Mayo Clinic: safer sidewalks, less salt

The Mayo Clinic in Rochester is a big place, especially for winter maintenance crews. Around 65,000 people visit the campus every day, with foot traffic 24 hours a day, seven days a week. The campus has 15 miles of sidewalk, 120 acres of parking lot, and 300 doorways, all of it in need of snow removal in the winter. Heavy salting has traditionally been the tool

Mayo continued on page 4
National Mousetrap award: portable manhole

Each year the Exchange honors the recipients of Minnesota’s Build a Better Mousetrap competition and shares highlights of their work. Starting in this Exchange, we’ll also publish some award-winning innovations from the National LTAP Mousetrap competition. First up: a portable manhole for training.

The highway department of Beacon, New York, recently developed a new way to encourage employees to think outside the box, or in this case, the manhole.

There are hundreds of thousands of manholes in municipal streets across the country. They are portals to many vital city systems, and maintenance crews must be able to navigate them safely because these types of confined spaces present serious dangers not found in normal work areas.

To provide safer, more flexible training to its maintenance workers, the department created an innovative way to conduct confined space training that reduces travel and downtime. It involves the invention of a portable manhole that can be used indoors, eliminating the unpredictability of Mother Nature.

“When we used to go on site to one of our confined spaces, that’s outdoors,” said Working Supervisor Reuben Simmons. “Having something that is built and can be used indoors makes scheduling the training so much easier. In the past, if we tried to schedule the training and it turned out to be a bad weather day, it would require us to reschedule, which affected a lot of people and their time.”

The city’s highway superintendent, fire inspector, and maintenance mechanic came up with the idea to build a mobile structure that is a mock-up of a complete confined space manhole. In addition to avoiding inclement weather, the system also provides safer training for larger groups in one session, which reduces lost time traveling to various training sites.

A tripod is set up over the simulator, and an employee strapped in a harness is hooked up to the tripod. A small meter is dropped in to ensure there are no odorless gases and it is safe for entry. Additionally, the team developed a confined space checklist to review all hazards and procedures for the trainees to use during the training.

Maintenance mechanic Dave Wayne is a carpenter by trade and built the structure in just five days. “We don’t have the room to store it, so it had to be portable,” he said. “We take it apart and put it back together several times a year because people [from other agencies] like the City of Newburgh and the fire department borrow it from us.” Wayne also added a window to the simulator to accommodate firefighter “bailout” training.

Materials cost about $1,500, and the team is already thinking of improvements. “If I had to do it over again, I’d make it out of aluminum, because wood is a little heavy, especially the staircase,” Wayne said. More than 100 people use the simulator annually across multiple agencies.

“Ironically, more people from other agencies have used this than people from our highway department,” Simmons said. “We’re really excited about the difference we’ve been able to make in our community. We’re saving lives, time, and money.”

(Reprinted from fwha.dot.gov/clas/ltap.)

Submit your ideas for the 2020 Mousetrap competition!

To enter Minnesota’s 2020 Mousetrap competition, submit an entry form by May 31. You’re also encouraged (but not required) to submit photos and short video clips showcasing your project along with your entry form. For more information, please contact Katherine Stanley at sell0146@umn.edu or 612-626-1023.

Steering committee chair leaves record of efficiency, streamlining

Mitch Rasmussen brought a passion for helping local agencies to his role as assistant commissioner of MnDOT’s State Aid Division and chair of the Minnesota LTAP Steering Committee. He left those positions earlier this year and is now a principal in the Minneapolis office of SRF Consulting Group, Inc. Below, he looks back at accomplishments and offers thoughts for the future.

What are some highlights from your time at State Aid?

Just being there was a highlight—it was a great job. The best part was the people I got to work with. The culture is so good—people are 100 percent dedicated to their job. The best part was the people I got to work with. The culture is so good—people are 100 percent dedicated to their job.

One policy accomplishment happened after we received a legislative mandate to align State Aid standards with MnDOT standards. It had the potential to be extremely controversial. People want their specific needs met, and balancing different interests was challenging. Cities, counties, and bike and pedestrian stakeholders, for example, had different interests. We ended up with aligned standards that gave local engineers more flexibility to use good engineering judgment in designs.

Another significant accomplishment was an overhaul of the cooperative agreement program. When local agencies made improvements that touched the trunk highway system and the local agency was the lead, they went through the same rigorous process required for any other trunk highway project, even though these State Aid projects were relatively simple. We were able to streamline the process so that a project that may have taken three years to deliver now takes perhaps a year or less. This is a significant improvement for local agencies.

Rasmussen continued on page 3

LTAP Steering Committee welcomes new chair and members

Kristine Elwood is the new LTAP Steering Committee chair. She is assistant commissioner of MnDOT State Aid and the Statewide Radio Communications Division.

New committee members are Jon Lennard, Rick Shomion, and Katie Walker.

Lennard, Fridley’s assistant city engineer, represents the City Engineers Association of Minnesota. He succeeds Steve Lillegaard of Brooklyn Center.

Shomion is a maintenance training coordinator with the MnDOT Office of Maintenance. He succeeds Tom Peters on the committee.

Walker is the director of MnDOT’s Office of Research & Innovation. She succeeds Linda Taylor, who retired.

We thank our new members for joining and our former members for their service!
**LRRB SPOTLIGHT**

**OPERAscape project: Temporary roadside turf irrigation system**

Irrigating newly planted grass seed in roadside areas disturbed by construction is a common challenge for many local agencies. To address the problem, the City of Edina Engineering Department developed a temporary roadside turf irrigation system.

The City of Edina received a $5,900 grant through the LRRB’s Operational Research Assistance (OPERA) Program for the project team to develop and test the temporary roadside turf irrigation system. The team designed the system with parts readily available at most hardware retailers for less than $200.

The City of Edina tested the system along a portion of the roadside of a smaller city road and utilities reconstruction project. Turf establishment was monitored and compared to the traditional method of irrigating with a water truck on the remaining portions of the project. The contractor was directed to water the turf areas per the specifications but to not water the temporary irrigation area.

It was assumed that testing the system on a 50-foot strip that was 5-feet wide would yield the same results when applied to a much larger area. It was assumed that both areas were undisturbed during turf establishment and that the water for both applications came from the same source and was not contaminated during application.

The temporary system and a control plot were installed along a portion of the project that was not watered by a permanent irrigation system. City staff monitored staff time, gallons of water, and length of time to achieve 90 percent coverage with 6-inch turf grasses.

The City of Edina intends to share the design, installation, and use of the temporary roadside turf irrigation system with other local agencies.

**Steps for creating a temporary roadside turf irrigation system**

1. Identify a local water source.
2. Fabricate an irrigation system with common parts.
3. Set it, relax, and watch the grass grow.

** Local OPERA funding available: Send us your ideas!**

Funding is available from the Local OPERA Program. If you or your staff have an idea—perhaps a new tool, process, or design—and need funding to develop it, please see the OPERA webpage to submit a proposal.

OPERA funds projects up to $20,000 through a request-for-proposal process. Proposed projects should focus on the timely development of relevant ideas or methods that improve transportation or maintenance operations.

**Study determines optimal sight distances, stop-bar positions at rural intersections**

To improve safety at often-dangerous rural road intersections, University of Minnesota researchers investigated drivers’ ability to judge traffic speed and gaps between cars at varying sight distances. Using a state-of-the-art driving simulator, the researchers showed that 1,000 feet of sight distance allows drivers to make better crossing decisions.

“They’ve known that sight distances were factors in traffic crashes for some time,” says Tracey von Bargen, county engineer for Grant County. “This study gave us the hard data showing how long sight distances should be to allow drivers sufficient time and space at rural thru-stop intersections.”

The need for this project was pressing because four-way intersections carry inherent safety risks for drivers. From 2008 to 2012, nearly 42 percent of severe crashes occurring at Minnesota intersections resulted in serious injuries and fatalities, and crashes are often most severe at unsignalized rural intersections.

“Drivers on minor roads seeking to cross must determine when traffic gaps are sufficient to cross and can misjudge the time-to-collision,” says Nichole Morris, director of the U of M’s HumanFIRST Laboratory. “Limited visibility has been associated with drivers choosing insufficient gaps, so we wanted to determine the optimal sight distance at four-way intersections. This will maximize driver safety, reduce injuries, and save lives while potentially reducing unnecessary clearing of trees and brush at intersections.”

Study results show that 400- and 600-foot sight distances are insufficient for drivers to make good crossing decisions. The 1,000-foot sight distance and slower speeds (55 mph) allowed drivers to judge time-to-collision more effectively and respond to cars at minor thru-stops intruding into the mainline. “This means that drivers could effectively respond to a car running a stop sign—often a catastrophic crash scenario,” Morris says. Finally, researchers discovered that when mainline drivers noticed a thru-stop car waiting closer to the intersection, they reduced speed more than for a car stopped farther back. Therefore, moving the stop bar on minor roads closer to the intersection could both increase the sight distance for the waiting driver and slow driver speeds on the mainline—an inexpensive change with potentially significant benefits.

“Agencies could use the 1,000-foot sight distance and our other findings for guidance,” Morris says. The project was funded by the LRRB.

**What would you recommend to improve state and local roads?**

The next big thing is the limited-use permit process with MnDOT. Any time a local agency does a project on a MnDOT facility and the improvement includes putting a trail in MnDOT right-of-way, the local agency has to execute a limited-use permit for occupancy of that facility. If there is context in the corridor that creates the need for that trail, I feel the trail should be part of the transportation system and not a limited use.

The other big thing is finding ways to fund maintenance, operations, and reconstruction. The systems are deteriorating faster than the resources are coming in.

**How can LTAP help?**

In the big picture, practitioners need to know what’s out there—new research and products—to stretch dollars as far as possible. LTAP is the conduit. It can help local engineers and their staff use the most current tools and technologies in an effort to be as cost-effective as possible. That’s why LTAP is so important. Without it, we’re missing a piece of the conduit.

Rasmussen from page 2 agencies, and it makes it easier for them to work with MnDOT. And day to day, a highlight was trying to help both local agencies and MnDOT see the importance of good relationships and working well together.

**To watch a video about the project.**

**December 2019**

**MINNESOTA TECHNOLOGY EXCHANGE**

**The Local Road Research Board is a major supporter of Minnesota LTAP**
Environmental leaders honored for salt reductions

The Freshwater Society presented four Environmental Leadership Awards at the Road Salt Symposium held on October 29. This was the second offering in 2019 of the annual symposium, which has usually been held in February. Based on participant feedback, event organizers determined that October is the best time of year for the symposium and began the transition by holding a second event this fall. The fall award recipients are Mayo Clinic Grounds Maintenance (see article on p. 1), Douglas County Public Works, the City of Edina Engineering Department, and MnDOT’s Road Weather Technology Team. Highlights from the recipients’ submissions follow.

Douglas County Public Works

Douglas County does not have a bare pavement policy. The county will clear the roads enough so they are safe for motorists but avoids using the amount of salt needed to achieve bare pavement. Steve Johansen is the maintenance superintendent at Douglas County public works in Alexandria. He has been with Douglas County for two years, and in coordination with his employees and public works director, has taken the salt reduction program to the next level.

When Johansen joined the county, it was already using a drip system on the sander plates, which helps keep the material on the road. Johansen then had all the sanders calibrated. He installed the latest sanding controllers and GPS in the new trucks, which also have ground speed controllers to keep the application rates efficient but not extreme.

The county also purchased a brine-making system and set up its water truck and water tank trailer with a brine application spray bar for anti-icing. Johansen has also added brine application systems in three pickups for pretreating in the outer parts of the county.

As with any new initiative, educating the operators is key to success. As their supervisor, Johansen made his expectation of reduced salt use clear. He found the operators were more than willing to join the effort, which was also a priority for county commissioners.

The winter of 2019 was challenging in Douglas County. There was a lot of snow and a lot of wind. Despite the tough conditions, the county used 30 percent less salt with few complaints from residents. Johansen intends to continue the program this winter and send more operators through training.

City of Edina Engineering Department

The city has been supporting regulatory controls, building knowledge, and investing in technology and tools.

Edina was the first city to pass a Resolution for Support for limited liability legislation. Private and public winter maintenance service providers face different barriers when it comes to using less salt. Through hosting training events and talking to private applicators, it became apparent that risk allocation played a large role in decisions about salt use and selection of best practices.

City staff were also engaging with local Master Water Stewards who were particularly concerned about chloride pollution. Through an idea initiated and championed by local Master Water Stewards, a Model Contract for Snow and Ice Management was developed. The city convened a diverse advisory committee of service providers, property managers, and other interested representatives to develop a model contract that embraces best practices to minimize environmental impacts from sand, chlorides, and other chemicals while also maintaining safety and addressing liability risk allocation.

The city was also part of the push to create a collection of model ordinances for cities to use regarding chloride pollution. These ordinances were created along with the MPCA, Nine Mile Creek Watershed District, and several other cities and watershed organizations and include topics such as required training for winter maintenance professionals, salt storage regulations, chloride management plan requirements, and sweeping regulations for excess deicers.

In another effort, the City of Edina partnered with researchers at the University of Minnesota to study adaptive management for deicing operations. The study, which is in its final stages, was funded by the Local Road Research Board. The project included workshops with operators where researchers provided data, empowering operators to use that of choice, but environmental, infrastructure, and financial concerns have begun to cause maintenance crews to consider alternatives. "Paved surfaces keep growing," said Nick Queensland, grounds maintenance supervisor at the Mayo Clinic and a presenter at the Road Salt Symposium in October. "That is one of the things that kind of spurred our salt reduction efforts. If we just kept going the way things were going, the snow budget kept going up."

Though the Mayo Clinic is a private entity, the process Queensland and his crew experimented with salt reduction involved many little projects that had a big effect when taken together. In one instance, Queensland took note of a particularly nasty stretch of stairs where frequent foot traffic made it necessary to heavily salt. In response, Queensland set up a $20 sign that warned visitors of icy stairs. "That paid for itself," Queensland said. Accidents at that spot fell to zero that winter, and maintenance crews saved around $20 in salt per snow event.

Queensland and his crew experimented with brine, which proved effective at clearing roads, though not sidewalks. They also had their contractors calibrate their salt spreaders so that they put out salt at a consistent, calculated rate, and it crews began spot-salting rather than blanket-covering the entire campus.

Results

The results from Queensland’s efforts have been significant. "Last year we were able to reduce our salt usage by 60 percent in one year," he said. Mayo Clinic data monitoring falls on the campus showed no significant differences from the 2016–2017 to 2017–2018 winters. Queensland could not speak as to the exact dollar amount that the clinic saved on salt, but the money did come back to his crew and they were able to buy two new snow blades, a used pickup truck for their brine sprayer, and a new side-walk machine.

"Nothing revolutionary, nothing expensive," Queensland said. "It took effort."

—Sophia Koch, LTAP freelancer

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Practice

No single method proved effective on its own; salt reduction involved many little projects that had a big effect when taken together. In one instance, Queensland took note of a particularly nasty stretch of stairs where frequent foot traffic made it necessary to heavily salt. In response, Queensland set up a $20 sign that warned visitors of icy stairs. "That paid for itself," Queensland said. Accidents at that spot fell to zero that winter, and maintenance crews saved around $20 in salt per snow event.

Salt brine proved effective at clearing roads but not sidewalks.

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Mayo from page 1

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New Hampshire highway expansion stirs controversy over road salt

Interstate 93 runs from downtown Boston and through most of New Hampshire before ending in northern Vermont. It’s a crucial corridor for Boston-area tourists to access the ski hills of New Hampshire’s White Mountains in the winter and the state’s lakes region in the summer. Tourism is an important part of New Hampshire’s economy, but the Boston metro area has more than 5 million people, while the entire state of New Hampshire has a little over one million. This means a lot of vehicles on I-93 during peak times.

The highway was designed, in 1962, for up to 70,000 vehicles per day. In 1997, over 100,000 vehicles clogged down the interstate on an average day. By 2020, the number is estimated to reach 140,000. The New Hampshire Department of Transportation (DOT) decided it had to do something.

More road, more salt
To deal with the increased traffic, the NHDOT wants to expand the highway from two lanes to four lanes, going each way, from the Massachusetts border to Manchester, NH. In addition, it wants to widen on- and off-ramps and add more park-and-ride lots.

Total proposed cost: $750 million.

Ted Diers, watershed management bureau administrator at the New Hampshire Department of Environmental Services, gave his inside perspective on this project, and what growth and development mean for road salt management, at the Road Salt Symposium in February. “This is going to be the largest infrastructure project in New Hampshire history,” he declared.

All of this, of course, would mean more pavement that would need to be maintained during icy winters, which would mean more road salt. With water quality in mind, many were quick to object to the plan.

Opposition rises
When planning for the highway expansion began in the 1990s, the first step was an environmental impact statement (EIS). The EIS came back with shortcomings that growth and development would mean for road salt management, at the Road Salt Symposium in February. “This is going to be the largest infrastructure project in New Hampshire history,” he declared.

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Roads Scholars: Where are they now?

What paths have Roads Scholars taken since graduation? In this issue, we hear from Grant Riemer, City of Ramsey Public Works superintendent and a 2017 Roads Scholar. He has also served as president of the Minnesota Fall Maintenance Expo.

What got you interested in your field? I had a close friend that worked for the Coon Rapids Public Works department and at the time I was working in construction, installing sewer and water main line. His job seemed interesting because he was involved in so many different things every day. He always had stories about working with the police and fire departments, snowplowing, water main breaks, etc. It just seemed interesting.

How did LTAP training help you in your work? There are many aspects to the public works field. I had experience in the utilities area, but really nothing else. LTAP provides training in snowplowing, traffic engineering, asphalt maintenance, stormwater infrastructure, and much more. You really need training in all these areas to be proficient as a maintenance worker.

What has been the most exciting or surprising part of your job? The most surprising part of my job is how quickly you have to be able to switch work plans. It comes as no surprise to anyone in this job that whatever you have planned for the day or week, all or part of your plan will be discarded by 8:00 a.m. that morning for a new plan. You really need to think ahead and have plans B, C, and D ready to go at any given time.

The most exciting part of my job right now is working on the beginning stages of a new public works facility for the City of Ramsey. We have never had a building that was actually designed for our department’s operations. We have operated out of a couple different locations that were available when we had to expand, but nothing actually laid out properly for our needs.

What can people learn from your path? I will be starting my 31st year with the City of Ramsey in May 2020. I started as a maintenance worker in the parks department cutting grass and dragging ball fields. I am now the department head for the Public Works department and giving my input from a public works perspective on multimillion dollar projects. There are many directions you can take your career, and that choice is totally up to you.

What makes the Fall Maintenance Expo so popular, and why is it important to participate? The Fall Maintenance Expo is an event held every October at the City of St. Cloud Public Works Facility. A typical year sees approximately 2500+ maintenance workers from across the state attending. The expo gives maintenance personnel the opportunity to attend educational sessions on winter maintenance and also talk with vendors displaying just about every conceivable piece of equipment on the market.

There is also a snowplow rodeo where participants can show off their driving skills. The rodeo can either earn you bragging rights at your shop for the year, or something bigger. The Fall Expo Committee, along with APWA-MN, sponsors the top two drivers to represent Minnesota at the national snowplow rodeo in Colorado next fall.

There is also a course for skid steer or mini excavator operators (depending on the year) to show off their operating skills.

The biggest benefit of the expo is the chance to talk with other maintenance workers and exchange ideas. They just may have the answer to a problem you’re dealing with back in your community.

Certificate from page 1

- Advanced concepts in public works operations and maintenance
- Effective creation and delivery of workplace and technical documents

The certificate is an additional level of training for Roads Scholars that requires four more training courses:

- Writing that Works! Communication Skills for Construction. This one-day course provides an introduction to the importance of writing and professional skills needed for public works professionals. Course emphasis is on planning, preparing, and delivering effective and clear workplace documents to communicate with the general public and elected officials.
- Transitioning into Leadership: Essential Skills for Supervisors. When moving from peer to manager, new supervisors face a whole new set of challenges. This interactive workshop will teach practical, easy-to-understand, and fundamental methods to grow your leadership skills and help you become an effective leader.
- Management Operations and Maintenance Fundamentals. This course relates to the delivery of maintenance and operations services to the public, commonly known as public works. It will identify the equipment and personnel resources needed for efficient and effective service delivery.
- Administration and Management Basics. This course is under development.

Roads Scholar enrollment is free, but there is a small charge to attend individual workshops. Classes are offered at convenient locations across Minnesota to make the program easily accessible to most local agencies.

“Minnesota LTAP provides cost-effective training to local transportation and public works agencies,” says Stephanie Malinoff, Minnesota LTAP director. “We’re pleased to widen our curriculum with the new leadership certificate and help local agencies develop their greatest asset—their employees.”

The Maintenance Operations and Technical Certificate will continue to give local transportation personnel the opportunity to improve their road and bridge maintenance skills. Participants learn proven techniques as well as how the latest technologies and innovations can be applied to their particular maintenance problems. Students who earn eight credits from the maintenance operations category of LTAP courses receive this certificate.

Roads Scholars honored at maintenance expo

At a ceremony held as part of the Minnesota Fall Maintenance Expo in St. Cloud, LTAP presented certificates to three recent Roads Scholar grads.

Left to right: Alvin Pederson, Otter Tail County; Justin Sorensen, City of Waconia; Eric Geyen, City of Waconia.
Pennsylvania saves millions with mobile construction apps

The Pennsylvania Department of Transportation (PennDOT) has saved an estimated $39 million in overall productivity through its mobile construction app program. These savings were calculated based on time saved using apps compared to older paper and manual processes.

Program goals include increasing productivity for field staff and field consultants; transforming labor-intensive, manual paper processes through efficient mobile technology; and improving data collection and reporting capabilities.

PennDOT implemented its first app in 2013. Today, PennDOT uses nine different apps and has another two in development. The apps cover a wide range of activities, including mobile construction documents, punch lists, concrete inspection diaries, mileage and hour trackers, and payroll.

PennDOT isn’t done, either. The next step includes implementing e-ticketing, supporting maintenance systems, using radio frequency identification tags, and payroll.

Learn more:
- Every Day Counts: fhwa.dot.gov/innovation/everydaycounts
New CDL license requirements coming in February

New rules are coming into effect for entry-level truck driver training in February 2020. The changes will affect drivers who want to get a commercial license (CDL) for the first time or upgrade their license.

The new rules were announced earlier this year by the Federal Motor Carrier Safety Administration (FMCSA). Drivers don’t need to re-apply if they already have a CDL before the compliance date comes into effect on February 7, 2020. After that date, drivers will have to take the revised training to apply for any kind of a commercial vehicle license.

The rules established new minimum training standards for individuals applying for these licenses:

- A Class A or Class B commercial driver’s license for the first time
- An upgrade of a CDL (e.g., a Class B CDL holder seeking a Class A CDL)
- A hazardous materials (H), passenger (P), or school bus (S) endorsement on a driver’s CDL for the first time

These individuals are subject to the new requirements and must complete a prescribed program of theory (knowledge) and behind-the-wheel instruction provided by an entity that is listed on FMCSA’s Training Provider Registry.

Learn more:
- FMCSA Entry-Level Driver Training: fmcsa.dot.gov/registration/commercial-drivers-license/eldt

Brush up on your winter skills with Clear Roads online training modules

It’s never too late to brush up on your winter skills. One training option is the Clear Roads snowplow operator and supervisor training program, meant for both entry-level and experienced snowplow operators and supervisors. The training materials are available free of charge to any agency, including local and county highway departments.

The 22-module program covers equipment, materials, techniques, and procedures. A test question from the second module is shown at right (answer on page 7).

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