



OPERA
Local Operational Research
Assistance Program

LRRB
LOCAL
ROAD RESEARCH
BOARD

2008 Annual Report



2008 Local Operational Research Assistance (OPERA) Program Annual Report

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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 project results are submitted. The remaining 20 percent will be paid upon submission of a final report.

This report is a compilation of projects completed during the past year by local government transportation organizations receiving OPERA support. View complete project reports as submitted by each agency online at www.mnltap.umn.edu/opera/projectreports.

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 www.mnltap.umn.edu/opera.

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Evaluation of Paving Fabrics for Isolation of Bituminous Cracking

Project Title	Evaluation of Paving Fabrics for Isolation of Bituminous Cracking	
Project Number	2005-02	
Project Leader	Courtney C. Kleven	
Agency	Red Lake County Highway Department 204 7th Street SE Red Lake Falls, MN 56750	
Phone	218-253-2697	
Problem	Existing bituminous pavements require major seasonal maintenance for both thermal and distress crack repairs. Less expensive alternatives are needed to isolate existing structural and cracking problems and retain strength and usability of existing roadways.	
Solution	Use spun-glass paving fabric to preserve existing bituminous pavements by isolating the effects of heavy crack sealants and reflective cracking. Paving fabric may isolate overlay pavements from current cracking and moisture intrusion paths, allow retention of base and bituminous for route upgrades, and reduce the need for and impact of future crack treatments.	
Procedure	Spun-glass paving fabric was installed on 300-foot sections in 14 areas. For comparison purposes, the preceding and succeeding 300 feet adjacent to the test segments were also documented and evaluated.	
Results	Inspections concluded that the installation of the spun-glass paving fabric did not add structural strength or retard early thermal and centerline cracking. The fabric can be installed at less expense than mill, however, and can be installed over existing pavement or over fresh blade-laid leveling course.	
Approximate Cost	\$10,000 (\$10,000 approved for project)	
Implementation	Evaluation of fabric effects on cracking should be continued until better data is demonstrated.	
Status	Completed.	

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

Low-Cost Base Stabilization

Project Title Low-Cost Base Stabilization

Project Number 2006-01

Project Leader Guy Kohlhofer

Agency Dodge County Highway Department
16 South Airport Road
P.O. Box 370
Dodge Center, MN 55927



Phone 507-374-6694

Problem The surface of a 4-mile segment of road had block cracking and other weather-related distresses. Load-related distresses were minimal, and sufficient structure existed to obtain a 9-ton capacity. Because this road, like most municipal local roads, was not built to handle today's increased and heavier traffic, the challenge was to rehab the surface and possibly increase the load capacity. To stretch limited road funds, county officials turned to full-depth reclamation (FDR) to use the existing bituminous surface as additional base material. But an insufficient amount of bituminous and base material, as well as limited road width for adding material, led to consideration of a low-cost base stabilizer to strengthen the existing material.

Solution Use a low-cost base-stabilizing agent, Team T15 Base One solution, in place of expensive oil-based products.

Procedure The county line road shared by Dodge and Goodhue Counties was reclaimed to a depth that includes the asphalt and some base. About 660 gallons of Base One was mixed with water and blended with about 2 miles of reclaimed materials in windrows. The remaining section was reclaimed without the solution. Just prior to paving, the project site received heavy rain, which delayed paving of the stabilized section for a month due to excessive moisture.

Results A visual inspection of the test section and control section showed no noticeable difference. Both sections are performing well. Non-destructive falling-weight deflectometer (FWD) testing determined that no benefit was achieved by adding the base-stabilizing agent to 5.5 inches of reclaimed bituminous.

Approximate Cost \$10,000 (\$5,000 approved for project)

Implementation Visual monitoring of the test section will continue in order to determine if any long-term durability of the stabilized material is realized.

Status Completed

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

Improvement of Water Quality in Storm Ponds

Project Title	Improvement of Water Quality in Storm Ponds	
Project Number	2006-07	
Project Leader	Tom Tri	
Agency	St. Louis County Public Works 4787 Midway Road Duluth, MN 55811	
Phone	218-625-3876	
Problem	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 (NPDES) permit. Many of the storm-water ponds detain runoff for long periods of time and later discharge the water to protected and or impaired waters of the state. With longer detention periods, the storm water may undergo deterioration of water quality in terms of dissolved oxygen and temperature.	
Solution	Install two windmills to aerate the large pond. This method uses wind energy at no cost and a direct drive compressor to provide the air flow/oxygen necessary to aerate the pond.	
Procedure	Two 23-foot windmills were easily assembled and installed on a berm adjacent to the large pond for optimum wind conditions. Dissolved oxygen (DO) and temperature levels were measured several times during winter 2005 and throughout of 2006 and 2007.	
Results	Overall turbidity has declined to less than 10 NTU's (almost clear water) since the windmills were installed.	
Approximate Cost	\$3,175	
Implementation	The county will continue to aerate the storm-water pond as it appears to have an overall beneficial effect. In addition to treating storm water, the ponds have attracted wildlife.	
Status	Completed	

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

Seal Coating of a Gravel Road Hill

Project Title	Seal Coating of a Gravel Road Hill
Project Number	2007-01
Project Leader	Elvin Paulson
Agency	Yucatan Township 9383 Cut Across Road Houston, MN 55943
Phone	507-864-7623
Problem	The grade and curves on the Muhle Coulee Hill create a problem for keeping the surface smooth. Trucks and trailers have difficulty keeping up speed and reaching the top of the hill.
Solution	Put seal coating on the top 1/2 mile of Muhle Coulee Hill.
Procedure	Yucatan Township contracted Knife River to apply the seal coating. Gravel was applied and then graded, and hot oil and chips were put down and rolled to a smooth surface.
Results	There is now a smooth surface on top of the hill. The road was heavily used during an August 2007 flood, and the seal coating remained solid.
Approximate Cost	\$38,000 (\$10,000 approved for project)
Implementation	The seal coating will continue to be used as a solution to this problem.
Status	Completed



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

QuickView Storm Sewer Camera

Project Title	QuickView Storm Sewer Camera	
Project Number	2007-02	
Project Leader	Terry Noonan	
Agency	Ramsey County Public Works Department 1425 Paul Kirkwold Drive Arden Hills, MN 55112	
Phone	651-226-7160	
Problem	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 inspections are time consuming and require special training and equipment.	
Solution	The QuickView camera system allows a single person to view the sewer system, with setup, in less than 10 minutes. QuickView allows the inspector to take still images and record them on a memory card as well as video/audio recorded on a DVR tape. The camera also measures distance.	
Procedure	The camera was used in several structures, including short corrugated culverts, long concrete storm sewers, sanitary pipe, shallow and deep manholes, and outlets and inlets, both with and without water.	
Results	Ramsey County found the camera to be efficient and easy-to-use. The camera saves time as well as eliminates the dangers associated with the confined space entry. QuickView provides a warranty on the system, and assistance is easily obtained.	
Approximate Cost	\$16,000-17,000 (\$10,000 approved for project)	
Implementation	The City of St. Paul has purchased a number of the cameras to be used for sewer inspection.	
Status	Completed	

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

Road Material Recovery

Project Title	Road Material Recovery	
Project Number	2007-03	
Project Leader	Dennis Brown	
Agency	Bridgewater Township 11821 Dundas Boulevard Dundas, MN 55019	
Phone	507-649-2111	
Problem	There was a loss of gravel and crushed rock from road surfaces and shoulders.	
Solution	Installation of a wing-mount retriever on the township road grader.	
Procedure	Workers measured and assessed the amounts of material recovered with the retriever before re-applying it to the road surface. Weight tests were documented at each test interval.	
Results	Because of the smoother transactions created by the wing-mount retriever, the roadway is safer, thereby reducing the potential for accidents.	
Approximate Cost	\$8,400 (\$5,000 approved for project)	
Implementation	The wing-mount retriever is in use in Bridgewater Township.	
Status	Completed	

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

Mini Paver

Project Title	Mini Paver	
Project Number	2007-04	
Project Leader	Jay Johnson	
Agency	City of Cottage Grove 8635 West Point Douglas Road South Cottage Grove, MN 55016	
Phone	651-458-6080	
Problem	Longitudinal cracks develop along curb lines and centerline streams, forcing crews to hand-patch certain areas in order to preserve the integrity of the bituminous surface. This presents a number of problems. Hand-patching does not stay in place through the freeze/thaw cycle, nor does it uniformly seal the joints. The drive quality of the road is also reduced by hand-patching.	
Solution	Use the Mini Paver to repair roadway instead of hand-patching.	
Procedure	The Mini Paver was tested under four different applications including skin-patching along the concrete curb line, overlay application along curb line, centerline or crown area paving, and gravel shouldering.	
Results	Using the Mini Paver more than doubles the amount of patching that can be completed in a day. There will be a uniform, neat patch, and roads will remain in better condition longer, increasing the life expectancy of the road.	
Approximate Cost	\$10,000	
Implementation	The City of Cottage Grove continues to use the Mini Paver extensively for paving applications. This project could lead to implementation at city, county, and state levels because of possible savings in time and labor cost.	
Status	Completed	

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

Evaluation of Hot Beam Wiper Blades

Project Title	Evaluation of Hot Beam Wiper Blades	
Project Number	2007-09	
Project Leader	Gary Haugen	
Agency	Big Stone County Highway Department 437 Minnesota Street North Ortonville, MN 56278	
Phone	320-839-3747	
Problem	Windshield wipers become coated with ice during snowplow operations, causing poor visibility out of the windshield. The ice coating can also damage the windshield when tiny rocks get embedded into the ice and scratch the glass.	
Solution	Use Hot Beam heated wiper blades on snowplow trucks to keep ice from forming.	
Procedure	The Hot Beam wiper blades were installed on the front of a 143H motor grader and also on a 1999 Sterling tandem.	
Results	The heated wiper blades performed well compared to the standard blades. Drivers had no problems with ice sticking to blades or the windshield. The blades performed especially well when plowing in a direction where the wind brought a large amount of snow up over the windshield.	
Approximate Cost	\$1,700	
Implementation	There are many advantages to using the heated wiper blades. The blades will be retested this winter and possibly will be implemented statewide.	
Status	Completed	

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

Past OPERA Projects

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 Mn/DOT, 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 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, retro-reflectivity, 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 (LED) 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. But 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.

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