

MINNESOTA LTAP

TECHNOLOGY EXCHANGE

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Minnesota Local Technical Assistance Program

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Congratulations, Minnesota Mousetrap winners!



Congratulations to Otter Tail County and the City of Rochester, the recipients of Minnesota's 2018 Build a Better Mousetrap awards! Otter Tail County took first place for its Otter Plow Cushion (left), and the City of Rochester placed second for its Hydraulic Arrow Board project (right).

Mousetrap awards continued on page 2

Report recommends ways to reduce snowplow operator fatigue

Snowplow operators face harsh driving conditions and must also deal with fatigue and drowsiness. A recent Clear Roads project identifies factors that cause driver fatigue in snowplow operators and recommends cost-effective solutions to help reduce it.



The project included a survey that was sent to 33 Clear Roads member states to gather data on snowplow operators' experiences with fatigue. More than 2,000 snowplow operators from 23 Clear Roads states responded.

Nearly all the respondents (94 percent) reported feeling fatigue at some point while operating a snowplow during winter weather events. The majority of vehicle operators (59 percent) reported their shifts of 8 to 16 hours included both daytime and nighttime segments. Smaller proportions reported that they worked primarily during the day (22 percent) or primarily at night (18 percent).

Survey results also indicated that more experienced operators were more prone to fatigue, and those who worked shifts lasting longer than 16

Fatigue continued on page 6

Bridge approach transition curb adapted for retrofits

Washout erosion along the wing walls of bridges has been a persistent problem for many local agencies. To address the problem, the Jackson County Public Works Department developed a bridge approach transition curb that has been included on all new bridge construction for the last 10 years. The extended curb design protects the area immediately behind the wing walls by reducing the intensity of stormwater runoff and gradually channeling it further away from the structure to a less erosion-prone area.

The success of the bridge approach transition curb on new bridges inspired Jackson County public works staff to adapt the design for the many bridges in the county older than 10 years. Jackson County received a \$5,000 grant through the Minnesota Local Road Research Board (LRRB) Local Operational Research Assistance (OPERA) Program to develop a process for adding the feature to existing bridges, including the design and fabrication of reusable custom metal forms for each corner of a bridge.

Jackson County views the process of retrofitting the curb to existing bridges as a good short-term, fill-in project for maintenance staff. They estimate retrofitting one bridge takes five maintenance workers one full day and two subsequent half-days. The cost for labor, equipment, and materials for these improvements to each bridge total approximately \$7,500 using the specialty

Curb continued on page 3



TECHNOLOGY EXCHANGE
 Minnesota Local Technical Assistance Program
 Center for Transportation Studies
 University of Minnesota
 200 Transportation and Safety Building
 511 Washington Avenue S.E.
 Minneapolis, MN 55455-0375

READ THE
EXCHANGE
 online for links to publications
 and other resources.

HONORS

Mousetrap awards

from page 1

The Minnesota competition is sponsored by the Minnesota Local Road Research Board and administered by Minnesota LTAP.

Both submissions were forwarded to the National LTAP Mousetrap Competition, where they competed with other projects from across the country. The national contest is sponsored by the Federal Highway Administration's Local Technical Assistance Program and Tribal Technical Assistance Program.

First Place: Otter Tail County Highway Department

Project: Otter Plow Cushion

Problem: Winter roads, especially late in the season, can be especially rough, causing more stress on snowplow lift chains and plow lift parts as the heavy plow assembly bounces more. Broken plow lift chains are a common result and can take maintenance vehicles and personnel out of service for hours.

Solution: Maintenance personnel with the Otter Tail County Highway Department created the Otter Plow Cushion with spare parts during downtime on a cold winter day. The device absorbs the shock of rough roads on the plow assembly and lift chains, improving ride quality and reducing the failure of the plow lift chains and parts. Once their stock of used parts was depleted, the department maintenance

staff found they could purchase the needed parts new for about \$431 per plow.

"We have a talented crew on staff that teamed up to find a solution to this problem. Otter Tail County Highway Department has become a leader in transportation innovation and safety," remarked Rick Hoium, Otter Tail County highway maintenance supervisor. "We are proud to have earned this award."

Second Place: City of Rochester Public Works Department

Project: Hydraulic Arrow Board

Problem: The city's infrastructure maintenance crew members had to climb into the back of the truck and physically lift/lower the electronic arrow board into position. The arrow board has to be lowered before moving to a new work site in order to avoid it being caught in low-hanging trees.

Solution: The arrow board is now raised and lowered by a hydraulic pump operated from inside the vehicle. This eliminated the need for staff to climb into the back of the truck to raise and lower the board manually. Additionally, the new system allows the arrow board to be raised 18 inches higher than before, making it more effective at traffic control because it's more visible. ■

Submit your ideas for the 2019 Mousetrap competition!

Have you or one of your co-workers developed an innovative gadget or improved process? Show off your creativity and enter your ideas in next year's Build a Better Mousetrap Competition!

Please complete the entry form on our website (mnlta.umn.edu/research/mousetrap) and submit it to sell0146@umn.edu by May 31, 2019. You're also encouraged (but not required) to submit photos and short video clips showcasing your project along with your entry form. ■



Minnesota LTAP welcomes new coordinator



A big welcome to Katherine Stanley, who has joined Minnesota LTAP as a program coordinator! She will perform project management and coordination for Minnesota LTAP, the Airport Technical Assistance Program, and customized training programs for local agencies. In this role she will manage the Roads

Scholar initiative, including managing the student database and providing customer service to students in the program.

"I am excited to join the Minnesota LTAP team as the coordinator," Stanley says. "I am an experienced workforce development professional, with over 10 years of managing and developing training programs for various Minnesota organizations including businesses, community-based organizations, and local/state agencies. The majority of these trainings have focused on technical skill development within a wide spectrum of populations. This experience provides me with individual and program viewpoints to ensure Minnesota LTAP continually provides high-quality, relevant training opportunities." ■

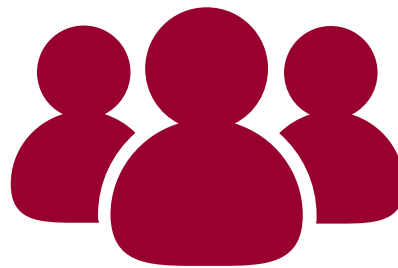
Steering Committee membership changes

Minnesota LTAP has made the following membership changes to our steering committee.

Ruth Simpson, the attorney and education director with the Minnesota Association of Townships, is the interim replacement for Gary Pedersen.

Paul Sandy, assistant city engineer for the City of Brainerd, joined the committee and represents the City Engineers Association of Minnesota. He succeeds Kent Exner, city engineer/director public works for Hutchinson.

We thank all our members, past and present! Their guidance and commitment are essential to our work. ■



Nominate an environmental leader

The Freshwater Society is looking for nominations for the environmental leadership awards, to be given at the Road Salt Symposium on Feb. 7, 2019, at the Plymouth Creek Center.

The awards honor those who have taken steps to reduce their salt use. Any organization/individual is eligible. You can nominate yourself, your organization, or others.

Please call Connie Fortin at 763-478-3606, or email connie@fortinconsulting.com, with nominations. Symposium information is available at freshwater.org. ■



Technology Exchange

The **Minnesota Local Technical Assistance Program** is part of the Federal Highway Administration's Local Technical Assistance Program (LTAP). LTAP is a nationwide effort designed to foster and improve information exchange among local practitioners and state and national transportation agencies. Minnesota LTAP is administered by the Center for Transportation Studies at the University of Minnesota, and cosponsored by the Minnesota Local Road Research Board and the Minnesota Department of Transportation.

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Contact us

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Technology Exchange welcomes contributions and suggestions from its readers. Submit ideas and other comments to Pamela Snopl, managing editor.

Minnesota LTAP

Center for Transportation Studies
University of Minnesota
200 Transportation and Safety Building
511 Washington Avenue S.E.
Minneapolis, MN 55455
Phone: 612-626-1077
Fax: 612-625-6381
Email: mnlta.umn.edu
Web: mnlta.umn.edu

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Minnesota LTAP Staff

LTAP Director: Stephanie Malinoff
LTAP Program Director: Mindy Carlson
LTAP Program Coordinator: Katherine Stanley
CTAP Instructor: Kathy Schaefer
Workshop Registration & Facilitation: Teresa Washington
Managing Editor: Pamela Snopl
Editors: Christine Anderson, Michael McCarthy
Designer: Angie Kronebusch

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Minnesota LTAP Steering Committee

Chair: Mitch Rasmussen, State Aid for Local Transportation Division, MnDOT
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Lyndon Robjont, Carver County; Minnesota LRRB
Rich Sanders, Polk County; Minnesota County Engineers Association
Paul Sandy, City of Brainerd; City Engineers Association of Minnesota
Ruth Simpson, Minnesota Association of Townships (interim)
Linda Taylor, Research Services Section, MnDOT

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County tests methods to improve roadside pollinator habitats

During the past 10 years, pollinator species such as monarch butterflies and other wildlife have declined due to the loss of native habitats from increasing development, intensive agricultural practices, and greater use of pesticides. Roadsides, in particular, have grown in importance as a refuge for pollinators.

Washington County public works staff, in collaboration with the Washington Conservation District, are testing four different methods of site preparation and seeding to determine which is the most effective and efficient way to increase floral resources for pollinators along roadsides. Those methods include application of various conventional and organic herbicides, mowing, and broadcast seeding.

Washington County received a \$5,000 grant through the LRRB's Local Operational Research Assistance (OPERA) Program for the project team to purchase 22 pounds of seed for the three-year project. The team designed the seed mix specifically to provide nectar for pollinators during the spring, summer, and fall. In addition, the seed is readily available at most native plant retailers and costs less than \$500 per acre.

Once the floral seed has become established and been maintained over the course of three growing



Washington County is testing methods to increase floral resources along roadsides.

seasons, the project team will use what they've learned from the process to determine the best methods for enhancing roadsides with pollinator resources. Ultimately, the project team will share

their findings with other local agencies seeking to provide habitat and demonstrate stewardship at the local level. ■

—Michael McCarthy, LTAP editor

Curb from page 1

metal forms made as part of the OPERA grant.

So far, Jackson County has retrofitted two bridges with the approach transition curb. The county plans eventually to retrofit all bridges on paved roadways, prioritized by worst condition first. Public works staff continue to monitor the performance of the improvements for any needed adjustments.

Jackson County intends to share the process and the specialty forms for retrofitting bridges with approach transition curbs with other local agencies upon request. ■

—Michael McCarthy, LTAP editor



Jackson County developed a bridge approach transition curb.

WATCH VIDEOS
and read more
about the projects:
MNLTAP.UMN.EDU
/OPERA

Guidebook helps cities, counties choose tools for managing fleets



Managing a fleet of trucks, heavy equipment, and other vehicles challenges road agencies large and small. While large agencies like MnDOT use software and specialized administrators to manage fleet management systems electronically, city and county agencies often do not. For some

small agencies, fleet management may fall to a shop mechanic or two.

In a recent project from the LRRB's Research Implementation Committee, researchers identified the fleet management needs of city and county agencies and reviewed various cost-effective tools that could help these agencies make fleet management decisions. They then developed a guidebook for local agencies that addresses the tools and methods needed to manage fleets effectively.

"The guidebook provides the benefits of fleet management, a comparison of various program features and attributes, and a contact for more information about each program," says Guy Kohlnhofer, county engineer, Dodge County, and the project's technical liaison.

The guidebook—*Fleet Management Tools for Local Agencies* (2017RIC01)—includes a matrix comparing the eight most widely used fleet management software tools among Minnesota agencies. Costs, equipment needs, tracking features, financial analysis applications, and other attributes are reviewed. Case

studies of agencies that use spreadsheets, software, and specific fleet replacement strategies are also included.

Three approaches to fleet replacement planning are presented in the guide. "You may have a vehicle that has been driven 300,000 miles and needed little maintenance, while another vehicle has been driven 100,000 miles and has needed a lot of maintenance," says Renae Kuehl, senior associate, SRF Consulting Group, Inc., one of the co-authors. "We provide three models to determine when you should replace each."

One of the findings of the project is that spreadsheets are effective and widely available tools for managing fleets. They are easy to tailor to local needs and fleets, are well understood by most computer users, are part of most office software suites, and work well for small data sets. Disadvantages, however, include limitations in reporting features, easy corruptibility of data, and inconsistent data entry among users.

In contrast, fleet management software offers easy report generation; software linkage to fuel, financial, and other software systems or modules; secure and consistent data; and interagency shareability. However, these tools can be expensive. Software costs for managing fleets average almost \$36 per vehicle, and annual support costs average about \$18 per vehicle. Other disadvantages include the need for training and internet accessibility. ■

Learn more:

- *Fleet Management Tool for Local Agencies* (LRRB 2017RIC01, June 2018)



The transition to the use of a
**FLEET MANAGEMENT
SOFTWARE TOOL**
appears to be when fleets
are within

**50 TO 100
VEHICLES.**

BRIDGES

Historic local bridges: What you need to know

I recently had the opportunity to visit with two of Minnesota's foremost experts in local historic bridges: Kristen Zschomler, director of the Minnesota Department of Transportation (MnDOT) Cultural Resources Unit, and Patti Loken, manager of the MnDOT State Aid local bridge funding program.

Kristen supervises 12 staff dealing with historic issues for roads and bridges and for rest areas, buildings, and other features that may be affected by transportation projects. Work includes facilitating historic-related conversations with the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), Corps of Engineers (COE), and State Historic Preservation Office (SHPO). Patti manages the local bridge funding program and has been instrumental in developing strategies for dealing with historic bridges.

After dealing with local historic bridges for years as a county engineer, I learned some things I would like to share with you.

—Alan Forsberg, P.E., retired Blue Earth County Engineer

Does age alone determine if a bridge is historic?

Age is only one consideration of whether a bridge is historic. Also important is the historic integrity of the bridge, its role in opening the area for early settlers, and relationship to other historic features. Its engineering characteristics, especially innovative design, are very important. It is not surprising that 80 to 85 percent of historic bridges are on the local system. Bridges were essential to early development and were often built by local governments before the state transportation system was developed.

Do historic bridges have public value—how do they contribute to the “Public health, safety and welfare?” With 12,000 local bridges and 900 on the replacement priority list, how is investment in historic bridges justified?

There is value in preserving history for its own sake, celebrating the past to benefit the future, and understanding our engineering heritage. There is also an economic tourism benefit in preserving historic structures, such as generated by the Stone Arch Bridge in Minneapolis, the Aerial Lift Bridge in Duluth, or Jones Ford Bridge near Amboy. In some cases, historic rehabilitation can cost less than replacement.

As democratic evidence of the value of preserving these historic resources, our elected officials have recognized the public value, crafted state and federal laws, and invested tax dollars to preserve and rehabilitate historic bridges

What are the federal and state laws protecting and preserving historic bridges?

If federal funds are used for a project or if a federal permit is needed, the National Historic Preservation Act of 1966, Section 106, and in some cases Section 104, applies. In Minnesota, the Minnesota Historic Sites Act and Minnesota Environmental Protection Act apply. Both federal and state acts have rules on implementation. The definition of when a bridge is historic is a bit fuzzy. All this creates a complex situation when a local government is faced with a decision about an obsolete and deficient structure.

How are the federal and state historic bridge laws implemented in Minnesota?

Fortunately, MnDOT State Aid has taken a leadership role in helping local governments. In the 1990s, local governments were often not clear on how to proceed. MnDOT surveyed local bridges constructed before 1956 and determined which bridges were eligible or on the historic register.

In 2010 this list needed updating. A survey was done of problems local governments were having with historic bridges, the earlier list was reviewed and updated, and a report was prepared on each of the eligible or listed bridges. This list includes about 3 percent of all local bridges. The report documented the bridge description and condition and included a management plan for maintaining the bridge as a historic structure. Historic American Engineering Record documentation requirements are met by the reports.

When the federal process must be followed due to funding or permits, the report provides a head-start. Each report is located on the MnDOT Bridge Office website. Why a bridge is historic, and a discussion of its historic nature, is already done for

you. See the MnDOT website, A-Z, Historic Bridges, for a wealth of information on historic bridges in Minnesota.

The challenge is to meet the local transportation need while respecting the historic value of a structure. The goal of the historic review process is to foster a conversation between all affected parties on how best to meet this challenge.

Is help available?

If you have an eligible historic bridge or one on the historic register, you are fortunately not on your own. Help is available!

Suggested first step—contact Kristen Zschomler or Katie Hawn Schruing, MnDOT Cultural Resources staff. The Cultural Resources Unit may also be able to assist with grant applications for historic funding. MnDOT's Patti Loken can assist with funding options and status. David Conkel, State Aid bridge manager, can assist with structural preservation and rehabilitation options. There are several bridge engineering firms with historic bridge expertise.

The FHWA, COE, and SHPO will become involved depending on funding and permits. After ground-work is laid with MnDOT State Aid and Cultural Resources and perhaps an assisting bridge engineering consultant, direct coordination with these agencies and development of a collaborative relationship is important in moving your project forward. (Note: SHPO is no longer an independent agency but is now part of the Department of Administration.)

As always, one of the most beneficial sources of information are your professional county engineers.

Historic bridge preservation project examples

After 10 years, significant progress has been made in preserving historic bridges, and there are many successful examples. See the MnDOT Bridge website—dot.state.mn.us/historicbridges—for examples in both the Twin Cities metro and Greater Minnesota areas. Some excellent ones are below. ■



Redwood County's swayback bridge features an overflow section for high flows.



Todd County's multi-plate arch has a rock façade and early steel plate design.



The new deck and substructure repairs of the Franklin Avenue bridge in Minneapolis respect the original design.

Minnesota LTAP brings Demo Day to the Great North Woods

Public works staff from around the state ventured to the Great North Woods for the seventh annual Minnesota Roadway Maintenance Training and Demo Day. The event was held May 17 at the Beltrami County Fairgrounds in Bemidji, home of the legendary trailblazer Paul Bunyan and his companion, Babe the Blue Ox.

About 120 attendees received local road maintenance updates and training refreshers through a series of presentations provided by LTAP's expert instructors. Demonstrations included gravel road maintenance using a motor grader, culvert and ditch maintenance, and cargo securement.

Brian Barott and Marv Hayes, training specialists with the Minnesota Department of Transportation, explained updated commercial drivers license regulations for government drivers and shared ways to properly inspect securement devices and secure cargo.

Barott noted new federal training requirements to obtain a commercial motor vehicle license. Beginning in February 2020, new commercial drivers must be trained at an accredited school. In addition, drivers seeking a license class upgrade or special endorsements also must be trained at an accredited school, according to the new requirements.

Barott also warned commercial drivers against the use of cell phones and texting. He pointed out that drivers for a government entity may be exempt from rules prohibiting cell phone use while driving, but it is still dangerous and commercial drivers still can be cited for distracted driving.

Nebraska LTAP instructor Brian Jackson presented motor grader blading techniques and best practices for managing and maintaining gravel roads. He provided real-world examples while focusing on basic design principles, correct materials, and safety.

Minnesota LTAP instructor Ann Johnson partnered with retired Crow Wing County Engineer Duane Blanck to discuss well-designed, well-built, and well-maintained ditches and culverts. According to Johnson and Blanck, both ditches and culverts serve an important function in drainage systems and are essential for the proper design, installation, and maintenance of good roads and roadsides. ■

—Michael McCarthy, LTAP editor



Brian Jackson taught motor grader blading techniques.

Hail to thee, graduates!

Congratulations to the 2017* graduates of the Roads Scholar Program!

- Douglas Assink, Rice County
- Jack Brosh, Benton County
- Chad Christopherson, Carver County
- Cristi Field, Otter Tail County
- James Gilles, Kanabec County
- Robert (Bob) Goebel, City of Mahtomedi
- Jeremy Greenwaldt, Olmsted County
- Jared Hallberg, City of Savage
- Jamey Hecksel, Carver County
- Jeff Hince, Empire Township
- Corey Kloepper, City of Coon Rapids
- Charles Larsen, Olmsted County
- Brad Metcalf, City of Woodbury
- Timothy Meuleners, Carver County
- James O'Connell, Chisago County
- Grant Riemer, City of Ramsey
- Josh Rosckes, Carver County
- Evan Sieben, City of Woodbury
- Nolan Sprengeler, MNSU
- Anthony Voigt, City of Norwood Young America

*Students who completed their coursework by December 31, 2017, are considered the Class of 2017. ■



At a ceremony held as part of Demo Day in Bemidji, Minnesota LTAP presented certificates to 4 of 20 maintenance workers who completed training requirements during 2017. Left to right: Mindy Carlson (LTAP); grads Cristi Field, Douglas Assink, Evan Sieben, Brad Metcalf; and Stephanie Malinoff (LTAP).

Roads Scholars: Where are they now?

Nearly 170 students have received a Roads Scholar certificate since the program's inception in 2005. What are they doing now? Starting in this issue, we'll share stories from some of the graduates. Our first shining star is Chris Petree, a 2007 grad who's now the public works director for the City of Rochester. He also is an instructor for the Roads Scholar program and is teaching our "Transitioning into Leadership" workshop (one is scheduled for October 25 in Rochester).

How did your career begin?

I started in public works in the early 1990s as a seasonal maintenance employee in Apple Valley. I did all sorts of things—park maintenance, street maintenance, utilities maintenance, and so on. When I was 19, I was hired as the youngest full-time employee (at the time) in the utilities division. I earned an associate of arts degree and completed the public works certificate program in the late 1990s, then was hired as the City of Hugo's public works director in 1999. A few years later, I went on to obtain my bachelor's degree in business management.

How did the certificate help you advance?

One of the education programs I completed while in Hugo was the Roads Scholar certificate, in 2007. I took the courses over a few years and it helped me expand my foundation of technical skills and broaden my transportation skillset. Hugo is a diverse community, with both paved urban streets and rural roads, and the Roads Scholar certificate provided a good balance of classes on topics from

culverts to pavement management. In 2008 I was hired as the operations and maintenance director in Lakeville, and then went on to become public works director there. Earlier this year I accepted my current position as public works director for Rochester. The last 25 years or so, from seasonal maintenance employee to where I am today, has been an incredible and rewarding experience.

What got you interested in your field?

Even as a young seasonal employee, I learned I have a passion for public works, and for public service in general. I also realized I have a passion for mechanical activities and like to work out in the field.

What's the most interesting or surprising part of your work?

There's rarely a day that plays out just as you intended. It seems something you couldn't anticipate tends to occur, and new things come up every day—challenging, yet rewarding—and keep it fresh. It's always great for storytelling with friends!

Also, people may not realize that public works

employees are often first responders. When infrastructure is involved, such as road flooding, we're there with police and EMTs. There's an excitement, an adrenaline piece, in public works. The first snow event of the year is exciting, and our workers have a ton of pride in delivering great service.

And for me, with the infrastructure plans that are part of Rochester's Destination Medical Center initiative, it's exciting to touch projects that are once in a lifetime. It's rewarding to add value to the community and to the organization and deliver a level of service that residents of this community expect.

What can people learn from your path?

I'm a case study that anything is possible. I was a kid who started out emptying garbage. Depending on your aspirations and commitment—and with the right training, education, and networking—the sky's the limit.

I encourage people to get involved in the opportunities provided by LTAP and APWA-Minnesota. LTAP training and education programs provide a niche that's really necessary. They give folks in our profession important information and networking. ■

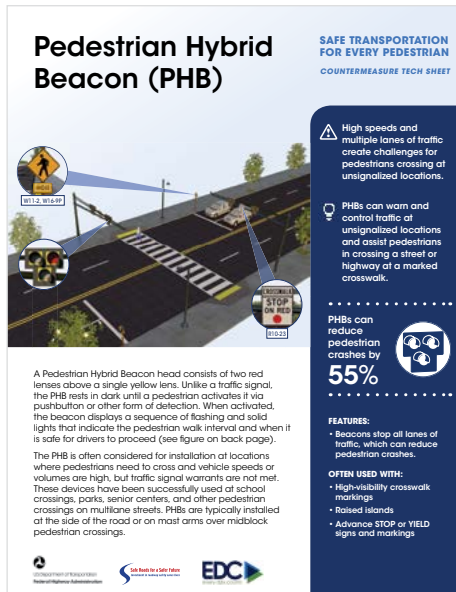
SAFETY

Treatments help pedestrians cross the road

As the shadows lengthen and children head back to school, it's a good time to think about pedestrian safety. The Every Day Counts (EDC) program has developed tech sheets and a video about cost-effective pedestrian safety countermeasures. The materials are part of EDC's Safe Transportation for Every Pedestrian Program (STEP).

STEP focuses on five treatments to help pedestrians cross the road safely:

1. **Crosswalk visibility enhancements** include crosswalk lighting, enhanced signing and marking, and curb extensions.
Total crash reduction: 23 – 48%
2. **Raised crosswalks** are a traffic-calming technique that can reduce vehicle speeds and encourage drivers to yield to pedestrians.
Pedestrian crash reduction: 45%
3. **Pedestrian refuge islands** provide a safer place for pedestrians to stop at the midpoint of a road before crossing the remaining distance.
Pedestrian crash reduction: 32%
4. **Pedestrian hybrid beacons** provide a stop control treatment for higher-speed multilane roads where pedestrian volumes aren't high enough to warrant a traffic signal.
Pedestrian crash reduction: 55%
5. **Road diets**, which reconfigure a roadway cross-section to safely accommodate all users, can decrease vehicle speeds, reduce the number of lanes pedestrians must cross, and create space for new pedestrian facilities.
Total crash reduction: 19 – 47% ■



One of the EDC fact sheets discusses beacons.

Don't forget! LRRB guidebook looks at uncontrolled crossings

Another safety resource is a 2014 guidebook from the LRRB that focuses specifically on uncontrolled pedestrian crossings, which aren't controlled by a stop sign, yield sign, or traffic signal.

The guidebook recommends when to install marked crosswalks and other enhancements based on a number of 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.

When using the guidebook, practitioners are guided through an 11-step evaluation process. 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. For each potential treatment option, the guidebook includes information on advantages, disadvantages, recommended locations, and cost. ■

Learn more:

- *Pedestrian Crossings: Uncontrolled Locations* (LRRB, June 2014)



Every Day Counts is the FHWA's initiative to advance a culture of innovation in the transportation community in partnership with public and private stakeholders.

Fatigue from page 1

hours reported significantly higher levels of fatigue.

Based on the results and analysis, researchers ranked the in-cab and external equipment that caused fatigue. The top four equipment-related sources of fatigue were bright interior lighting, standard windshield wipers, misplaced or insufficient auxiliary lighting, and old or uncomfortable seats.

Among the nonequipment-related sources of fatigue, the most commonly reported factor was silence (lack of music or talking), followed by length of shift, lack of sleep, and insufficient breaks.

Using the same ratings, researchers developed a list of recommended actions that can be implemented by agencies to decrease driver fatigue. The recommendations were based on a comparison of each solution's costs (equipment costs and potential risk of adversely affecting fatigue) and benefits (effectiveness in reducing operator fatigue).

Among the researchers' equipment-related recommendations, the most cost-effective called for adding:

- A CD player or satellite radio to deliver music

or speech, preventing short-term fatigue.

- Dimmable interior lighting to reduce reflections on the windshield and windows, providing better visibility.
- Dimmable warning lights to reduce back-reflected light from the warning lights, lowering visual distraction.
- Snow deflectors to reduce the amount of snow blown on the windshield, providing better visibility.
- Heated windshields to reduce snow and ice buildup on the windshield, providing better visibility.

Nonequipment solutions included encouraging adequate breaks, limiting shifts to 12 consecutive hours when feasible, developing a fatigue management policy, encouraging a healthy lifestyle, and designating dedicated rest locations for operators.

According to the report, both the equipment-related and nonequipment-related solutions provide easy and quick corrective actions that agencies

can implement immediately to increase the health and safety of snowplow operators. ■

Learn more:

- *Identification and Recommendations for Correction of Equipment Factors Causing Fatigue in Snowplow Operations* (Clear Roads, Nov. 2017)
- "Truckers disregarding sleep apnea treatment show greater crash risk," *CTS Catalyst* (Aug. 2018)

Recommendations include installing an **AUDIO PLAYER, DIMMABLE INTERIOR LIGHTING, and SNOW DEFLECTORS.**

Brush up on your winter skills with free online modules

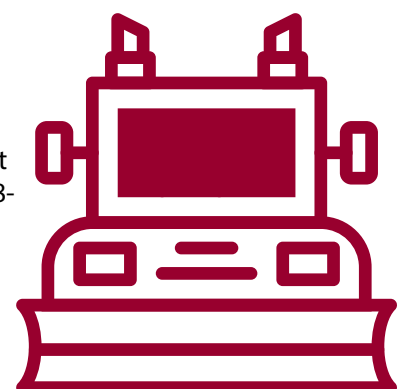
A comprehensive snowplow operator and supervisor training program is available online from Clear Roads. The program is meant for entry-level and experienced snowplow operators and supervisors.

Clear Roads is making the training materials available free of charge to any agency, including local and county highway departments.

The 22-module program covers equipment, materials, techniques, and procedures. The 22 modules contain 1,300 presentation slides and provide more than 42 hours of training materials. Each module is designed to be presented by an instructor and includes a PowerPoint file with teaching notes and aids plus

an instructor's guide with detailed directions, notes, resources, references, and suggested activities. A set of pre- and post-assessment tests is also included.

For access to the training materials, contact Clear Roads administrator Greg Waidley at 608-490-0552 or greg.waidley@ctcandassociates.com. ■



THE SHELF

Minnesota LTAP partners with the MnDOT Library to operate a state-of-the-art service that can help you track down almost any resource from Minnesota or beyond. Questions? Contact Marilee Tuite, Minnesota LTAP librarian, 612-626-8753, ctslib@umn.edu.

Winter Roadway Maintenance Material Enhancers (Field) Evaluation (Pennsylvania DOT, Apr. 2018)

Evaluates the performance and cost analysis of four deicer products through parking-lot tests and on-road tests.

Safety Evaluation of Corner Clearance at Signalized Intersections (Federal Highway Administration, Feb. 2018)

Analyzes corner clearance at signalized intersections. Corner clearance is defined as the distance between an intersection and the nearest driveway or access point along the approach.

Evaluating the Impacts of Red Light Camera Deployment on Intersection Traffic Safety (Maryland DOT, June 2018)

Analyzes crash data to determine the impact of red-light cameras (RLCs) on driver behavior. This report focuses on drivers' responses to yellow lights at RLC locations.

Roundabout Research (FHWA, June 2018)

Assesses the effects of the FHWA's investment in roundabout research and related activities. This report also evaluates the adoption of roundabouts in the United States and the impacts of those roundabouts on safety, operational, and environmental performance on the U.S. transportation system.

Effectiveness of Stationary Police Vehicles with Blue Lights in Freeway Work Zones (Florida DOT, March 2018)

Analyzes the effectiveness of deploying stationary police vehicles with flashing blue warning lights in freeway work zones.

Infiltration Basins: Standards and Procedures to Ensure Performance (MnDOT, Feb. 2018)

Highlights practices of other state transportation agencies for the planning, design, and construction of infiltration basins. Infiltration basins have been a common means of stormwater management across the United States, as well as internationally, but they can incur high failure rates.

Evaluation of the Metal Fatigue Solutions Electrochemical Fatigue Sensor System (Iowa DOT, March 2018)

Evaluates the electrochemical fatigue sensor, which detects very small fatigue cracks actively growing in bridges and other structures.

Designing Base and Subbase to Resist Environmental Effects on Pavements (MnDOT, Feb. 2018)

Evaluates existing pavement sections in Minnesota to characterize pavement performance, including limited winter profile measurements.

Durable Pavement Marking and Grooving (Iowa DOT, Apr. 2018)

Evaluates different durable markings and pavement grooving configurations in an effort to make better choices for year-round markings in Iowa.

Material Selection Guidance for Asphalt Pavement Design (National Center for Asphalt Technology at Auburn University, June 2018)

Provides guidance for flexible pavement

design methods and identifies the challenges when trying to incorporate these materials.

Safe Routes for Older Adults (California Office of Traffic Safety, Apr. 2018)

Provides communities with background information on walking and bicycling safety for older adults. This report also includes tools to better facilitate age-friendly transportation systems in California.

Promising Practices for Increasing Access to Transportation in Rural Communities (Walsh Center for Rural Health Analysis, University of Chicago, Apr. 2018)

Summarizes potential rural transportation program models and shares lessons learned from rural communities. This report resulted in the Rural Health Information Toolkit, a web-based toolkit of rural transportation program models and resources.

Behavior of Epoxy-Coated Textured Reinforcement Bars (Illinois DOT, Apr. 2018)

Details a preliminary investigation of the bond behavior of textured epoxy-coated reinforcing bars in bridge decks.

Development of a Computational Framework for Big Data-Driven Prediction of Long-Term Bridge Performance and Traffic Flow (Midwest Transportation Center, Apr. 2018)

Develops and validates several computational tools for bridge management.

A Comparative Laboratory Study of Metallic Reinforcing Steels for Corrosion Protection of Reinforced Concrete Bridge

Structures (FHWA, June 2018)

Evaluates the corrosion resistance of 12 types of metallic reinforcing steel bars. This report is part of the FHWA's Long-Term Bridge Performance Program, which develops a collection of data-driven tools, including predictive and forecasting models, which aim to help bridge owners manage their bridges. ■

Search me

The Minnesota LTAP website features custom search engines to help you find information. You can search:

- LTAP & TTAP Centers
- State DOTs
- Transit agencies
- University transportation centers

Bookmark mnlap.umn.edu/publications/library.

Other great resources are:

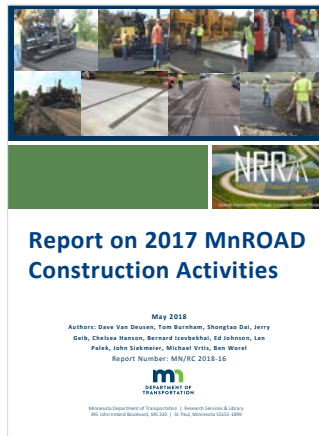
- LRRB's site: lrrb.org
- MnDOT Library's catalog: dot.state.mn.us/library ■

MnROAD construction update

The 2017 construction season at MnROAD saw construction of 35 new and unique pavement test sections. A MnDOT report details the development, design, and construction of each research project and the test sections supporting them.

MnROAD is a pavement test facility owned and operated by MnDOT. With the 2017 construction described in this report, MnROAD now has four separate experimental roadway segments.

The National Road Research Alliance (NRRRA), a multi-state pooled-fund project, helps direct the use of the MnROAD test track for local, regional, and national research, technology transfer, and implementation needs. The new test sections, designed to address NRRRA high-priority research topics, were conceived and planned by NRRRA project teams. Test sections support long-term research contracts; results from those projects will be published in future reports. ■



Learn more:

- *Report on 2017 MnROAD Construction Activities* (MN/RC 2018-16, May 2018)
- National Road Research Alliance: dot.state.mn.us/mnroad/nrrra

AASHTO TC3 library provides online training

The FHWA and the American Association of State Highway and Transportation Officials (AASHTO) finalized an agreement that provides local and tribal transportation professionals access to the AASHTO TC3 library.

AASHTO's goal with TC3 is to create and maintain a fully optimized curriculum to respond to the changing needs of the transportation technical workforce. Courses provided by TC3 are developed through a collaboration of national best practices and a network of knowledgeable subject matter experts.

If you are a transportation practitioner working for a local or tribal government and want to improve your construction, maintenance, and material selection processes and projects, please take the opportunity this agreement provides to access the AASHTO TC3 catalogue that provides over 120 courses and some of the best online training available anywhere. ■

Learn more:

- To browse and access TC3 course offerings, go to <https://tc3.transportation.org>. You will need an AASHTO account to access the FHWA-sponsored online training courses.
- For questions or more information, please see <https://tc3.transportation.org/contact>.



Website has tools to control blowing snow

The Blowing Snow Control Tools website is the home for tools and resources that can help you keep your state and local roads clear of blowing and drifting snow and ice. It includes a design module, cost-benefit tool, and webinars demonstrating how to use both tools.

New on the site this year are two webinars to help users interpret results from the cost-benefit tool. One webinar explains how to interpret results from the perspective of a landowner, and the other

from the perspective of a transportation agency.

The site also includes videos, background, and news. It is developed and maintained by the Center for Transportation Studies with sponsorship from MnDOT. ■

Learn more:

Blowing Snow Control Tools website: snowcontroltools.umn.edu

and 10 are tools to reduce fatigue.
Answer to quiz on page 8: Numbers 1, 5, 6, 8, 9,

WORKSHOPS & TRAINING

CALENDAR

For details and an up-to-date list of events, please see mnltp.umn.edu.

Truck-Weight Education Training

(1 RS credit) *LTAP*

Locations throughout the state

Fall Maintenance Expo

(1 RS credit) *LTAP*

Oct. 3–4, St. Cloud

Minnesota's Best Practices for Traffic Sign Maintenance and Management

(1 RS credit) *LTAP*

Oct. 11, Baxter

Oct. 17, Blaine

Oct. 25, Mankato

Transitioning into Leadership: Essential Skills for Supervisors

(1 RS credit) *LTAP*

Oct. 23, Rochester

Statewide TZD Conference

Oct. 23–24, Mankato

CTS Transportation Research Conference

Nov. 1, Minneapolis

APWA-MN Fall Conference and Workshop

(1 RS credit) *LTAP*

Nov. 14–16, Brooklyn Center

ONLINE TRAINING: Anytime, anywhere!

Culvert Design and Maintenance

(1 RS credit) *LTAP*

Sign Maintenance and Management for Local Agencies

(1 RS credit) *LTAP*

Gravel Road Maintenance and Design

(1 RS credit) *LTAP*

Work-Zone Safety Tutorial

(0.5 RS credit) *LTAP*

Turfgrass Pathology Course

(0.5 RS credit) *LTAP*

Road Salt Symposium

(1 RS credit) *LTAP*

Feb. 7, Plymouth

Roads Scholar credit

You can earn credits in Minnesota LTAP's Roads Scholar (RS) program by attending LTAP and CTAP workshops and other cosponsored events. To learn more or enroll in the program, visit mnltp.umn.edu/roadsscholar.

LTAP workshops

LTAP workshops, along with events cosponsored by Minnesota LTAP, are marked with an *LTAP* at left. Check the web for details and to register online: mnltp.umn.edu. To be added to our print or electronic mailing lists, email mnltp@umn.edu or call 612-625-1813.

CTAP workshops

Circuit Training and Assistance Program (CTAP) workshops bring LTAP services to your neck of the woods. CTAP uses a fully equipped van to provide on-site technical assistance and training. Each CTAP workshop earns 0.5 RS credit. For more information or to schedule classes, call the CTAP instructor, Kathy Schaefer, at 651-366-3575, or email Kathleen.Schaefer@state.mn.us.

New prep course for remote pilot exam

A new online course is geared toward individuals who wish to earn their FAA Remote (drone) Pilot Certification. The nine-hour course, offered by the University of Massachusetts Amherst Transportation Center (UMTC), covers all required knowledge content areas of the FAA's Remote Pilot Test.

The course is based on recorded presentations by aviation and UAS industry experts. Topics include regulations, the National Airspace System, weather, aircraft loading and performance, and flight operations.

Students can complete the course modules over a weekend, a week a month, or more. The registration fee is \$150.

Additional components include downloadable course materials, review of common test questions for all exam sections, and useful tips on what to bring and expect during the test. Upon completion, participants should feel qualified to take the FAA Remote Pilot Exam.

To learn more, visit the UMTC Training Institute web page. ■

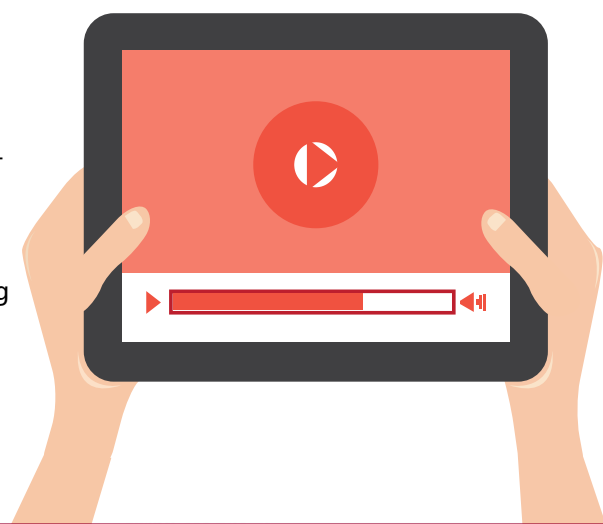


ADA training online

If you weren't able to attend the Accessible Design in the Public Right-of-Way training in person, you can watch video recordings of the workshop sessions and view presentation slides on the Minnesota LTAP website.

The training, offered in nine locations across Minnesota in early 2018, gave attendees an understanding of how to provide accessibility in the public right-of-way from scoping through final design. The course covered the basic design requirements of the Americans with Disabilities Act (ADA) and how those needs relate to the broader concepts of designing facilities that are usable, constructable, and maintainable.

Stay tuned for more information about the final workshop in our ADA training series, focused on construction, coming in 2019. ■



Don't be asleep at the wheel!

According to a Clear Roads report (page 1), which of these are tools to reduce snowplow operator fatigue? Answers are on page 7. ■

1. Satellite radio
Yes or No

5. Snow deflectors
Yes or No

8. Heated windshields
Yes or No

2. Heated seats
Yes or No

6. Dimmable warning lights
Yes or No

9. Dimmable interior lighting
Yes or No

3. Bright interior lighting
Yes or No

7. Traditional tire chains
Yes or No

10. Rubber-encased blades
Yes or No

4. Smartphone apps
Yes or No