT & CTS Crossroads blog, April 11, 2014)
Device shows at a glance if wheels are loose

A wobbly wheel on a big truck is a dangerous thing. It isn’t always easy, however, to see when lug nuts are coming loose. The Polk County Highway Department has put a simple plastic device on all its trucks that shows at a glance when a lug nut is loosening.

The device, formed from bright plastic that stands out visually, is a ring that fits tightly around the nut. A mechanic installs the devices so that the pointed ends form a simple pattern. A driver doing an inspection should be able to tell if a nut is loose, because the pattern will be broken.

Several companies make versions of the devices. Polk County uses an orange “loose nut indicator” available from redovalparts.com. “Loose tires can kill,” says Brad Driscoll, mechanic in the Polk County Highway Department. “We’re pleased to add these devices to our fleet. It only takes about five minutes to install them per wheel. And when drivers do their morning inspection, it makes it easier and quicker to make sure the lug nuts are tight.”

—Pam Snopil, LTAP managing editor

MN2050 ‘Roads and Bridges’ video on the air and online

The new video from Minnesota 2050 (MN2050) began airing on public television in September. State of Repair—Roads and Bridges is the first of three video productions by MN2050 and tpt MN on the infrastructure future in our state. The program is available for streaming online at tpt.org and on YouTube for you to watch and share with others.

Roads and Bridges sets the stage for two more infrastructure documentaries, each one-hour and produced by tpt MN. In late 2014 State of Repair—Airports, Ports and Rail debuts, followed by State of Repair—Our Water Infrastructure in early 2015.

MN2050 is a nonprofit coalition of partners comprising engineering and infrastructure professional organizations striving to provide Minnesota citizens with acceptable infrastructure that meets the needs of the 21st century. Its programs and website aim to create awareness in private citizens, politicians, and public agencies. For more information and to learn how you can become involved, please see MN2050.org.

EQUIPMENT

High-friction treatment from page 7

Hydroplaning on wet surfaces. The treatments can be applied by machine at a similar speed to other paving surface treatments or applied with hand tools.

Motorists may notice a slightly rougher riding surface in treated areas, but they will also experience greater pavement friction and thus better vehicle control. Increases or decreases in road noise will depend on the original surface. In general, HFST will be less noisy than transversely tined concrete pavement, chip seals, and possibly dense-graded asphalt, but may be noisier than open graded surfaces.

HFST has been tried and proven on a variety of treatment sites across the country as part of the Federal Highway Administration’s Surface Enhancements at Horizontal Curves demonstration program.

Benefits

• HFST has been thoroughly evaluated in the UK and in New Zealand with tremendous success, showing an approximately 31 percent reduction in crashes and a benefit-cost ratio of 40 upon the implementation of skid resistance policy. The U.S. crash data are confirming the experience from abroad—large reductions in vehicle crashes are being reported after installation of HFST. The Pennsylvania, Kentucky, and South Carolina DOTs report a before/after total crash reduction of 100, 90, and 57 percent, respectively, for their respective signature trial projects, for which the after periods equal approximately three to five years.

• HFSTs are relatively low in cost compared to geometric improvements. The square foot cost of HFST is not insignificant, but its durability makes the investment worth the cost since the treatments are long lasting and the life-cycle cost is excellent. Further, the benefit-cost ratio is good since the crash reductions continue for many years.

• HFSTs are customizable to specific state and local safety needs. Road owners can use HFST where most needed as shown by studies and their experience, such as on two-lane urban or rural roads at horizontal curves, areas near steep grades, areas at or near lane changes, and rural and urban intersections.

• HFSTs produce negligible environmental impacts and minimal impact on traffic. Typically, project lengths are very short, and the materials set up very quickly, so the treatments can often be applied in just a few hours.

More information about HFST, including a 12-page “frequently asked questions” document, is online at fhwa.dot.gov/everydaycounts/edctwo/2012/friction.cfm.

(Adapted from FHWA website and materials)

Every Day Counts

High Friction Surface Treatment is one of the FHWA’s Every Day Counts (EDC) 2012 initiatives. Launched in 2010, EDC is designed to identify and deploy innovation aimed at reducing the time it takes to deliver highway projects, enhance safety, and protect the environment. Teams from the FHWA work with state, local, and industry partners to deploy the initiatives and develop performance measures to gauge success. Read more at fhwa.dot.gov/everydaycounts.

MINNESOTA TECHNOLOGY EXCHANGE
Michigan road agencies “Like” Facebook

This is the first article in a two-part series about how Michigan road commissions (the state’s county agencies) are using Facebook to enhance public relations efforts. This article covers general Facebook setup, policy, and guidelines. The second part will be published in the next Exchange, and will include more detail about posting content, growing an audience, and moderating conversations. Our thanks to Michigan LTAP for allowing us to reprint the series.

Many people like Facebook—over a billion, in fact. While social media such as Twitter and RSS feeds are common with tech-savvy crowds, Facebook is more widely used by the general public. For this reason local road agencies are increasingly creating and maintaining Facebook pages to keep in touch with the motoring public. A quick search of Facebook reveals that county road commissions in Michigan have a presence there.

Linnea Rader, account clerk and Board of Public Works secretary for Van Buren County Road Commission (CRC), appreciates the convenience of using Facebook to communicate with residents. “Facebook has proven to be a great tool for the road commission,” Rader says. “It offers an opportunity to educate the public on what we do, why we do it, and it also provides a convenient way for them to interact with us.” Rader receives alerts on her cell phone whenever a resident posts to the Van Buren CRC Facebook page; she spends up to three hours a week monitoring and maintaining the page. “Posting doesn’t take long, but it does require some thought to avoid misunderstanding,” she says.

Deb Hunt, clerk and office manager for Grand Traverse CRC, spends 30 to 40 minutes a day moderating her agency’s Facebook page. She says that the time invested is worthwhile given the number of views the page receives and the activity it generates.

Karl Hanson, county highway engineer for Wexford CRC, was initially opposed to having a Facebook page for his agency, but he has grown to appreciate the convenience it provides. “It’s a great tool to communicate general information quickly to a large number of people,” he said. “Seasonal activities like plowing snow, ditching, and blading gravel roads can be posted on the phone call; we post our plans on Facebook and some residents go there with questions. In some cases, residents actually answer questions for each other. It’s very convenient.”

Many Facebook users express excitement when they first see their local agency appear on Facebook. Early user posts range from “Welcome to Facebook!” to “This is a great means to address public questions, concerns, and debunk common myths. Keep up the good work!” Topics addressed on local agency Facebook pages fall into familiar categories of safety and road commission administration, rules for what posts are considered appropriate, and technical details. It illustrates how social media can facilitate simple, quick, convenient communication with the motoring public.

Configuration

Among Michigan road commissions with Facebook pages, Van Buren and Grand Traverse are two of the most active and well-established. However, the following different approaches in allowing the general public to post on their page.

Van Buren CRC’s Facebook page is set up to allow any user to create a new post. This configuration encourages the public to become more involved on the page. “Conversations must be two-sided to be worthwhile,” explains Van Buren CRC’s Rader, when asked about allowing users to create posts. “I love to have more people ask questions or create posts on our page; each one creates another opportunity to educate and share information with the public.”

On the other hand, the board of Grand Traverse CRC decided that its agency’s Facebook page should be configured to only allow users to comment on content that the road commission creates. Limiting comments in this fashion results in fewer posts from the public commission to respond to, and ensures that posts from users do not overshadow important road-commission posts such as travel advisories. However, trying to keep the public from posting to a Facebook page does little to quell distracting posts, since a user with an axe to grind with the road commission may post in the “Recommendations” section of the Facebook page.

Policy

Another area where Grand Traverse and Van Buren differ is in official written policies. Grand Traverse CRC has a formal written policy governing its Facebook page, whereas Van Buren CRC puts much of the responsibility for the page in the judgment of the moderator. In the case of Grand Traverse CRC, configuration of the Facebook page regarding user comments is board policy, and not in the hands of the moderator. The board for Grand Traverse CRC also drafted a document that specifically establishes guidelines for using social media. The guidelines include the goal of social media utilization, rules for what posts are considered appropriate, duties of the page’s moderator, and other details. Anyone within the road commission can decide how to interpret the overall goal and protocol of the Facebook page. (Grand Traverse CRC’s social media policy is available at michiganltap.org/sites/ltap/files/SocialMediaPolicy.pdf)

Van Buren CRC does not have a specific written policy, but rather places much of the decision-making in the hands of its Facebook moderator. Rader’s directive from her supervisor is to “respectfully educate” public audiences. Explaining how she responds to posts, she says, “If they are an easy fix, a misconception or issue, I handle it myself, but if it’s more difficult or hostile post, I’ll draft the response and share it with my superiors for approval.” This ensures that the moderator is free to use his or her judgment in dealing with common posts, and that responses to difficult topics are collectively decided upon.

Opportunity

No matter what a local agency’s Facebook policy is, it’s important to recognize that local agencies’ Facebook pages are considered a type of public forum. Therefore, a user’s comment or post is protected by First Amendment rights in the same way as a statement made in any other public forum/medium. However, Facebook’s community standards (facebook.com/communitystandards) do not permit things such as threats, harassment, hate speech, graphic content, or any other content considered inappropriate in a public forum. Material that falls into these categories can be deleted. Nonetheless, a local agency should not remove posts just because they are critical, ill informed, or negative; instead, it should respond to the posts in a productive manner, which makes each post—no matter how critical—a springboard for educating the public about local agency policies or procedures.

So, what happens after the Facebook page and its policies are set in place? How does a public agency grow its Facebook audience? How does a moderator turn a mean-spirited post into a teachable moment? The second part of this article (scheduled for publication in the next issue of the Exchange) will go into detail about what types of content a local agency should post to its Facebook page and how to respond to posts from the public.

(Reprinted with permission from Michigan LTAP)

DAILY ACTIVE FACEBOOK USERS ON AVERAGE IN JUNE 2014: 829 MILLION

This Facebook thread about pothole patching in Oakland County, Michigan, includes comments that reflect personal opinions, official road commission policy, and technical details. It illustrates how social media can facilitate simple, quick, convenient communication with the motoring public.

(Reprinted with permission from Michigan LTAP)
Save time and money, get better results with MnDOT Library Services

City and county employees are always welcome in the MnDOT Library, located on the first floor of the Transportation Building near the State Capitol. However, you don’t need to visit in person to benefit from the variety of services.

“Many of our requests for information come via e-mail, phone, or the library’s website,” says Sheila Hatchell, MnDOT Library director. “The library staff is knowledgeable and trained in handling many types of questions.”

In the past year, MnDOT librarians answered hundreds of questions, ranging from simple requests to find a specific article, to complex literature searches—for instance, the cost-benefit impacts of cable median barriers or the automated deicing of bridges. More examples of recent questions are available in the library’s 2013 return on investment (ROI) report at dot.state.mn.us/library/Library-ROI-Study.html.

MnDOT Library actively maintains several sets of Professional Engineer examine materials, according to the list from the National Council of Examiners for Engineering and Surveying. To meet demand, the exam materials are available for check-out only to MnDOT, city, and county employees and may be kept under completion of the exam.

In addition to transportation and engineering resources, MnDOT Library offers an expanding collection of titles on management and personnel issues. Recent additions include Writing Performance Reviews, The Introvert Advantage, Leading Change, and Difficult Conversations: How to Discuss What Matters Most.

Interlibrary loan (ILL) is also available to city and county employees as well as MnDOT employees. This means the staff can obtain work-related books and articles that are not available in MnDOT Library, at no cost to you. The library belongs to a network of other libraries for ILL and information exchange. The Minnesota Local Road Research Board (LRBB) provides annual funding to MnDOT Library in support of these efforts to help city and county engineers and practitioners in their transportation work.

“MnDOT Library Services has been a valuable tool throughout the process of research for the LRBB project Transportation Synthesis: Chloride Free Snow and Ice Control Material, which we are conducting for the City of Burnsville,” says Lauren Tjaden of Fortin Consulting, Inc., a contractor for the City of Burnsville. “Their research has been thorough, timely, and well organized, helping save time and progressing the project by finding necessary information. They are a great resource.”

To contact MnDOT Library, call 651-366-3791 or e-mail library.dot.state.mn.us. The library space is open 8:00 a.m. to 4:30 p.m. Monday through Friday, and the catalog is accessible 24/7 at mndot.gov/Library.

—Marilee Tuite, LTAP/MnDOT librarian

Salt handling tip sheet to help agencies reduce pollution

MnDOT’s Office of Maintenance and Office of Environmental Stewardship have created a handy one-page tip sheet to help agencies handle salt and reduce pollution. The tip sheet covers these categories: after deliveries/off season, prep for events, loading, and post-event.

Download the checklist as a Word file (for easy customization) or as a PDF from the Minnesota LTAP publications page. LTAP

—Pam Snopl, LTAP managing editor

INFORMATION SERVICES

Rural Connections: Challenges and Opportunities in America’s Heartland: 2013-2014

This report explores the condition, use, and safety of the nation’s rural transportation system, particularly its roads, highways, and bridges, in order to help identify areas where an improvement to America’s rural transportation system may be needed.

Cost-Benefit Analysis of Rural and Small Urban Transit

This report discusses qualitative and quantitative benefits of small urban and rural public transit systems in the United States. It also focuses on transportation cost savings, low-cost mobility benefits, and economic development impacts.

Recommended Bicycle Lane Widths for Various Roadway Characteristics

This report presents an analysis of the research and design guidance for bicycle lane widths on existing travel lane widths and parking lane widths. The conclusions are most applicable to urban and suburban roadways with level grade and a posted speed limit of 30 mph. This should be used cautiously for the design of roadways with motor vehicle speeds outside of the range of 35 to 35 mph, and in particular for higher-speed roadways.

Bridge Stormwater Runoff Analysis and Treatment Options (TRB, July 2014)

This report presents information and an analysis process for identifying cost-effective, pollution-reducing strategies for management of stormwater runoff from highway bridges.

Evaluating the Performance of Corridors with Roundabouts (TRB, July 2014)

This report provides measurement and evaluation methods for comparing the performance of a corridor with a functionally independent series of roundabouts to a corridor with signalized intersections in order to arrive at a design solution.

Case Studies on Successful Utilization of Reclaimed Asphalt Pavement and Recycled Asphalt Shingles in Asphalt Pavements (FHWA/HCAT, July 2014)

This report describes the development of specifications and practices that state highway agencies have used for reclaimed asphalt pavement and recycled asphalt shingles.

Hot Mix Asphalt Research Investigation for Connecticut, Part-D: Evaluate the Feasibility of Using Permeability for In-Place Discrete Resolution on Bridge Decks (MnDOT, July 2014)

This report explores whether measuring the permeability of a pavement on a bridge deck will work as a non-destructive discrete resolution test for the in-place density of the pavement.

Years to First Rehabilitation of Supercrime Hot Mix Asphalt (Colorado DOT, July 2014)

This report evaluates the performance of four roadway functional classes—interstates, principal arterials, minor arterials, and major collectors—to forecast their pavement life span.

MnDOT’s Office of Maintenance and Office of Environmental Stewardship have created a handy one-page tip sheet to help agencies handle salt and reduce pollution. The tip sheet covers these categories: after deliveries/off season, prep for events, loading, and post-event.

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Manual for Selecting Safety Improvements on High Risk Rural Roads (WAC, August 2014)

This report discusses the costs and benefits of safety treatments on high-risk rural roads.

LTAP

THE SHELF

Links to these publications and many more are on the LTAP website. Questions? Contact Marilee Tuite, Minnesota LTAP librarian, 612-626-8753, ctslib@umn.edu.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Titles Borrowed from Other Libraries</th>
<th>Value Factor: Borrowing Instead of Buying</th>
<th>Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interlibrary Loans</td>
<td>Journal articles borrowed 138</td>
<td>x $55</td>
<td>= $8,000</td>
</tr>
<tr>
<td>Book titles borrowed 426</td>
<td>x $125</td>
<td>= $53,000</td>
<td></td>
</tr>
<tr>
<td>Total Interlibrary Loan Savings</td>
<td></td>
<td></td>
<td>= $61,000</td>
</tr>
</tbody>
</table>


Dollars Saved (based on actual library statistics)
WORKSHOPS & TRAINING

Calendar

If your professional organization meets on a regular basis, let us include the information here. Contact us at mnltap@umn.edu. For details and an up-to-date list of events in Minnesota, please see mnltap.umn.edu/training.

From Line to Leadership: Transitioning from Operations to Supervision (1 RS required credit) LTAP
Sept. 30, Baxter
Oct. 1, Arden Hills
Oct. 14, Mankato

Truck-Weight Compliance Training (1 RS elective credit) LTAP
Oct. 1, St. Cloud
Jan. 7, Mankato
Jan. 14, Arden Hills
Jan. 21, East Grand Forks
Jan. 27, Roseau
March 11, Alexandria
March 18, Bloomington
March 26, Detroit Lakes
Apr. 1, Marshall
Apr. 8, Rochester
Apr. 15, St. Cloud
Apr. 22, Duluth

Minnesota’s Best Practices for Traffic Sign Maintenance and Management (1 RS required credit) LTAP
Oct. 22, Baxter
Oct. 29, Blaine
Nov. 5, Rochester

Snowplow Simulator Training (7:00–11:00 a.m. or 11:30–3:30 p.m.) (0.5 RS elective credit) LTAP
Oct. 21, Arden Hills
Oct. 23, Arden Hills
Oct. 28, Arden Hills
Oct. 30, Arden Hills
Nov. 4, Arden Hills

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Oct. 30, Arden Hills
Nov. 4, Arden Hills

Toward Zero Deaths Annual Conference
Nov. 13–14, Duluth

APWA-MN Fall Workshop (1 RS elective credit) LTAP
November 19, Brooklyn Center

APWA-MN Fall Conference November 20–21, Brooklyn Center

U of M 64th Annual Concrete Conference
Dec. 4, Brooklyn Center

MAAAPT 61st Annual Asphalt Conference
Dec. 10, St. Louis Park

Road Salt Symposium (1 RS elective credit) LTAP
Feb. 5, Chaska

TERRA Pavement Conference (1 elective credit) LTAP
February 12, St. Paul

95th Annual Asphalt Contractors’ Workshop/Quality Initiative Workshop
Feb. 19, St. Cloud

Minnesota’s Transportation Conference March 3–5, Bloomington

Northland Chapter AASHTO Annual “How to” Safety Training Workshop (1 RS elective credit)
March, Fargo

CTS Transportation Research Conference May 21–22, St. Paul

Roads Scholar credit
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CTAP workshops
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Sign Maintenance and Management
This course will provide a concise, cohesive set of sign maintenance and management materials for employees of cities, counties, and municipalities. The course stems from the new Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD) requirements related to sign maintenance and management.

Available in early 2015, the course will help agencies develop and maintain plans and processes to meet MN MUTCD standards. Participants can complete the course, which will take about 10 hours, at their own pace. All reading assignments and course materials are included and will be available online to registered students.

Course registration is anticipated to open in early 2015 and will include a small registration fee.

The project is a collaboration of the Minnesota Local Road Research Board (LRRB), the University of Minnesota, MnDOT, SRF Consulting Group, CH2MILL, and city and county agencies.

Culvert Design and Maintenance
In this course, students will learn the purpose of well-designed, well-built, and well-maintained culverts. The course will discuss culvert theory and important factors in design that will help the installer and operator understand the importance of proper installation and maintenance. It will cover installation, planning, scheduling, permitting, typical installations, repairs, and rehabilitation methods, and wraps up with culvert inventory, inspection, and maintenance.

Activities will engage students and test their knowledge. Videos and resources will also be provided.

The project is a collaboration of BARR Engineering, Minnesota LRBB, University of Minnesota, MnDOT, CTAP, Advanced Drainage Systems, American Concrete Pipe Association, and Minnesota Concrete Pipe Association. LTAP

Why take online training?
- Learn at your own pace—any time, any place.
- Reduce travel costs.
- Become familiar with online learning formats.
- Learn to use the computer for other education purposes.

Program prepares workers for supervisory positions
The American Public Works Association–Minnesota Chapter has modified the curriculum of its Public Works Certification Program. Offered through North Hennepin Community College (NHCC) in Brooklyn Park, the program prepares students for supervisory positions. It now consists of only five core courses:

- Office and Professional Skills for Public Works
- Public Works Organization and Administration
- Public Works Management and Communication
- Technical Aspects of Public Works
- Public Works Operations and Maintenance

Each course is worth four credits, and students should be able to complete the program in one year. APWA–Minnesota issues a certificate to graduates.

Interested? Get started by working with an NHCC advisor on course planning. Contact Maria Yang, academic advisor, 763-424-0826, myang@nhcc.edu. LTAP

Gravel Road Maintenance and Design (1 RS required credit) LTAP
Work-Zone Safety Tutorial LTAP
Turfgrass Pathology (1 RS elective credit) LTAP

COMING THIS WINTER:

New online training courses for sign and culvert maintenance

Photo: David Gonzalez, MnDOT

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