INSIDE:

PROJECT MANAGEMENT
Bidding and project management ....2

LRBB UPDATE
OPERA project: Vinyl paint wrap .....3
Rumble strips ......................................... 3
Aggregate rejuvenation ............................ 3

TRUCK WEIGHT
Truck-weight education .........................4
Portable weigh-in-motion system ....5

ROADS SCHOLARS GRADS
Class of 2014 .............................................. 6

INFORMATION SERVICES
The Shelf & search tools........................ 7
Fish-friendly culverts ..............................7
Roadside swales .......................................7

WORKSHOPS AND TRAINING
Calendar ......................................................8
Underground utility inspection...........8
Summer crossword fun ........................8

Overweight or not? Truck-Weight Education Program has the answers

In recent years, legislative changes have increased allowable truck weights for some industries and for some vehicle configurations, complicating an already complicated and technical area of law. The Minnesota Truck-Weight Education Program deciphers these laws and explains the configurations in easy-to-understand language. Free classes statewide teach attendees how to haul larger—but legal—weights. The program is funded by the Minnesota Department of Transportation in cooperation with Alexandria Technical and Community College and Minnesota LTAP. Greg A. Hayes, the

Salt-tolerant seed, sod recommended for road sides

For Minnesota’s roadside grasses, life isn’t easy. To survive, grass must be able to withstand extreme stresses including drought, heat, disease, soil compaction, poor quality soils, and high levels of road salt. Ideally, it could survive all that while still looking lush and green. Quality roadside vegetation is also important for preventing erosion and maintaining water quality from roadside runoff.

What are the best seed mixes for grasses along road sides? A multi-year research study aimed to find out. The final report, now online, recommends fine fescues—not Kentucky bluegrass. The effort started back in 2010, when the Minnesota Department of Transportation (MnDOT) noticed a number of its new sod and seed plantings were failing and asked University of Minnesota experts to take a look at its specification. “We saw the problem immediately,” says Eric Watkins, associate professor with the Department of Horticultural Science. “The specification was for a mix with a lot of Kentucky bluegrass, which needs a great deal of care and watering. There was clearly an opportunity for improvement.”

LED technology is shining bright in more municipal roadways

Street lighting enhances public safety and security and improves the aesthetic appeal of the surrounding area. Lighting costs, however, can account for a sizable chunk of a city’s total energy expense. As energy-efficient light-emitting diode (LED) technology has rapidly advanced and improved over the past few years, its use in municipal lighting applications has increased exponentially.

Osseo, Minnesota, was one of the first cities in the state to move to LEDs in 2008. When an existing high-pressure sodium lamp system reached the end of its economic life, the city chose LED over metal halide or another high-pressure sodium system, said Mark Ziemer, senior electrical engineer with Barr Engineering. Ziemer was one of several speakers in an LED lighting session at the City Engineers Association of Minnesota annual meeting in January.
Bidding and project management technologies are increasing city engineering efficiency

Technology innovations are occurring at an astonishing pace and drastically changing the tools city engineers use to do their jobs. One example is the shift to online digital bid management and distribution systems.

These software tools, such as those from QuestCDN, now automate the entire construction project bidding process from advertising and bid opening through receiving proposals and announcing the award. Bill Pinnegar explained, "The City of Coon Rapids, Minnesota, was the first [municipal] engineering group to implement digital distribution and management of plans and specs back in 2006... today, nearly everybody is doing it."

Pinnegar, president of QuestCDN (Construction Data Network), spoke in a session at the City Engineers Association of Minnesota annual conference in January.

Bid management software provides the ability to quickly and securely communicate critical project information, including last-minute addenda and other changes. In addition, bidders always have access to the most current plans and specifications and can easily search the project database to quickly find multiple projects on which they may want to bid.

While these digital tools have not reinvented the bidding process itself, they have reduced many of the challenges and difficulties of a previously labor-intensive operation. "Prior to 2003, the bid process consisted of 24 separate steps and relied heavily on office staff who already had a full-time job," Pinnegar explained. "Today, the more automated process is cut down to five steps."

Paperwork and associated administrative costs have fallen, as has the need for repeated rounds of data entry.

Bid management products also facilitate online bidding, allowing bidders to securely build and accept bids electronically. In addition, online bidding helps minimize human error, and bidders cannot submit bids with missing information. "You get the best possible proposals because more bids are acceptable," Pinnegar said.

One of the main benefits of digital bid management technology is that all bid-related information exists in the cloud, he added. Cloud computing involves using groups of remote servers and software networks to create centralized data storage and online access to computer resources. "We are simply a service that you and your bidders use. There is no software to buy, install, or support," Pinnegar said.

Other types of process automation technology are also gaining popularity with city engineers. These systems can be especially helpful to manage the growing volume of information needed to support engineering projects.

Getting at the right information is already challenging for many departments. According to the independent research firm International Data Corporation (IDC), employees spend 15 to 25 percent of their time retrieving or recreating information needed to do their work. "This means 15 to 25 percent of your annual budget is wasted just looking for information," said Tom Girtz, owner of RVision, Inc.

RVision’s software solutions provide a seamless, automated information flow among various construction-related processes, including project monitoring, maintenance, land, permit, and time management. "All project information is housed in a central, secure online database with the flexibility to share information in the office or while in the field via GPS-enabled cell phones or tablets," Girtz explained.

RVision’s web database is very different from the spreadsheet programs many offices may already have, he pointed out. "Spreadsheets were not intended to be used as databases. Accurately maintaining a massive spreadsheet with thousands of entries is very difficult," he said. Updates to formulas, summary ranges, or macros may lead to mistakes in the spreadsheet data, but with a database, when information is added, modified, removed, filtered, or queried, the existing record is unaffected. "When you have complex data that needs some logic behind it, a database is the better option... it is like a vault...you cannot accidentally alter the information."

A web database also goes a long way to safely retaining knowledge acquired from veteran employees even after they leave, he added. "This information will gain even more value when you build it and use it as a training tool for new hires."


—Nancy Streege, LTAP freelance writer
OPERA spotlight: Vinyl wrap for paint truck

Project leader: Dave Tucker
Agency: Sherburne County Public Works

Problem: The Sherburne County paint crew is always given the worst truck of the fleet since it is likely to get paint on it during painting operations. The crew also spends a significant amount of time cleaning up the equipment at the end of the painting season.

Solution: The county installed a vinyl wrap on the box and tailgate of a pickup truck. This allowed the paint crew to have access to a newer truck with better strobes and an extended cab. The goal of the wrap is to extend the life and value of the paint truck.

Procedure: The paint truck was dropped off at Trent Signs & Graphics for the design and installation of the vinyl wrap. Prior to installation, the county approved a computer-generated picture of the truck with the vinyl wrap.

Results: In this project, the county took a product that is readily available and used it in a different way. Wrapping the paint truck with a vinyl wrap helped keep the truck protected from permanent stains caused by accidental spills or drips during the painting season. At the end of the season, the county was able to remove the wrap and still have a functional, undamaged truck to use for other purposes.

Approximate cost: $900
OPERA funding: $900
Implementation: The installation of the vinyl wrap on the paint truck spurred other implementation ideas for the county. For example, a similar wrap could be applied to parts of the crack-filling tar kettle to aid in clean up. The wrap could also be used to protect portions of other equipment or trucks that tend to get a lot of paint chips.

Status: Complete LTAP

OPERA project fact sheets, along with the full project reports, are posted on the OPERA website as they are completed throughout the year. All are available at mnltap.umn.edu/opera.

Quieter rumble strips tested in Minnesota

In the search for a quieter rumble strip, Minnesota may have found a winner in California. California’s standard rumble strip design outperformed Minnesota’s and Pennsylvania’s in a comparison study along a rural highway near Crookston, Minnesota.

“California’s rumble strip still gave significant feedback to drivers, but it was significantly less noticeable to the vehicle," said engineering consultant Ed Terhaar, who performed a noise analysis with acoustical engineer David Braslau on behalf of the Minnesota Local Road Research Board (LRRB).

Although they serve as an effective warning to drivers, rumble strips can cause unwanted noise when a vehicle drifts over a centerline or edgeline. Both the LRRB and the Minnesota Department of Transportation, which is sponsoring a companion study, are interested in finding a new design that still captures the driver’s attention, but minimizes the sound heard by neighboring residents.

Terhaar and Braslau’s research showed that the Minnesota and California designs produce a similar level of interior noise. Although external decibel levels are not that different from each other either, Minnesota’s rumble strip has a considerably stronger tone that can be heard further away.

“California’s sound is less sharp, less intrusive, and less noticeable,” Braslau said. “Minnesota’s has a really sharp peak. So while the absolute sound level of California’s isn’t all that much lower, its perception is less.”

Testing was performed using three different vehicles—a passenger car, pickup truck, and semi-trailer truck—at three different speeds (30, 45, and 60 miles per hour). In general, Pennsylvania’s rumble strip had both a quieter interior and exterior sound than California’s and Minnesota’s.

Like Pennsylvania’s, California’s rumble strip has what is called a sinusoidal design—a continuous wave pattern that’s ground into the pavement (it’s the smooth, “Terhaar explained.

The final report (Rumble Strip Noise Evaluation, MnDOT 2015-07) and a technical summary (Wave-Shaped Rumble Strips Reduce Nuisance Noise, MnDOT 2015-07TS) are available at lrrb.org. The next step for researchers is to test variations of the California rumble strip design at MnROAD, MnDOT’s road research facility. LTAP

(Reprinted from Crossroads MnDOT/CTS blog post, March 16, 2015)

A California-style sinusoidal rumble strip

Blending fines into loose aggregate rejuvenates roads

Gravel roads can develop problems due to floating aggregate, an excess of large rocks left on the road surface when rainfall, vehicle traffic, or maintenance operations erode the fine particles binding the gravel together.

Local agencies have generally addressed the problem of floating aggregate by simply regrading a road with an appropriate mix of new gravel and silt or clay fines. However, some parts of Minnesota have limited sources of aggregate, and extracting and hauling it to the road site are becoming more expensive.

To help reduce costs, the LRRB sponsored a project to see whether mixing fines into existing aggregate on a road could be an alternative to regrading.

Test sections in Beltrami County provided significant cost savings over the control section. The section that received 83 tons of crusher dust cost $3,100 (36 percent) less than the aggregate control section, while the section that received only 50 tons of crusher dust saved $5,200 (61 percent).

The research suggests that the aggregate rejuvenation procedure will provide local agencies an option to save money while treating their gravel roads if a suitable binder is available and less expensive than locally available aggregate.

The final report (Aggregate Road Surface Rejuvenation, MnDOT 2015-04) and a technical summary (Blending Fines into Existing Loose Gravel: Costs Less Than Regrading, MnDOT 2015-04TS) are available at lrrb.org. LTAP

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck

Vinyl wrap for paint truck
TRUCK WEIGHT

Free classes start again in the fall!

Minnesota LTAP offers at least 15 classes each year. Class sizes are limited, and registration is required. Stay tuned for dates and locations:

- Truck-Weight Education Program: mnltap.umn.edu/training/topic/customized/truck-weight
- Minnesota Truck Education for Road Authority and Enforcement Staff: mnltap.umn.edu/training/topic/customized/truck-weight/enforcement

North Dakota truck-weight program is also a success

The North Dakota Truck-Weight Education and Outreach Program has been a huge success for the past two years, says Denise Brown, the North Dakota LTAP training coordinator.

The program was developed and adapted from the Greg Hayes original. The North Dakota DOT has provided funding for the training program, and the training sessions are free of charge and open to the public, Brown says.

NDLTAP has conducted 60 training sessions since the fall of 2013 for a total of approximately 675 attendees. The instructors are five retired or former Highway Patrol officers who have extensive knowledge in truck-weight compliance.

Participants include the construction and oil industries, equipment haulers, and agriculture producers, as well as officials and employees from local and state government. One attendee said this: “Excellent training program. I wish I would have had this information when I first started driving truck.”

For more information, visit ndltap.org or contact Denise Brown 701-328-9856, e-mail denise.brown.1@ndsu.edu. LTAP

Comments about the class

The Truck Weight Compliance program has been a huge benefit for us here at GNP Company. We have sent managers, supervisors, and the scheduler for the trucks. We encourage everyone to get through the program at least once. The first time, you get your feet wet, and by the time you go back for the second class, you are more involved and can start asking questions to benefit the organization that you work for. It has enabled us to work with the trailer manufacturer to make sure our equipment has the axle spacing for the load we are hauling.

—Gregg Pflipsen, Live Haul Manager, Golden Plump Poultry

[The class] has helped us design and adjust our trucks for ultimate payload as normal and during seasonal restrictions, thus preventing fines and equipment stress.

—Joe Foster, Knife River Trucking

All of our employees came away with an understanding of how to calculate weights to be legal, and we are happy to say that we have not had any overweight violations with our trucks since attending the class!

—Camille Nisius and Sherri Tatro, Trucking Division, R.D. Offutt Company

The biggest reason to continue these classes is to educate the farmers/truck owners of what they can legally haul with their truck. It has helped our roads by reducing the number of extremely overweight trucks on them. I would like to see that the class become mandatory for those ticketed for more than one overweight truck in a year.

—Rich Sanders, Polk County Engineer and LTAP Steering Committee Member

How have truck-weight laws changed?

Legislation has increased allowable truck weight if trucks are built and configured correctly. For example, legislation in 2008 increased allowable weight up to an additional 17,000 pounds gross weight for specified commodities if the trucks are configured according to new regulations.

Currently, some timber and unprocessed agricultural haulers are allowed increased weights. Industries that are excluded, such as gravel, aggregate, and construction, ask why: “How does the road know the difference between a load of grain and a load of gravel?” They feel they should also have the option of the additional gross weight if they use the same configurations.

The 2015 legislative session heard several bills to extend increased weights to other commodities. Only one bill—a ‘porta-potty’ weight exemption—passed. The bill allows haulers to service portable toilets up to 7-ton limits during spring load restrictions. I expect we’ll see further attempts at truck-weight changes in future legislative sessions.

What do the classes cover?

The training explains the laws governing gross weights, axle weights, tire weights, road-restriction weights, and seasonally increased (winter and harvest) weights, and the differences between the state and local transportation systems. Classroom projects start with the simplest truck and graduate to more complex configurations.

Who attends the training?

Attendees come from many types of organizations, such as trucking companies and truck manufacturers, township and county road authorities, scale operators, aggregate haulers, and law enforcement. More than 5,000 students have attended the training since 2001.

A few years ago officers attending the training needed material to meet their specific needs, so in 2010 we developed an additional version of the class formatted for law enforcement. The class focuses on statutes and additional material to help officers understand and correctly weigh trucks. Training includes field demonstrations to show the correct procedure to weigh a truck on portable scales and document results as evidence for a successful prosecution.

Recently, more and more local law enforcement officers have attended classes in response to requests from local road authorities who want regulations enforced on their roads.

Is customized training available?

Industries sometimes request customized training for their employees. Through Alexandria Tech, we’ve done this for scale operators in the aggregate industry, the agricultural industry, and the timber industry. Several county engineers have hosted classes for their area trucking industries. We’ve also offered classes to manufacturing companies so they can properly configure trucks to comply more easily with Minnesota laws. At times, manufacturers attend the class with their customers to learn how to properly configure their trucks to meet specific needs.

What other resources does the program provide?

Attendees are not left without resources when they complete the training. Truckers or companies can call us to verify the legality of truck configurations, for example, or ask about retrofitting axles or tires. There are also comprehensive resources on the web, such as class materials, sample truck-weight calculations, and a clickable, county-level state map for finding basic county-level truck weight information. LTAP

Tractor/Semitrailer

W/Quad group

Alexander Tech

This is an example of all the factors which need consideration in determining and configuring a

Size = 11 inches
Rating = 6800# each

Instructor Greg Hayes, a retired state patrol regional commercial vehicle supervisor, provides detailed materials for students. Hayes also drove truck in interstate commerce for six years.
Portable weigh-in-motion system provides low-cost screening

Heavy freight vehicles are a concern for many local agencies due to the damage they can cause to roads. Weigh-in-motion (WIM) systems can provide useful data about freight vehicles that use a given road, but current systems are expensive. They are also more difficult to install, requiring costly and intrusive pavement cuts or boring to install.

A University of Minnesota Duluth researcher developed a portable WIM system that can be installed with tape and anchors in less than 40 minutes and that costs significantly less than permanent WIM systems. The prototype’s portability gives agencies the flexibility to gather data at multiple locations without additional—and generally impractical—costs of purchasing a new system.

Researchers field-tested the portable WIM system in two phases. The first phase took place in 2013 at seven sites near existing automatic traffic recorders (ATRs) throughout the state. Data from those ATRs were used as a baseline to evaluate the WIM system’s accuracy. Between the first and second phases, researchers upgraded the system with significant software improvements.

The second phase, which took place in 2014, included three more sites near ATRs around the state as well as seven sites in Chisago County, which used road tubes to compare results.

Tools measure impact of heavy trucks

A tool developed by the LRRB helps cities and counties assess how much increased heavy vehicle traffic affects local roads. The analysis method and corresponding spreadsheet tool calculate the impact of heavy vehicles on asphalt roads beyond what was planned in the original pavement design.

Researchers also tested the use of several vehicles for calibrating the system, ranging from a half-ton pickup to a Class 10 truck with a loaded trailer. To determine if county-owned vehicles could be used for calibration runs, this step was important because while MnDOT has a designated test Class 9 truck weighted to 76,000 pounds and a driver who is skilled at maneuvering it to cross sensors at a consistent speed and location, that calibration vehicle will not always be available for local agencies.

In general, traffic volumes recorded by the portable WIM system were within 6 percent of ATR data. Speed accuracy was within 5 percent, and the WIM system’s vehicle classifications generally matched baseline data.

This system proved accurate enough for screening of low-volume roads to identify sites where overweight vehicles are likely to travel. The system can also provide improved data about vehicle class and weight that would be valuable for planning and pavement design, or to better understand the impacts of heavy freight vehicles on a particular road. MnDOT has two of these systems available for local agency use.

The final report (Portable Weigh-In-Motion System Evaluation, LRRB/MnDOT 2015-03) and a technical summary (Portable Weigh-In-Motion System Accurate Enough for Low-Cost Screening, LRRB/MnDOT 2015-03TS) are available at lrrb.org/ltap.

TRUCKS CARRY MORE THAN

63% of goods

moved in Minnesota
(by volume, 2012).

— MnDOT

Lighting

Although LED systems still cost more upfront than conventional lighting systems, prices keep coming down, Ziemer said. The cost premium per fixture for Osseo’s LED system was around $500, with a projected payback period of about six-and-a-half years. Today, the per fixture cost premium for that same system is down to about $300 with a four-year payback period.

Even with a higher initial cost, Osseo’s LED system saves the city nearly $10,000 a year in energy and maintenance costs. “We have achieved the recommended light levels using LED lamps, which last for a long time,” warned Ziemer.

LED lamps have a much longer life than other lighting systems and in most streetlighting applications can be expected to burn 100,000 hours or more. In streetlighting applications of approximately 4,000 hours per year, this translates to 25 years of service. LED life can be extended even further by using dimmers and other lighting controls.

“Heat dissipation is key to an LED’s long life—the cooler they run, the longer they last,” explained Ken Taillon, manager of municipal lighting services with Short Elliott Hendrickson Inc. “Dimmers reduce power to the bulb, which saves energy. LED bulbs run cooler when dimmed, which helps extend bulb life.”

LED fixtures also contain a programmable driver that, when paired with remote monitoring and control systems, can be set to automatically drop light output down to certain levels during off-peak times and bring the levels back up during peak times, or be programmed with customized schedules for unique events.

These remote systems, which communicate via a wired or wireless mesh network, enable real-time monitoring so problems can be quickly and accurately identified and fixed, Taillon said. These systems also can generate various reports with performance analysis and energy use information.

In 2014, the City of Mankato, Minnesota, embarked on a three-block reconstruction project in its central business district. Both property owners and public safety personnel had identified the need to increase the street light levels for additional safety and security to accommodate the high-volume of night traffic generated by the area’s many bars and restaurants. “We wanted a system that would operate at an average of 1.2 foot-candles, but we also wanted the ability to increase this level to more than 3.5 foot-candles during the restaurant and bar dismissal time,” said Landon Bode, associate civil engineer with the City of Mankato.

Along with new LED fixtures, the city installed the ROAM® (remote operation asset management) lighting control and monitoring system that provides the remote on/off control and other scheduling and dimming controls the city needed. This state-of-the-art system also has override capabilities that allow public safety officials to temporarily change the set lighting schedules as needed, such as in an emergency situation.

Because there are now so many companies offering LED products and making various performance claims, it can be difficult for customers to know what to believe, Taillon said. “There are people building LED systems in their garages, so there’s an affordability aspect to it,” he cautioned. “Just be careful and stick with the handful of big manufacturers who have been around for a long time.”


Portable weigh-in-motion system provides low-cost screening

Researchers also tested the use of several vehicles for calibrating the system, ranging from a half-ton pickup to a Class 10 truck with a loaded trailer, to determine if county-owned vehicles could be used for calibration runs. This step was important because while MnDOT has a designated test Class 9 truck weighted to 76,000 pounds and a driver who is skilled at maneuvering it to cross sensors at a consistent speed and location, that calibration vehicle will not always be available for local agencies.

In general, traffic volumes recorded by the portable WIM system were within 6 percent of ATR data, speed accuracy was within 5 percent, and the WIM system’s vehicle classifications generally matched baseline data.

This system proved accurate enough for screening of low-volume roads to identify sites where overweight vehicles are likely to travel. The system can also provide improved data about vehicle class and weight that would be valuable for planning and pavement design, or to better understand the impacts of heavy freight vehicles on a particular road. MnDOT has two of these systems available for local agency use.

The final report (Portable Weigh-In-Motion System Evaluation, LRRB/MnDOT 2015-03) and a technical summary (Portable Weigh-In-Motion System Accurate Enough for Low-Cost Screening, LRRB/MnDOT 2015-03TS) are available at lrrb.org/ltap.

TRUCKS CARRY MORE THAN

63% of goods

moved in Minnesota
(by volume, 2012).

— MnDOT

Lighting

Although LED systems still cost more upfront than conventional lighting systems, prices keep coming down, Ziemer said. The cost premium per fixture for Osseo’s LED system was around $500, with a projected payback period of about six-and-a-half years. Today, the per fixture cost premium for that same system is down to about $300 with a four-year payback period.

Even with a higher initial cost, Osseo’s LED system saves the city nearly $10,000 a year in energy and maintenance costs. “We have achieved the recommended light levels using LED lamps, which last for a long time,” warned Ziemer.

LED lamps have a much longer life than other lighting systems and in most streetlighting applications can be expected to burn 100,000 hours or more. In streetlighting applications of approximately 4,000 hours per year, this translates to 25 years of service. LED life can be extended even further by using dimmers and other lighting controls.

“Heat dissipation is key to an LED’s long life—the cooler they run, the longer they last,” explained Ken Taillon, manager of municipal lighting services with Short Elliott Hendrickson Inc. “Dimmers reduce power to the bulbs, which saves energy. LED bulbs run cooler when dimmed, which helps extend bulb life.”

LED fixtures also contain a programmable driver that, when paired with remote monitoring and control systems, can be set to automatically drop light output down to certain levels during off-peak times and bring the levels back up during peak times, or be programmed with customized schedules for unique events.

These remote systems, which communicate via a wired or wireless mesh network, enable real-time monitoring so problems can be quickly and accurately identified and fixed, Taillon said. These systems also can generate various reports with performance analysis and energy use information.

In 2014, the City of Mankato, Minnesota, embarked on a three-block reconstruction project in its central business district. Both property owners and public safety personnel had identified the need to increase the street light levels for additional safety and security to accommodate the high-volume of night traffic generated by the area’s many bars and restaurants. “We wanted a system that would operate at an average of 1.2 foot-candles, but we also wanted the ability to increase this level to more than 3.5 foot-candles during the restaurant and bar dismissal time,” said Landon Bode, associate civil engineer with the City of Mankato.

Along with new LED fixtures, the city installed the ROAM® (remote operation asset management) lighting control and monitoring system that provides the remote on/off control and other scheduling and dimming controls the city needed. This state-of-the-art system also has override capabilities that allow public safety officials to temporarily change the set lighting schedules as needed, such as in an emergency situation.

Because there are now so many companies offering LED products and making various performance claims, it can be difficult for customers to know what to believe, Taillon said. “There are people building LED systems in their garages, so there’s an affordability aspect to it,” he cautioned. “Just be careful and stick with the handful of big manufacturers who have been around for a long time.”


Portable weigh-in-motion system provides low-cost screening

Researchers also tested the use of several vehicles for calibrating the system, ranging from a half-ton pickup to a Class 10 truck with a loaded trailer, to determine if county-owned vehicles could be used for calibration runs. This step was important because while MnDOT has a designated test Class 9 truck weighted to 76,000 pounds and a driver who is skilled at maneuvering it to cross sensors at a consistent speed and location, that calibration vehicle will not always be available for local agencies.

In general, traffic volumes recorded by the portable WIM system were within 6 percent of ATR data, speed accuracy was within 5 percent, and the WIM system’s vehicle classifications generally matched baseline data.

This system proved accurate enough for screening of low-volume roads to identify sites where overweight vehicles are likely to travel. The system can also provide improved data about vehicle class and weight that would be valuable for planning and pavement design, or to better understand the impacts of heavy freight vehicles on a particular road. MnDOT has two of these systems available for local agency use.

The final report (Portable Weigh-In-Motion System Evaluation, LRRB/MnDOT 2015-03) and a technical summary (Portable Weigh-In-Motion System Accurate Enough for Low-Cost Screening, LRRB/MnDOT 2015-03TS) are available at lrrb.org/ltap.

TRUCKS CARRY MORE THAN

63% of goods

moved in Minnesota
(by volume, 2012).

— MnDOT
Demo Day draws a crowd!

The Minnesota Roadway Maintenance Training and Demo Day, an annual offering from Minnesota LTAP, was held this year in Rosemount on May 13.

In classroom sessions and outdoor demonstrations, more than 200 students learned about gravel road maintenance, cargo securement requirements, and much more.

The Minnesota Department of Transportation, the Minnesota Local Road Research Board, and the Federal Highway Administration, along with Minnesota LTAP, sponsored the training in partnership with the Minnesota Chapter of the American Public Works Association and the Minnesota Street Superintendents Association. LTAP

The latest graduates of the Roads Scholar program received a certificate of achievement during a ceremony at the 2015 Minnesota Roadway Maintenance Training and Demo Day in Rosemount. “Congratulations to this year’s Roads Scholar graduates,” said Jim Grothaus, Minnesota LTAP’s director. “Their dedication to road safety and maintenance through engagement in this program is inspiring. This experience will not only help them improve in their jobs on a personal level, it will also give way for further improvements to be made in communities statewide.”

Comments from some of our new Roads Scholars:

“From supervising, to performing street maintenance and maintaining gravel roads, the training that was provided will be used daily, and it will also be handed down to the other workers in the departments within the city.”
— Tony Johnson

“The courses were geared to your everyday needs. You could take home what you were taught and put it to use the next day as part of how you did business.”
— Pete Shutrop

“It will help me look at different options of doing jobs and how to use the new and current methods that have worked for other agencies.”
— Peter Tholen

“The instructors were current with information, and described in detail the different applications for specific needs.”
— Troy Walsh

The Roads Scholar Program

The Roads Scholar Program combines a range of training options into a structured curriculum. To become a Roads Scholar, participants must earn eight credits within five years from a combination of required and elective courses. Training options include LTAP workshops, Circuit Training and Assistance Program workshops, and other events. For more information, contact Mindy Carlson, Minnesota LTAP program manager, at 612-625-1813, mnltap@umn.edu, or visit mnltap.umn.edu/RoadsScholar.

The latest graduates of the Roads Scholar program received a certificate of achievement during a ceremony at the 2015 Minnesota Roadway Maintenance Training and Demo Day in Rosemount. “Congratulations to this year’s Roads Scholar graduates,” said Jim Grothaus, Minnesota LTAP’s director. “Their dedication to road safety and maintenance through engagement in this program is inspiring. This experience will not only help them improve in their jobs on a personal level, it will also give way for further improvements to be made in communities statewide.”

Comments from some of our new Roads Scholars:

“From supervising, to performing street maintenance and maintaining gravel roads, the training that was provided will be used daily, and it will also be handed down to the other workers in the departments within the city.”
— Tony Johnson

“The courses were geared to your everyday needs. You could take home what you were taught and put it to use the next day as part of how you did business.”
— Pete Shutrop

“It will help me look at different options of doing jobs and how to use the new and current methods that have worked for other agencies.”
— Peter Tholen

“The instructors were current with information, and described in detail the different applications for specific needs.”
— Troy Walsh

The Roads Scholar Program combines a range of training options into a structured curriculum. To become a Roads Scholar, participants must earn eight credits within five years from a combination of required and elective courses. Training options include LTAP workshops, Circuit Training and Assistance Program workshops, and other events. For more information, contact Mindy Carlson, Minnesota LTAP program manager, at 612-625-1813, mnltap@umn.edu, or visit mnltap.umn.edu/RoadsScholar.
Installing culverts is a necessary part of most transportation projects, allowing water to pass under roads and other transportation infrastructure. However, when culverts create obstacles for fish and other aquatic life, the consequences can be serious. “Culverts can create barriers in a stream network that fragment aquatic organism populations,” says Jessica Kozarek, a research associate at the University of Minnesota’s St. Anthony Falls Laboratory (SAFL). “This leaves fish vulnerable to dying off by chance events and can lead to a longer-term loss of genetic diversity.”

To allow fish to pass through culverts, many are installed slightly below streambed level. The expectation is that sediment from the stream will be carried into the culvert, creating a consistent streambed. But does this strategy actually work? A new study from SAFL researchers reveals that it may not always achieve the desired results—and outlines new strategies for making culverts more fish-friendly.

To determine whether setting a culvert below the streambed was enough to make aquatic organisms pass through a culvert, researchers created several model streams in their laboratory that represented Minnesota streams with three different gradients, or slopes. Using these models, they tested the effectiveness of two installation methods: one in which the

Swales prevent water pollution near road-sides

In an LRRB-sponsored study, researchers developed methods and guidelines for assessing and improving the pollution prevention of roadside swales (low-lying tracts of land or ditches). Vegetated roadside swales remove water during rainfall events, infiltrate water into the soil, and filter the solids and associated pollutants from the water. The research team combined the best available knowledge on swale maintenance with information collected from new surveys to develop recommendations for swale maintenance schedules and effort. The research also provides information that can be used to gain pollution-prevention credits for these systems.

The final report—Assessing and Improving Pollution Prevention by Swales (MnDOT 2014-30)—is available at lrrb.org. LTAP

Concrete Pavement Mixture Design and Analysis: Development and Evaluation of Vibrating Kelly Ball Test for the Workability of Concrete (National Concrete Pavement Technology Center, March 2015)

This report describes a test method that assesses the responsiveness of a dry concrete mixture to vibration. LTAP

Culverts are more fish-friendly using new strategies

culvert was placed below the streambed but not filled with sediment and another in which the culvert was pre-filled with sediment.

“We found that pre-filling the culvert with sediment that replicates the streambed as part of the installation process helped prevent upstream erosion and the development of vertical drops that can become barriers to aquatic movement,” Kozarek says. “In addition, pre-filling the culvert helped ensure that the sediment remained inside the culvert when flows were high and when water moved quickly during rainstorms.” For streams with steep slopes, researchers also found that adding structures such as steps, boulders, and riffles was critical to the stability of the sediment within the culvert. An experiment that used these structures inside the culvert showed that they helped stabilize the streambed upstream of the culvert.

Based on these experiments, the researchers developed design recommendations for embedded culverts where maintaining a natural streambed is necessary to preserve fish and other aquatic organism passage is a design goal. These recommendations include making the culvert as wide as the width of the stream when water levels are highest, analyzing each installation site to predict sediment movement into the culvert, pre-filling the culvert with sediment that matches the sediment in the existing streambed, and installing structures within the culvert for streams with steeper slopes to maintain sediment stability and provide resting places for fish traveling upstream.

Moving forward, MnDOT will be using these recommendations when designing culverts in environmentally sensitive areas, says Petronella DeWall, MnDOT bridge waterway engineer.

The final report—Sediment Transport through Recessed Culverts: Laboratory Experiments (MnDOT 2015-08)—is available at lrrb.org. LTAP

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

Visit lrrb.org or email lrrb.org

Other great resources are:

• LRIB’s site: lrrib.org
• MnDOT’s LTAP Library's catalog: dot.state.mn.us/library. LTAP

Congruently, The Shelf provides information services.
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.

WORKSHOPS & TRAINING

Underground Utilities Construction Inspectors School offered in Bloomington and St. Cloud
The Underground Utilities Construction Inspector School (UUCIS) provides practical information to enable people with underground utility inspection responsibilities to expertly and confidently do their jobs. It’s offered by the American Public Works Association–Minnesota Chapter.
This year the school will be held at the City of Bloomington’s Public Works Facility, and a web-based UUCIS version will be offered in St. Cloud at a reduced cost.
Eight monthly sessions are scheduled between October 2015 and May 2016, starting again in fall.

Find the hidden answer...and win an online course registration!
It’s summer: time to catch a ballgame or 40 winks at the cabin. When you finish our summer puzzle, the letters in the shaded boxes, moving from top to bottom, will spell out something else many Minnesotans like to catch in the summer. Puzzle answers are available in articles from this issue and from our online courses. E-mail the answer to us at mnltap@umn.edu. By August 30, 2015. We’ll hold a drawing to pick up to five lucky winners of a free registration for one of our online courses—up to a $75 value! The winners and the answers will be posted in September. LTAP

A Summertime Catch

Across
1. Sherburne County installed a vinyl one on a paint truck.
2. These are in some gravel roads ... and potato chips.
3. Light-emitting_____(LED) lamps use less energy.
4. Inadequate culvert design may cause this.
5. New designs make culverts more fish-______.
6. An intelligent and well-educated person
7. The matter that settles to the bottom of a liquid
8. Compliance with this sign is below 20%.
9. A software tool with forumulas and tabs
10. You can submit this online ... or on bended knee.
11. The legislature passed a “porta-______” weight exemption in its 2015 session.
12. Legal truck loads don’t exceed axle ____ limits.
13. Fine fescue is a recommended seed mix for this.

Down
2. These are in some gravel roads ... and potato chips.
4. Inadequate culvert design may cause this.
5. New designs make culverts more fish-______.
7. The matter that settles to the bottom of a liquid
8. Compliance with this sign is below 20%.
10. You can submit this online ... or on bended knee.
11. The legislature passed a “porta-______” weight exemption in its 2015 session.
13. Nickname for a road safety feature ... or a street fight