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Video encourages compliance with load limits

Configuring trucks to haul loads legally is a win-win for the agencies that maintain our roads and the shippers and haulers who depend on them. The Minnesota Truck-Weight Education Program offers free workshops statewide that encourage voluntary compliance with truck-weight laws and regulations. A new video promoting the training is now available online to share widely with the freight industry and others who have a stake in maintaining our road networks.

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Submit an entry for ‘Mousetrap’ competition

Have you or one of your co-workers recently built an innovative gadget or developed an improved way to do a job? Now is the time to show off your creativity and help other agencies solve problems by submitting an entry to the Build a Better Mousetrap Competition! Minnesota LTAP is participating in the 2017 contest, sponsored by the Federal Highway Administration’s Local Technical Assistance Program and Tribal Technical Assistance Program.

Your entry can be anything from the development of tools or gadgets to equipment modifications to processes that increase safety, improve efficiency, reduce costs, or improve the quality of transportation. The purpose of this competition is to collect and disseminate real-world examples of best practices and tips from the field and assist in the transfer of technology.

To enter the competition, please complete the entry form on our website and submit it to cttap@umn.edu by May 31, 2017. You’re also encouraged (but not required) to submit photos.

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Demo Day: May 18 in Marshall

The Minnesota Roadway Maintenance Training and Demo Day will be held May 18 at Southwest Minnesota State University in Marshall. Attendees will earn a Roads Scholar credit. The event includes classroom sessions and outdoor demonstrations. Topics will be:

- Cargo securement requirements
- Changes in CDL driving rules
- Gravel road maintenance
- Vegetation management/ditch maintenance
- Culvert maintenance and inspection

For details, visit mnltap.umn.edu/training/roadway.

And when you’re in Marshall, here are a few other things to do (from visitmarshallmn.com):

- **Visit Memorial Park.** The park was dedicated on the 10th anniversary of 9/11. A steel beam the Marshall Fire department received from the World Trade Center in New York City is the centerpiece of the memorial.
- **Bike the Camden Trail.** Take a smooth ride or walk or run on the newly paved bike trail from Marshall to Camden State Park. Birds, small wild animals, and buffalo are common to see on this beautiful trail.
- **Go fishing.** Marshall is a prime spot for fishing, with the Redwood River flowing throughout the entire town. Drive out to Camden State Park and fish for brown trout in the Redwood River or bluegill a couple miles up the road at Brawner Lake.
cleaning, since much of the water stream is aimed at the top and upper sides of the pipe. The leftover debris would normally be cleaned by manual labor using shovels and water hoses. This process often required individuals to crawl inside the pipe and was very laborious.

A da County Highway District (ACDH) employees devised a system to keep the cleaning head on the bottom of the pipe: the Bottom Feeder. They attach this implement to the bottom one-third of the pipe and adjust the roller guide as necessary. The cleaning head now rides along the bottom of the pipe, cleaning the pipe with better efficiency and effectiveness. This device also helps remove the debris remaining at the end of the pipe, virtually eliminating labor work and dramatically increasing the overall safety of the operation.

After comparing two pipes of equal size with similar amounts of debris, ACHID determined that a process that once took eight hours with two vacuum trucks, one water truck, and two laborers could now be completed in only one and a half hours and with no water truck and no laborers. This new process provides 81% time savings.

Second Place: High-Pressure Sprayer Agency: Swatara Township, Dauphin County, Pennsylvania

The township was experiencing an ongoing issue with salt and salt residue on the underside of trucks and equipment corroding the metal, brake lines, fittings, and truck parts. Without a dedicated truck wash bay with undercarriage cleaning to completely wash off the salt and residue, the township spent thousands of dollars over the years to replace rusted parts. The rusted parts were also a problem because they were difficult to remove.

A Swatara Township employee fabricated a high-pressure sprayer with four 45-degree sprayer nozzles to blast off the salt and residue. The township now successfully uses the high-pressure washer, beginning by pre-rinsing the undercarriages of trucks and equipment before treating them with a salt rinse product and then rinsing them off again.

Third Place: Sign Stabilizer Agency: Cecil County Government, Maryland

When hanging dual street name signs, the county noticed the signs were folding and working free from the mounting hardware when exposed to high winds. By fixing the two signs together with polyvinyl chloride (PVC) pipe, signs are more difficult to move without moving the post. Since implementing the sign stabilizer, the county has not lost a single sign. An expense of only $13 can save ten signs from damage or loss. LTAP

Build a Better Mousetrap: 2016 national winners

The Build a Better Mousetrap National Competition highlights innovative solutions to everyday problems. Highlights of the top three projects from 2016 are below.

First Place: Pipe Bottom Feeder Agency: Ada County, Idaho, Highway District

When cleaning storm drain pipes greater than 36 inches in diameter, traditional vacuum truck systems leave a large amount of debris in the last 6 to 10 feet of the pipe due to the angle at which the cleaning head and hose are pulled back through the pipe. This angle also contributes to inefficiencies while of your project along with your entry form. Entries will be judged on the basis of cost savings, benefits to the community and/or agency, ingenuity, transferability to others, and effectiveness. We’ll pick a state winner, who will be recognized in the Exchange newsletter and receive a prize.

The winning entry will be automatically submitted to the national competition, where you’ll compete for more fantastic prizes—and bragging rights! Winners will be announced at the annual LTAP/TTAP National Conference. LTAP

Building and maintaining storm drain pipes greater than 36 inches in diameter can be a difficult task. Ada County, Idaho, recently developed a system to keep the cleaning head on the bottom of the pipe, called the Bottom Feeder. This device helps remove debris and adjust the roller guide as necessary. The clean implement is mounted to the bottom one-third of the pipe and rolls along the bottom of the pipe, cleaning it with better efficiency and effectiveness. This device also helps remove debris remaining at the end of the pipe, virtually eliminating labor work and dramatically increasing the overall safety of the operation.

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Local OPERA Project: Ultra-thin bonded wearing course over micro-milling

**Project leader:** John Brunkhorst  
**Agency:** McLeod County Highway Department  
**Problem:** A portion of McLeod County State Aid Highway (CSAH) 115 near Hutchinson, MN, exhibited a marginal improvement in ride after it was micro-milled in 2014. To preserve the surface of the road and further improve ride quality, engineers needed to apply a surface treatment.

**Solution:** McLeod County chose to surface the highway with a 5/8-inch-thick ultra-thin bonded bituminous wearing course (UTBWC) in lieu of a traditional seal coat. UTBWC consists of a thin gap-graded, polymer-modified hot-mix asphalt layer placed on a polymer-modified emulsified asphalt membrane. UTBWC should last longer, improve some surface distresses, and improve ride quality.

**Procedure:** The UTBWC was applied to CSAH 115 in August 2015. Following the application, McLeod County conducted International Roughness Index (IRI) testing, which is the current MnDOT standard measurement of pavement smoothness, on the road in September 2015. IRI measurements had also been taken in July 2015, prior to the application, for comparison.

**Results:** The UTBWC application provided a 57 percent improvement in ride quality in the eastbound lane and a 60 percent improvement in the westbound lane. County officials also noticed the UTBWC sheds water well during rainfall and provides a quiet ride.

**Approximate cost:** $85,000  
**OPERA funding:** $10,000  
**Implementation:** The cost of the material was $5.20 per square yard. The cost of a bituminous seal coat using granite and a fog seal is approximately $1.50 per square yard. The cost of a typical 1.5-inch hot-mix overlay is approximately $7.00 per square yard. Although the cost of the UTBWC is higher than a seal coat, McLeod County staff believe it is a good pavement management tool to consider because of its ability to improve ride, provide a quiet driving surface, and minimize reflective cracking.

**Status:** Complete  
**LTAP**

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**Interactive guide helps local agencies address funding gaps**

A new interactive guide from the LRRB and MnDOT will help local agencies evaluate their transportation network preservation needs, communicate these needs to elected officials and the public, and select and implement strategies to address funding gaps.

The guide and tools developed in the project are based in part on the experiences of five Minnesota counties: Anoka, Dakota, Freeborn, Otter Tail, and Stearns. These counties provided a representative sampling based on various factors, including environment (urban and rural), demographics, and agency size and budget.

Investigators worked with the five pilot counties to compare the gaps in their maintenance funding to the funding they needed to manage their pavement system, determine whether the county board understands those gaps, and choose implementation strategies to narrow the funding gaps. Structured as a decision tree, the step-by-step guide includes these steps:

- **Needs Assessment**—Helps agencies define their preservation needs through a three-phase approach: an examination of existing infrastructure and the impacts of current maintenance strategies, an analysis of revenue and expenditures history and forecasts using a sketch tool, and the creation of a State of the County Highway System Report that summarizes the agency’s pavement preservation needs and the funding gap to meet those needs.
- **Preservation Strategies**—Reviews eight system preservation strategies in four categories: system adjustments (such as recommending interjurisdictional transfers, changing maintenance classifications of roads, and improving roadways); planning and programming (including transportation plans, performance-based standards, and project prioritization methodologies); revenue enhancements; and cost reduction or longer life-cycle maintenance methods.
  - **Communication Strategies**—Provides outreach and communication strategies for informing and obtaining buy-in from elected officials and taxpayers, with guidance for identifying communication needs and developing a communications plan, tools, and messages.
  - **Lessons Learned**—Reviews lessons learned by pilot counties that helped develop the system preservation guide, such as details about the strategies, the value of a data-driven process and meaningful graphics in communications, and the utility of the State of the County Highway System Report in educating stakeholders.

The guide provides links to supporting documentation, including tools for collecting revenue and expenditure data, resources for assessing a county’s current maintenance practices, sample reports, case studies, and sample communications campaigns.

After using the process presented in the guide, all five pilot counties successfully built consensus among the public and their elected officials to implement either a sales tax or wheelage tax to increase transportation funding. Each county also selected other strategies to address funding shortfalls based on their specific needs and situations.

“Creating and maintaining a dialogue with elected officials and the public have been critical,” says Sue Miller, county engineer of Freeborn County. “Because of that dialogue, we’re now seeing road and bridge funding being prioritized!”

**More resources:**


**Editor’s note:**

We thank one of our readers for commenting about an article in the December 2016 Exchange. The article, which reprinted information about a MnDOT study of implements of husbandry, stated that farming practices have changed from family to corporate. Corporations are actually a small minority of farm businesses. We regret the misstatement. **LTAP**
Gravel roads: surface stabilization

Minnesota has 70,654 miles of gravel roads in its 142,913-mile road system, according to MnDOT’s Transportation Management System. Most of these gravel roads, due to funding constraints and traffic volumes, are likely to remain gravel roads. Gravel roads are at once good, bad, and ugly.

The Good. Gravel roads are essential to transport Greater Minnesota’s products to market and people to destinations. The gravel surface, as opposed to a dirt road, provides all-weather, all-year access. Gravel roads are often lower in dust, which improves air quality and reduces the cost to maintain. Gravel roads also require less vehicle maintenance than paved roads. Gravel roads cost less to build than paved roads, and it takes fewer resources to maintain them. Gravel roads also provide a good surface for bicycle and pedestrian traffic, especially in rural areas.

The Bad. Gravel roads require regular replacement of gravel as the gravel is crushed by traffic, washed off by rain, blown away by wind, and pushed off during snow plowing. The roads also require regular smoothing by a motor grader. They are expensive for the road agency to maintain. The cost to maintain gravel roads, due to funding constraints and traffic volumes, are likely to remain gravel roads.

The Ugly. Gravel roads are often dust- and bumpy, and, during spring periods, weight restricted. This generates significant complaints to the road agency’s elected leaders and staff.

Minnesota’s county engineers are actively exploring ways to enhance the good and reduce the bad. They are working on long-term solutions to improve gravel road performance.

Gravel roads are at once good, bad, and ugly. Gravel roads require regular replacement of gravel as the gravel is crushed by traffic, washed off by rain, blown away by wind, and pushed off during snow plowing. The roads also require regular smoothing by a motor grader. They are expensive for the road agency to maintain.

Experience supports the importance of the electrochemical attraction of clay particles. A freshly laid gravel base is referred to as “green” by an experienced base inspector and is often too soft for a good paving platform. With time, perhaps a week or two, especially with heat and sunshine, the gravel base hardens into a strong paving platform. Presumably this is due to an electrochemical attraction between clay particles, which is enhanced by the BASE ONE action.

Minnesota has 70,654 miles of GRAVEL ROAD.

The LRRB report did not determine the stabilizing mechanism or measure the stabilizing strength added by BASE ONE. The report did state the calcium and silicates in the product may form silicate hydrate, a cement-like material. The vendor states BASE ONE is environmentally friendly and contains no heavy metals, organics, or corrosives and shows no flammability.

How does it work?

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Construction process

BASE ONE comes in 275-gallon totes. The BASE ONE can be incorporated into the gravel with a water truck and motor grader or with a reclaiming machine (more accurate and better mixing). The material is then shaped by a motor grader and compacted with a rubber tire roller. The cost of BASE ONE material is about $6,325 for a 4-inch-thick treatment 24 feet wide and one mile long, or $0.11 per square yard and inch of thickness. Labor and equipment and any gravel that may be added are additional. Application may be by contract or county forces.

County experience

Polk, Wilkin, and Wadena Counties have experience using BASE ONE to stabilize gravel roads and believe it results in lower maintenance costs and a better road for citizens. As reported by County Engineer Richard Sanders, P.E., Polk County is budgeting for 20 miles of BASE ONE stabilized gravel road per year for the next four years. The county’s project includes 4 inches of additional gravel stabilized with BASE ONE at a total cost of about $35,000 per mile.

As reported by Brian Noetzelman, P.E., county engineer and former Team Lab employee, Wilkin County has a program of stabilizing low-volume gravel roads that receive heavy sugar beet truck loads. The county places 3 inches of additional class 5 aggregate base, windowed this along with an existing 1 inch of gravel, and blade-mixes BASE ONE into the top 4-inch section in two 2-inch lifts. The material is then shaped and compacted. The county reports good performance in carrying heavy loads and less blading required to smooth the road. It may add calcium chloride for dust control. Typically, in seven or eight years BASE ONE is mixed in to the top 1 inch of gravel as top dressing. The year previous to treatment, the county installs centerline drain tile to improve subsurface drainage.

Some considerations if you choose to try it

Studies show BASE ONE can increase strength. However, there is no approved performance specification or trial mix process to determine suitability of the material and amount to use. According to the LRRB report, the mechanism is not well understood. Try it on a small scale. The stabilizing action depends primarily on the fine, minus #200 particles. It works better with clay than silts. Quality aggregate with adequate clay fines is needed. It has less strength in the spring when saturated, so weight restrictions, an adequate thickness of gravel, maintaining a good crown, and good drainage are still needed. It treats the full gravel section rather than the surface, so dust control is still needed under some conditions.

It is very difficult to objectively measure amount of replacement gravel needed since it depends so much on gravel quality, traffic, rainfall, terrain, etc., and varies year to year. Likewise, the need for blading to smooth a road is largely subjective. Determination of cost-effectiveness will be largely subjective.
Road tours: Know your roads for good maintenance

Spring is an excellent time to conduct a road tour to observe and record the overall conditions of your roads and to identify needed maintenance to ensure the public health, safety, and welfare regarding the use of public roads.

Be reminded that a “road” is more than the travelway or driving surface even though the term “road” often refers to the improved portion of the overall right-of-way that is used for travel. There are several elements of a road including:

- Right-of-way – the overall width of the road
- Travelway – the driving surface
- Shoulders – support the driving surface, often integral with the driving surface of a gravel surfaced road
- Inlets – support the driving surface and are part of the ditch
- Ditches – supports the road bed, conveys water, provides snow storage
- Backslopes – are part of the ditch
- Appurtenances – such items as culverts, road signs, public utilities, mailboxes, E911 address signs, etc., that exist in the right-of-way

All elements of a road need to be observed or inspected on a regular basis and should become part of a spring road tour. It is important to note what has changed since the last road tour or inspection. The appearance of the driving surface becomes obvious while driving a road, but look for unusual conditions and deterioration in general along with suspicious wear and tear—all of which may suggest a need for maintenance.

Have winter conditions caused issues or problems that need to be addressed? Are there concerns about the relative condition of the overall right-of-way and ditch area such as tree windfalls, debris or discarded garbage, or even hay bales that were not picked up in the fall? These concerns may pose a liability risk in the event of an accident involving an errant vehicle or they may restrict lawful uses of the right-of-way as well as impact water quality. Have winter snowplowing and late fall or early spring rainfalls caused excess material to wash into ditches resulting in sediment buildup, thereby causing potential drainage issues? Is ditch cleaning necessary as a result?

Observing the condition of the various appurtenances that may exist within the right-of-way is an important aspect of a road tour. It is easy to concentrate on the driving surface and the immediate area while often unintentionally ignoring culverts, signs, public utilities, etc. It is important to know that culverts are in good functioning condition; note any damage such as crushed ends, particularly at driveways and other entrances caused by vehicle runoffs or private snowplowing. And, make note of culvert end conditions regarding scour and erosion—is end treatment appropriate such as rip-rap or aprons?

Traffic signs have been installed for good reasons and contribute to the overall safety of a road. They need to be maintained in a proper manner. Leaning or twisted sign installations resulting from snowplowing and excessive winds may no longer be visible, rendering them ineffective in providing road users with the information intended. The failure to properly maintain traffic signs once installed can become a serious liability risk.

Public utilities that exist above ground should be noted in terms of any conditions that may contribute to a public nuisance or particularly to a hazard or safety concern. Such conditions might be exposed cables due to erosion, open or uncovered electrical or other cable junction boxes, sagging overhead wires, sagging support/anchor-age devices, or leaning poles—if it looks unusual, report it to the appropriate utility company. Similarly, if mailbox supports have become unsightly or damaged over winter due to no negligence of the [agency], there should be an effort to encourage owners to repair or install acceptable mail box supports, especially if existing ones represent a safety concern or roadside hazard.

What do we do with the information collected once a road tour is conducted? It is reasonable to make a record of the tour: date, time, who participated in the “drive-about,” roads inspected, and what was observed. The information acquired can be useful in planning maintenance activities for the summer along with other road activities...

Subsequently, whatever may be planned should recognize the urgency to address immediate liability risks and safety issues that can be resolved with routine maintenance activities performed by your maintenance (employee) or regular contractor. Major and more costly maintenance activities can be planned consistent with overall goals and funding availability. Having a record of inspecting your roads and having a plan of action can be very helpful in explaining matters to your constituents as well as defending against a potential legal claim.

A follow-up tour in the fall allows for the “inspection” of maintenance work accomplished during the summer and to note work needed prior to winter and/or desired in the future. It is good to know your roads! LTAP

—Duane A. Blanck, P.E., former Crow Wing County Engineer

(Adapted with permission from the Minnesota Association of Townships’ Minnesota Township Insider, spring 2016)

New technology for back-up alarms

If annoyance level is an indication, backup beepers may be one of the most harmful noises. One alternative technology to the traditional backup beeper is the broadband beeper. This type of device has the same cadence as the conventional beeper but broadcasts a “white-noise” whooshing sound. An article in Colorado LTAP’s summer/fall 2016 newsletter discusses the technology.

Technologies that could mitigate problems from backup beepers have existed for over two decades. Non-reversing, the conventional single-tone backup alarm still dominates road construction and maintenance sites.

Advances in technology mean there are alternatives. One is the BBS-Tek® White Noise Reversing Alarm manufactured by Brigade Electronics. In contrast to the beeping sound of the old fashion high-pitched pure tone alarm, the BBS-Tek® back-up alarm uses broadband sound, also known as “white sound.” Because broadband sound dissipates at twice the rate of a pure tone sound, it doesn’t cause noise nuisance to neighboring residents or other workers on site.

The white noise reversing alarm is also considered safer because unlike conventional alarms whose noise can be heard all around the work site, broadband is localized. This means the sound is directed only into the hazard zone and not everywhere else, which increases response to the alarm and diminishes the chance of it being ignored. In a busy working or urban environment, anyone in the danger zone can recognize that the sound is coming directly from the reversing vehicle nearby.

White noise reversing alarms have been approved for use in construction vehicles in all areas of New York City and were implemented on the equipment at the Town of Snowmass Village, Colorado. LTAP

(Adapted with permission from Colorado LTAP)
Through round four of Every Day Counts (EDC-4), the Federal Highway Administration (FHWA) is promoting e-Construction to help deliver transportation improvements smarter and faster. e-Construction is the creation, review, approval, distribution, and storage of highway construction documents in a paperless environment. These paperless processes include electronic submission of all documentation by all stakeholders, electronic document routing and approval (e-signature and workflows), and real-time management of all documents in a secure digital environment accessible to all stakeholders through mobile devices and web-based platforms.

The documented seven-year e-Construction return on investment for construction management, project collaboration, mobile devices, and electronic bidding tools ranges from 200 to more than 700 percent. e-Construction time savings have averaged 1.78 hours per day, per inspector, and inspectors have collected up to 2.75 times more data. In addition, cost savings have been reported at about $40,000 per construction project, per year. All of this adds up to improved efficiencies in the highway construction program.

EDC-3 promoted e-Construction as an effective way to transfer and use electronic documents in construction, and it has been successfully demonstrated using various tools and technologies in states nationwide. EDC-4 will continue to provide the core knowledge, support, and impetus for stakeholders to venture into and mainstream e-Construction while highlighting the tools needed for successful implementation.

EDM benefits identified included increased efficiency in sharing data, the opportunity for nearly instant project approval, and eliminating thousands of printed pages. In Connecticut, using mobile devices has allowed project inspectors to access the construction reporting system and other resources in the field, reducing travel time and increasing productivity. The Connecticut DOT implemented the use of electronic signatures on internal documents, reducing transit time and eliminating thousands of printed pages. The agency piloted the use of digital signatures externally on construction orders signed by the project engineer, supervising engineer, and contractor, cutting a 20- to 30-day approval process to three to five days.

Guidelines help local agencies modernize documents

A recent project sponsored by the Minnesota Local Road Research Board and MnDOT developed guidelines to help local agencies incorporate 3-D modeling and electronic document management (EDM) into their design, bidding, and construction processes.

The project captured best practices for producing and delivering road construction plans and documentation from several Minnesota cities and counties, industry, and several other state departments of transportation (DOTs).

The project evaluated which options might be beneficial and feasible for local agencies in Minnesota and how those options might be implemented. “Our ultimate goal is to go from a paper workflow to an electronic workflow,” says Lyndon Robjent, public works director of Carver County and a member of Minnesota LTAP’s steering committee.

“We have to look years ahead to address the challenges involved in this, but the potential benefits justify a long-term commitment.”

The project identified four benefits of 3-D modeling: the ability to store all project information in a single file, increased efficiency, better visualization and communication, and better long-term decision making. Challenges identified included the difficulty of introducing new procedures, the cost of the technology and its steep learning curve, and potential liability.

EDM benefits identified included increased efficiency in sharing data, the opportunity for nearly real-time collaboration, the ability to track design changes, and the ability to electronically archive documents. Challenges again included the cost and learning curve of EDM systems, as well as concerns about security and software updates.

The final report includes recommended procedures for successful implementation. Both technologies require software investments that need to be thoroughly researched, and both call for training and the development of policies to guide their use. In addition, implementation will require extensive collaboration among agency staff, contractors, and consultants.

More resources:

- Final report: Modernizing Road Construction Plans and Documentation (LRRB and MnDOT, Sept. 2016, 2016-29)
- FHWA 3D Engineering Models web page: fhwa.dot.gov/construction/3d/resources.cfm

A single 3-D model can provide all the details that contractors may need to bid on a project. This can reduce paperwork, requests for information, and construction changes.
**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.

### Recycled Materials in Unbound Aggregate Base Layers in Minnesota (LRRB and MnDOT TRS 1604, Sept. 2016)
Provides information to local agency pave- ment engineers to encourage the use of recycled materials where appropriate and to promote realistic expectations of differences in construction and long-term performance.

### Development of a MnDOT Foundation Bor- ing Mobile Application Gateway, GeoApp (MN/RC 2016-26, Aug. 2016)
Describes custom app for use on “smart devices”—phones and tablets on iOS and Android platforms—that will allow users to easily access MnDOT geotechnical asset information in the field.

### Investigation of Shear Distribution Factors in Prestressed Concrete Girder Bridges (MNR/RC 2016-32, Sept. 2016)
Investigates the accuracy of existing shear distribution factors, which are used to estimate bridge system live load effects on individual girders and provide recommen- dations on shear distribution to be used in Minnesota.

### Small Town and Rural Multimodal Net- works (FHWA HEP-17-024, Dec. 2016)
Translates existing street design guidance and best practices for bicycle and pedestrian safety and comfort to the rural context and provides examples of how to interpret and apply these design practices to create safe, accessible, and comfortable multimodal networks.

### Risk Factor Identification (Center for Trans- portation Research and Education, Institute for Transportation, Iowa State University, Dec. 2016)
Identifies risk factors for traffic crashes on two facility types in Iowa: intersections and horizontal curves.

### Improving the Effectiveness of Smart Work Zone Technologies (Illinois Center for Trans- portation, FHWA-ICT-16-021, Nov. 2016)
Evaluates the effectiveness of sensor network systems for work zone traffic estimation.

Determines critical pavement design thresh- olds and approximate ranges of maximum thicknesses for flexible pavements in an effort to improve the cost-effectiveness of long-life asphalt pavements.

### Guide to the Prevention and Restoration of Early Joint Deterioration in Concrete Pave- ments (National Concrete Pavement Technol- ogy Center, Iowa State University, Dec. 2016)
Discusses strategies for preventing or limiting premature joint deterioration due to salt reactivity and joint saturation.

### Economic Impact of Multi-Span, Pre- stressed Concrete Girder Bridges Designed as Simple Span versus Continuous Span (Bridge Engineering Center, Iowa State Univer- sity, Oct. 2016)
Compares the economic impact of designing pre-tensioned prestressed concrete beam bridges utilizing the continuity developed in the bridge deck versus the Iowa Department of Transportation’s method of utilizing stan- dardized spans treated as simply supported.

### Evaluation of Portland Cement Concrete with Internal Curing Capabilities (Louisiana Transportation Research Center, Final Report 369, Sept. 2016)
Evaluates several curing methods for Port- land cement concrete.

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**Webinar offers tools, techniques for succession planning**

Your organization’s future depends on its ability to identify, retain, and prepare future leaders. This was the message of a webinar held last year by the Upper Great Plains Transportation Institute at North Dakota State University.

One of the speakers was Patrick Ibarra, a former city manager and HR director who owns and oper- ates an organizational effectiveness consulting practice, The Mejorando Group. He presented tools, techniques, and tips to allow viewers to begin suc- cession planning efforts immediately.

Ibarra first defined succession planning: It “ensures the continued effective performance of your organization by establishing a process to identify, select, and manage talent to build bench strength.”

Ideally, agencies should try to link their growth and development resources with those employees who take initiative. “Succession planning isn’t for everybody, and it’s not just about getting promoted,” he said. “As you build your workforce, think about what happens if your employees aren’t learning and they stay.”

Ibarra outlined a process for succession planning:

- **Identify potential:** Just because employees are high performers, it doesn’t mean they have high potential. “Some hit their ceilings soon in their career,” he said.
- **Assess readiness via performance and assess- ments:** The appraisal process is important in suc- cession planning. If employees aren’t receiv- ing timely feedback, they don’t have a good idea of their current capabilities or what to do to learn and grow.
- **Determine strategies to close gaps:** Determine any gaps between the workforce you have and the workforce you need. Look at what’s on the horizon in the next several years.
  - Provide opportunities for employees to pur- sue career paths and express career inter- ests: “Younger people don’t see a clear career ladder—it’s more of career lattice,” he said. “Millenials are more comfortable having a job portfolio than a job title. We advise investing more time in career services and mentoring.”
  - Evaluate succession planning efforts immediately.

Ibarra then led webinar participants through a series of interactive exercises to help them begin their succession planning. Accompanying materi- als—including an organization self-assessment and a workforce development survey—are on the webi- nar web page.

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**LTAP website goes mobile!**

- The site now adapts to fit on desktops, smartphones, and tablets.
  - It has a modern and clean look.
  - It has streamlined and easy-to-use navigation.
  - And it has the same engaging and useful content!

**Puzzle answers:** Culvert, ditch, pole, shoulder, sign

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**LTAP website features cus- tom search engines to help you find infor- mation. You can search:**

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

**Bookmark** mntap.umn.edu /publications/library.

**Other great resources are:**

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

**MORE RESOURCES:**

- Upper Great Plains Transportation Institute webinar, June 9, 2016: ugpТИ.org/resources /proceedings/view.php?id=32
- Mejorando Group: gettingbetterallthetime .com

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  - April 26–27, Minneapolis

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**Second Annual National Road Research Alliance Conference**
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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 mnltap.umn.edu/roadsscholar.

LTAP workshops
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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 elective credit. For more information or to schedule classes, call the CTAP instructor, Kathy Schaefer, at 651-366-3575, or e-mail Kathleen.Schaefer@state.mn.us.

**Road trip!**
Spring’s a good time to inspect your roadways (see page 5). Can you find the five roadway elements hidden in the puzzle? Answers are on page 7. LTAP

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**Video from page 1**
To catch a mouse
To get your creative juices flowing for the Build a Better Mousetrap competition (see page 1), here’s a rodent-related puzzle.

A mouse is helping a local agency with its spring road tour. Before heading back to its nest, the mouse needs to inspect a road sign and then file a report—without backing up into the paws of the cat close behind. LTAP