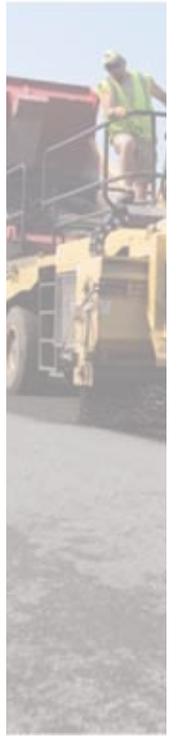


2013

Annual Report



OPERA

Local Operational Research Assistance Program

OPERA

2013 ANNUAL REPORT

2013 Local Operational Research Assistance (OPERA) Program Annual Report

Prepared by:

Minnesota Local Technical Assistance Program (LTAP)
 Center for Transportation Studies
 University of Minnesota
 200 Transportation and Safety Building
 511 Washington Avenue S.E.
 Minneapolis, MN 55455-0375
 Phone: 612-626-1077
 Fax: 612-625-6381
 E-mail: mnltap@umn.edu
 Web: www.mnltap.umn.edu

Editors: Christine Anderson, Pam Snopl
 Designer: Sarah Johnson

Local OPERA Program partners: Minnesota Local Road Research Board (LRRB), Minnesota Department of Transportation (MnDOT), and Minnesota Local Technical Assistance Program (LTAP) at the Center for Transportation Studies, University of Minnesota



MINNESOTA LTAP
 CENTER FOR
 TRANSPORTATION STUDIES
 UNIVERSITY OF MINNESOTA



CONTENTS

PROJECTS

In-Pavement LED Pedestrian Crossing Operations and Effectiveness	1
Nonintrusive Road and Weather Information System	2
Traffic Control Response Trailer.....	3
Sign Inventory Storage Cabinets	4
Chip Seal over Gravel Road.....	5
Past OPERA Projects.....	6
About OPERA.....	12



Since the **LOCAL OPERA PROGRAM** began in 2003, it has provided more than **\$469,000** in funding to **48** cities, counties, and townships for a total of **66** completed projects.

In-Pavement LED Pedestrian Crossing Operations and Effectiveness

Project Number 2011-04

Project Leader Jay Hartman

Agency City of St. Anthony Village
3301 Silver Lake Road
St. Anthony, MN 55418

Phone 612-782-3302



Problem Life-threatening situations can arise when pedestrians try to cross a street and vehicles fail to yield the right-of-way. In addition, recent trends have shown an increase in citizens choosing to walk or bike to their destinations. This has increased the number of conflicts in urban areas where heavy pedestrian and vehicle traffic occurs simultaneously during peak periods. The City of St. Anthony Village specifically identified a mid-block crossing on Silver Lake Road at 34th Avenue NE as a dangerous location with many pedestrian-vehicle conflicts and the potential of a severe accident.

Solution The City of St. Anthony Village identified and installed a pedestrian-activated in-pavement lighting system designed to increase driver compliance with state law and minimize potential dangerous situations. The system warns motorists as they are approaching the mid-block pedestrian crossing when it is occupied by pedestrians or about to be occupied by pedestrians. The system includes three primary components: a push-button activation mechanism, bidirectional in-pavement LEDs, and pedestrian crossing blinker signs.

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

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

Approximate Cost \$79,500

OPERA Funding \$10,000

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

Status Complete

View the complete project report online at www.mnltap.umn.edu/opera.

Nonintrusive Road and Weather Information System

Project Number 2011-05

Project Leader Tom Tesch

Agency City of Eden Prairie
8080 Mitchell Road
Eden Prairie, MN 55344

Phone 952-949-8534

Problem During night and weekend weather events, staff at the City of Eden Prairie had a difficult time determining when a full deployment of personnel was needed for snow and ice removal. Limited information about weather and roadway conditions was available to key decision makers who live outside of the city, which made it difficult for them to determine what type of precipitation was falling (snow, ice, sleet, rain), if an immediate response was needed, and what would be the most appropriate treatment (plowing, sanding, salting).

Solution The City of Eden Prairie installed a Vaisala road and weather information station on Viking Drive near Interstate 494. The system provides real-time information on weather conditions and on the current grip level of the roadway. In addition, the station includes a camera that can be accessed from any device with Internet access. The data provided by the system allow supervisors and on-call personnel to make timely and informed decisions about snow and ice removal—including the dispatching of appropriate personnel, materials, and equipment—even from off-site locations outside of normal business hours.

Procedure The Vaisala system was installed on Viking Drive near I-494 in November 2012. During the 2012–2013 snow removal season, the data provided by the system were compared to data collected at the nearby Minnesota Department of Transportation (MnDOT) Road Weather Information System (RWIS) station at Minnetonka Boulevard and I-494. The data were also compared to weather information from the National Oceanic and Atmospheric Administration (NOAA) office in Chanhassen.

Results The initial evaluation demonstrated that the data collected by the Vaisala system were comparable to the MnDOT RWIS station and to weather data reported by NOAA. The Vaisala system was also a more affordable option for the city than a full RWIS. Overall, city personnel have successfully used the system to help monitor winter weather events and make timely callouts for snow removal, which has led to improved customer service for those traveling in Eden Prairie.

Approximate Cost \$30,000

OPERA Funding \$10,000

Implementation The system has provided accurate, reliable data for the City of Eden Prairie. The city plans to continue using the system as a decision-making tool during winter weather events.

Status Complete

View the complete project report online at www.mnltap.umn.edu/opera.



Traffic Control Response Trailer

Project Number 2012-01

Project Leader Troy Grossman

Agency City of Lakeville Streets Division
20195 Holyoke Avenue
Lakeville, MN 55044

Phone 952-985-2714

Problem The City of Lakeville Streets Division is responsible for traffic control, street closures, and pedestrian safety in all work zones, for emergency response, and at community events. When streets, sidewalks, or trails need to be closed due to storm debris or flooding, the city must react immediately. The city also has community events throughout the year that require the placement of more than 200 barricades to protect pedestrians and control vehicle traffic. The Streets Division currently has to store these barricades and other traffic control devices at its facility to meet any traffic control needs.

Solution The city purchased a trailer and fabricated racks to store barricades and other traffic control devices. All traffic control devices have a designated location on the trailer where they are placed to allow for quick and easy access when needed and for inventory after each use. The Streets Division fabricated steel storage racks for the trailer, allowing all barricades and traffic control devices to be stored at its facility and ready at a moment's notice.

Procedure Staff measured and weighed the barricades to determine space needs so a correctly sized trailer could be purchased. After creating a plan for how the items would best fit, the city was able to order a trailer and purchase steel for fabricating the storage racks. Streets Division staff performed all of the fabrication and obtained quotes from local body shops to prepare and paint the steel racks.

Results The completed trailer has helped the city to better store its traffic control devices and to improve its response to traffic control and barricade placement needs. Because of the organization of the components, the city only needs one trailer to place traffic control devices for large events. In the past, two trailers were needed because staff could not stack all of the barricades neatly or safely on one trailer. In addition, the response time for delivery and placement of traffic control devices has been cut in half. Labor costs and time have also been reduced by eliminating much of the required handling time for each barricade.

Approximate Cost \$8,757

OPERA Funding \$8,100

Implementation The traffic control response trailer was used during the summer of 2013 for community events and exceeded the city's expectations. The city has made some changes to the fastener systems to keep the barricades secure on the racks and is now completely confident in the system.

Status Complete

View the complete project report online at www.mnltap.umn.edu/opera.



Sign Inventory Storage Cabinets

Project Number 2013-01

Project Leader Scott Holmes

Agency Olmsted County Public Works
Highway Department
1188 50th Street SE
Rochester, MN 55904

Phone 507-328-7070



Problem Olmsted County lacked the ability to efficiently store and maintain its sign inventory. Signs were stacked and stored in locations that were unorganized and not easily accessible, such as on metal racks. Due to the high cost of signs that have either diamond grade or high-intensity sheeting, a more efficient means of storing, organizing, and maintaining the inventory was needed to prevent damage.

Solution The county developed a storage cabinet system that was durable and could handle signs being repeatedly slid in and out of the storage compartment. The county constructed individual plywood cabinet dividers that fit inside metal racks. The dividers were built at several sizes to vertically store the county's multiple sizes and shapes of signs. The system allows for easy access and protects the sign sheeting from damage.

Procedure Multiple sizes of cabinets were built within the metal racks using three-quarter-inch plywood, with durability in mind. A one-quarter-inch piece of hard board was cut for the bottom of each cabinet opening to easily slide signs in and out of storage. This helps to eliminate wear on the plywood dividers and is easily replaceable once these pieces excessively wear. Multiple levels of metal racks were erected to store the individual wood cabinets, which gives the county the ability to store more cabinet units.

Results Since the cabinet units have been erected and installed, sign inventory has become much more efficient. The county uses magnetic labels attached to the metal racks to identify sign types, making it quick and easy for staff to locate each sign to be loaded in the sign truck for installation. The system also helps the county to keep track of its sign inventory by making it simple to check and evaluate the condition of its stock inventory annually. In addition, the clean, neat, organized look of the cabinet shelving makes the sign shop a great environment in which to work.

Approximate Cost \$7,963

OPERA Funding \$6,500

Implementation Olmsted County has added two more units in its cold storage building to help with the storage, organization, and maintenance of its inventory for temporary work-zone signage. In addition, the county has partnered with MnDOT District 6 to install multiple units for sign storage in its new facility.

Status Complete

View the complete project report online at www.mnltap.umn.edu/opera.

Chip Seal over Gravel Road

Project Number 2013-03

Project Leaders Brian Opatz and Thomas Wood

Agency Silver Creek Township
3827 134th Street NW
Monticello, MN 55362

Phone 763-286-2988



Problem Silver Creek Township has 44 miles of gravel roads to maintain. Costs associated with grading, controlling mud and dust, and adding gravel lost to grading, snow removal, and traffic are often high. However, the high cost of paving a gravel road with asphalt or concrete prevents this from being a reasonable alternative. The township wanted a more affordable solution to help reduce maintenance costs for gravel roads that have low traffic volumes and primarily serve residential homes and farms.

Solution The township applied a flexible chip-seal mat on four miles of gravel roads. The three roads chosen had been recently rebuilt for grade and soundness. The project included applying a 3/8-inch granite chip over an emulsion primer coat that was placed on top of the gravel surface. The cost to apply the chip-seal mat was approximately 75 percent less than the cost of applying a common bituminous asphalt mix.

Procedure Construction of the primer and chip-seal mat began on July 1, 2013, on Barton Avenue NW, 155th Street NW, and Curtis Avenue NW. The township applied a penetrating emulsion primer over the graded, prepared, and packed gravel road surfaces. It then applied a granite chip-seal mat over the primer. All primed areas were chip-sealed the same day to protect the surface from traffic damage. The completed mat is about 1/2-inch thick, flexible, and moves with freeze-thaw cycles.

Results Overall, the township and the residents living on the roads are happy with the design and performance of the improved gravel roads. The roads are smoother, ride well, and are not muddy or dusty. They have not required grading or chloride solution expenses. The township anticipates that the mat will be flexible and require little maintenance in its expected life of five to seven years.

Although several vehicles damaged the mat in the first month after its installation, the damaged areas were repaired easily, quickly, and much more affordably than asphalt or concrete.

Approximate Cost \$182,499

OPERA Funding \$10,000

Implementation The township continues to evaluate the roads involved in the project and is confident that the improved surface will hold up to wear for at least five years.

Status Complete

View the complete project report online at www.mnltap.umn.edu/opera.

PAST OPERA PROJECTS

2012

Evaluation of Deicing and Anti-Icing Technologies

The City of Grand Rapids assessed the operational efficiency of two alternative deicing technologies: tailgate spreaders and an Epoke bulk spreader. The city compared the performance of the spreaders on two equivalent routes.

Sustainable Pavement Rehabilitation Using Thin Bonded Overlay Constructed with High Taconite Mix

The City of Duluth constructed three roadway test sections to evaluate the performance of thin bonded overlay mixes containing taconite tailings, a locally available mining byproduct.

Snow and Ice Products for Bituminous Trails in Recreational and Critical Areas

To improve winter maintenance service delivery on segments of residential bituminous trails and sidewalks, the City of Waconia began treating these areas with anti-icing and deicing winter maintenance liquids. The project included the creation of an application unit as well as the use of a blending station for winter maintenance liquids.

Interim Report: Development of Aggregate Loss Factors for Rural Gravel Roads

Itasca County began collecting field data to measure gravel loss caused by traffic and winter maintenance activities. After four years of data collection, the information will be used to develop aggregate loss factors that can be used to predict annual gravel needs for a variety of roadway characteristics.

Greener Bituminous Pavements

Lake County developed potential reclaimed asphalt pavement (RAP) mixes containing imported, high-quality aggregates that could be tested in a low-volume pavement project. These mixes allowed the county to reduce costs by using less new asphalt while also using surplus RAP material available from local surface renewal projects.

Implementation of an Anti-Icing Calibration Unit

The City of Golden Valley purchased an anti-icing calibration unit so its trucks could be calibrated for consistent salt and sand application. The goal of the project was to reduce the city's material use, resulting in both a cost savings to the city and benefits to the watershed and surrounding environment.

Skid Loader Bituminous Screed

Murray County built a wide-screed skid loader attachment to improve the quality of its bituminous patching over large areas. The screed slides on hydraulically maneuverable skids that can be raised or lowered depending on the desired thickness of the patching material.

2011

Implementation of a Scale-Tec Calibration Scale

Olmsted County used a Scale-Tec Calibrator to correctly calibrate the amount of salt and sand being applied by its snowplows. By measuring the weight of the discharged material, the calibrator helped the county determine the appropriate settings for each spreader.

Taconite-Enhanced Pothole Repair Using Portable Microwave Technology

The University of Minnesota Duluth's Natural Resources Research Institute partnered with Anoka County and St. Louis County to test the repair of potholes and damaged pavement with mobile microwave technology.

Innovations in Microsurfacing Materials and Application Techniques

To improve the properties of microsurfacing for better performance on county roadways, Wright County partnered with Road Science to test a new flexible microsurfacing product on portions of two county roads. The new material was designed to improve the crack resistance of pavement.

Use of Laser Scanning Technology to Obtain As-Built Records of Historic Covered Bridges

The City of Zumbrota used laser-scanning technology to complete three-dimensional scanning and data processing of the Zumbrota Covered Bridge. The information was used to assemble a complete digital representation of the bridge and to generate a 1/100-scale three-dimensional replica.

CAD Drawing of a Simple Salter/Sander Chute

Washington County fabricated a simple salter/sander chute to facilitate more accurate and precise salt and sand placement on roadways. Accompanying CAD drawings were created to allow other agencies to easily fabricate, install, and adjust the salter/sander chute.

Rehabilitating/Upgrading Low-Volume Roads with Waste Shingles

Blue Earth County completed a gravel road stabilization project on a section of County State Aid Highway 48 using a blend of recycled asphalt shingles and recycled asphalt pavement. The county plans to observe the performance of the shingle mix for one to two years.

Stormwater Pollutant Removal in Rain Gardens

As part of a street reconstruction project, the City of Grand Rapids constructed modified rain gardens that discharge to the city's storm sewer system. Although not as large as traditional rain gardens, the modified gardens have potential as a best management practice for reducing stormwater pollutant discharge.

Minnetonka "Winter Green" Initiative

The City of Minnetonka began a "Winter Green" initiative after being notified that it was exceeding its maximum chloride loading standards by the Nine Mile Creek Watershed District. The initiative included an aggressive and comprehensive training program as well as the purchase and installation of upgraded equipment.

Advanced Deicing Product Testing

The McLeod County Highway Department tested the use of IceSlicer™ granular deicing material. The material allowed for reduced usage—about half as much material was needed compared to traditional white salt—at a comparable cost.

Installation and Early Performance of Mastic Patches on City Streets

The City of Bloomington partnered with the City of Minnetonka to compare the performance of mastic products to that of traditional bituminous patching. The materials were used to successfully repair potholes and transverse cracks.

Catch Basin Maintenance/Repair Trailer

The City of Lakeville Streets Division modified an existing trailer for use in catch basin repairs and maintenance. All the necessary equipment and materials are readily available, including a service crane and cement mixer installed directly on the trailer.

Application of Replay® Agricultural Oil Seal and Preservation Agent

The City of Hutchinson used Replay®, an agricultural oil seal and preservation agent that contains no petroleum, to seal two sections of asphalt pavement. Unlike other sealants, the treatment did not become sticky in hot weather, making it ideal for areas experiencing high volumes of pedestrian traffic during the summer.

2010

Magnesium Chloride Dust Coating Evaluation

Magnesium chloride was applied to a county road to help decrease material and maintenance costs. The application eliminated the need to apply a biennial resurfacing aggregate layer and reduced the need for blading operations in areas of light traffic.

City of Eagan Automated Vehicle Location

The City of Eagan equipped its winter vehicle fleet with automated vehicle location technology, allowing managers to observe real-time snow removal operations from any computer terminal and adjust resources immediately via telephone and radio communications.

Cushion Release Push Frame and Weight Transfer Kits

One Cushion Release Push Frame and two Weight Transfer Kits were installed on snow blowing and lawn mowing equipment. The Push Frame assisted the tractor-mounted snow blower in continuously scraping the surface being cleared, and the Weight Transfer Kits permitted operators to increase traction by shifting weight to the drive wheels.

Brunswick Township Erosion Control Project

When a tire fill was used to repair an old corduroy road, a silt fence was required between the construction area and a nearby swamp to prevent damage to the wetland. The stabilization fabric beneath the tire fill was extended to the construction limits and attached to stakes, forming a positive erosion control barrier.

Evaluation of Grader Front-Mounted Retriever Hitch

A front-mounted retriever was used on gravel roads and bituminous roads with gravel shoulders, allowing one motor grader to perform reclaiming and blading operations in a single pass.

U.S. National Grid Field Marker Prototyping

The City of St. Paul investigated the methodology and equipment necessary to inexpensively mark infrastructure in the field with U.S. National Grid location data. A smartphone-based system for generating portable markers in the field and a marker-reading application for end users was developed.

GPS/AVL Tracking and Mapping

A low-cost, flexible alternative to traditional automated vehicle location systems was developed using Nokia N900 cellular phones, off-the-shelf hardware, and open source tools. The system is designed to help medium and small communities track their mobile assets.

Ultra Guard Cart Test

The Ultra Guard Cart, a handheld device that can paint a 6-inch retro-reflective stripe on vertical surfaces, was used to paint guardrails on several types of curves. The cart was easy to use and adjust for different types of barriers, and paint stripes applied by the cart have shown less vulnerability to damage.

2009

Hot-Applied Asphalt as an Adhesive on Cold Longitudinal Asphalt Joints

An asphalt joint adhesive was used as a sealant on cold longitudinal asphalt joints and at the interface of asphalt pavement and concrete curb and gutter. The joint adhesive is pliable and will allow movement to occur without breaking, unlike the more rigid tack material formerly used to seal these areas.

Asphalt Emulsion Full-Depth Reclamation and Granular-Base Stabilization on Urban Streets

Several 7-ton streets scheduled for rehabilitation had their reclaimed road base stabilized with an asphalt emulsion to a depth of 4 inches. The emulsion provided added stiffness to the base section and allowed the depth of the new asphalt to be reduced from 3 ½ inches to 2 inches.

Blind Lake Chloride Research Project

High concentrations of chlorides were identified in the Blind Lake basin in part due to pre-treated road salt leeching into the lake. To lessen the impacts of the chloride, the city used a “liquids only” anti-icing/deicing program in the area.

Blue Light Use for Traffic Enforcement

Enforcement lights, which turn blue as traffic lights turn red, were installed at a number of intersections to help police officers observe violators more effectively and reduce right-angle intersection crashes caused by drivers running red lights.

Crack Sealing on Cupped Joints on Bituminous Pavements

Extensive cupping at transverse cracks in bituminous pavements allows water intrusion and accelerates pavement deterioration. By using Bergman Companies Inc. Flex-Patch material and a fine aggregate cover to seal cupped transverse cracks and improve ride, the serviceable pavement life was extended without the more expensive mill and overlay.

Culvert Sediment Elimination

Three culverts installed at the same elevation often became plugged during periods of low and normal water flow. The construction of a rock weir near the inlets of two of the culverts forced the water to pass through only one pipe during low- and normal-flow periods, minimizing the collection of sediment.

Road Reclamation With and Without Emulsion

Goodhue County split a 6-mile road project with poor surface conditions into two segments to determine if using an emulsion to build strength down into the existing structure was a viable alternative to the existing rehabilitation procedure.

Evaluation of Rear-Vision Systems for Snowplows

With a tandem snowplow, vision is very limited and several blind spots occur, particularly when the snowplow is backing up. Rear-vision cameras and LCD monitors were installed on snowplow trucks to determine if they would improve drivers' ability to see directly behind the plows during snow or ice events.

2008

Evaluation of Paving Fabrics for Isolation of Bituminous Cracking

Existing bituminous pavements require major seasonal maintenance for both thermal and distress crack repairs. Spun-glass paving fabric was used to preserve existing bituminous pavements by isolating the effects of heavy crack sealants and reflective cracking.

Low-Cost Base Stabilization

To stretch limited road funds, county officials turned to full-depth reclamation to use the existing bituminous surface as additional base material. An insufficient amount of bituminous and base material, as well as limited road width for additional material, led to the use of a low-cost base stabilizer to strengthen the existing material.

Improvement of Water Quality in Storm Ponds

The Minnesota Pollution Control Agency requires public road authorities and others to construct storm-water ponds as part of its National Pollutant Discharge Elimination System. Two windmills were installed on a berm adjacent to the pond in order to use wind energy at no cost and a direct drive compressor to provide the airflow and oxygen necessary to aerate the pond.

Seal Coating of a Gravel Road Hill

The grade and curves on the Muhle Coulee Hill make it difficult to keep the surface smooth, so a seal coating was applied to the top half mile of the hill. Gravel was applied and then graded, and hot oil and chips were put down and rolled to a smooth surface.

QuickView Storm Sewer Camera

The implementation of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit requires that owners of MS4 storm sewer systems inspect the systems for maintenance needs. The QuickView camera system allows a single person to view and examine the sewer system as well as record video and audio.

Road Material Recovery

A loss of gravel and crushed rock from road surfaces and shoulders required the installation of a wing-mount retriever on the township road grader, which created smoother transactions and a safer roadway.

Mini Paver

Longitudinal cracks along curb lines and centerline streams required crews to hand-patch certain areas in order to preserve the integrity of the bituminous surface. Using the Mini Paver more than doubles the amount of patching that can be completed in a day, and roads will remain in better condition longer.

Evaluation of Hot Beam Wiper Blades

Windshield wipers become coated with ice during snowplow operations, causing poor visibility out of the windshield. Hot Beam wiper blades were installed on the front of snowplow trucks to keep ice from forming.

2007

Extending the Life of Bituminous Overlays

Fiberglass mat TruPave was used prior to overlaying with new bituminous in order to prevent reflective cracking and provide a moisture barrier. A June 2006 inspection found that roadway sealed with TruPave averaged 36 cracks per 100 feet, while the control section averaged 79 cracks per 100 feet.

Recycled Tear-off Shingles Road Construction Demonstration

The use of post-industrial recycled asphalt shingles (RAS) as a partial asphalt and aggregate supplement in hot-mix asphalt (HMA) has been specified by MnDOT, but more field experience was required to demonstrate the use of post-consumer RAS. Several HMA blends containing RAS scraps were tested near the town of Hassan.

Millings for Gravel Road Stabilization

Millings were added to Scott County roads that required expensive maintenance because of heavy traffic. The millings were a cheaper alternative that kept roadbeds sturdier as well as less dusty in dry weather and less slick in wet weather.

Pick Cutting Edges

Straight cutting edges on washboard roads disturb more gravel than necessary. Pick cutting edges were used to comb the road top instead. Picked blades also helped remove snow in the winter and helped evenly spread caught-up vegetation on the roadside.

Frost Boil Correction

Geo-Tec fabric was used to seal the road bed instead of rock or gravel in order to prevent frost boiling and other road defects. The material will be used in future road repairs.

2006

Windshield Wiper Deicer

A pneumatic system was installed to remove ice and snow on plow windshield wipers from inside the cab, keeping drivers safe and warm. The system has since been implemented by several agencies and counties.

Concrete Pipe Tie Bars

A tie-bar system on the exterior of concrete pipes allowed crews to positively tie sections of pipe together without having to go inside the pipes and also prevents debris from being snagged inside the pipes.

Increasing the Capacity of Slab-Span Timber Bridges

University of Minnesota research showed that increasing the number and size of spreader beams increased the capacity and performance of a slab-span timber bridge over Buffalo Creek to accommodate increased traffic and loads.

Pedestrian-Activated Solar Warning Flasher

Flashing lights activated by pedestrians drew attention to a crosswalk in St. Paul and initially reduced conflict points at the intersection, but traffic behavior reverted after about three months, showing the devices have short-term effects on vehicle stopping actions.

DuraTherm Pavement Markings

Ramsey County tested DuraTherm pavement markings at a highway intersection for durability, ease of installation, retroreflectivity, and cost. Testing continues to determine if the markings outlast traditional epoxy treatments.

2005

Improved Effectiveness of Salt Brine as an Anti-icing and Prewetting Agent

Mankato found that liquid corn salt as an additive to the salt brine solution applied to winter roads resulted in longer-lasting road treatments and reduced need for salting trucks during snow events.

Advanced Warning with Solar-Powered Flashers

Kanabec County tested three different light-emitting diode flashers to alert drivers to controlled intersections down the road that they might otherwise not notice, especially at night or in inclement weather.

Dust Reduction and Stabilization of Gravel Roads

Gravel roads under heavy use in Kanabec County were treated with a soil stabilization product that increased load capacity and durability while reducing dust.

Construction Project Process Automation

Software and tablet personal computers used by Morrison County construction crews eliminated many duplications of information in the office and field, saving substantial time—in the case of engineering staff, reducing hours worked by almost half.

Cameras for Striping Truck

The cameras on a Washington County striping truck were inadequate for outdoor use. Operators couldn't view monitors over the glare of sun and the system was susceptible to water leaks. Upgrading to cameras used on large agricultural equipment solved the problem, reducing operator strain and eliminating the retracing of lines.

Blower Attachment to Remove Grass Clippings From Gravel Roads

A blower mounted to the front end of a Marshall County motor grader cleared gravel roads of grass clippings, which not only maintained the safety of the roads but also reduced the cost of replacing gravel that previously would have been discarded.

Rockville X-hesion Testing

A dust-control product was used on Rockville roads to increase the load capacity and minimize dust, but failed to meet standards of success when tested on three roads.

New Road Preparation Technology Prior to Overlay

A flexible slurry system tested on a one-mile section of road in McLeod County improved smoothness, durability, and cost-effectiveness, though the procedure was more expensive than traditional methods.

About OPERA

The Minnesota Local Road Research Board's Local Operational Research Assistance Program, or the Local OPERA Program, helps to develop innovations in the construction and maintenance operations of local government transportation organizations.

The Local OPERA Program encourages maintenance employees from all cities and counties to get involved in operational or hands-on research. In particular, OPERA helps to develop your great ideas locally and share those ideas statewide.

The Local OPERA Program funds projects up to \$10,000. OPERA project selections are made as projects are submitted. OPERA-funded projects also may receive support from other sources, including cities, counties, suppliers, or manufacturers. Projects are funded in two parts. The local agency is eligible for 80 percent of the total approved project cost when initial results are submitted. The remaining 20 percent will be paid upon submission of a final report.

Apply for OPERA funding

To apply for OPERA funding or to hear more about the Local OPERA Program, please contact Mindy Carlson or Jim Grothaus with Minnesota LTAP, or visit us online at mnltaap.umn.edu/opera.

Mindy Carlson, Program Manager
Jim Grothaus, Minnesota LTAP Program Director
Center for Transportation Studies
200 Transportation and Safety Building
511 Washington Avenue S.E.
Minneapolis, MN 55455-0375
Phone: 612-626-1077
E-mail: mnltaap@umn.edu