



OPERA

Local Operational Research
Assistance Program

2007 Annual Report

2007 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: mnltp@umn.edu
Web: www.mnltp.umn.edu

Compiled by: Jim Hammerand, Publications Intern

Designed by: Greg Summins, Graphic Design Intern

Editor: Michael McCarthy

Designer: Cadie Wright

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



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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.

Apply for OPERA funding

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

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
Fax: 612-625-6381
E-mail: mnltap@umn.edu

Extending the Life of Bituminous Overlays



Project Title Extending the Life of Bituminous Overlays

Project Number 2005-01

Project Leader Cory Slagle

Agency Washington County Department of Transportation and Physical Development
11660 Myeron Road N.
Stillwater, MN 55082

Phone 651-430-4337

Problem Agencies are looking to extend the life of bituminous overlays by reducing reflective cracking and preventing moisture penetration. Paving mat products have had limited success: they did not retard cracking as advertised, were difficult to install, and couldn't be recycled with the pavement.

Solution Use TruPave, a fiberglass mat made by Owens Corning, prior to overlaying with new bituminous. The new product doesn't shrink or stretch under high installation temperatures and is fully recyclable. The product also claims to retard (but not stop) reflective cracking and provide a moisture barrier.

Procedure TruPave was placed on a half-mile test section of CSAH 9 (Jamaca Avenue N.), north of TH 96, in the City of Grant in June 2005. The roadway was crack-patched before the mat was installed. A layer of asphalt emulsion was placed on the roadway using a tanker truck. A tractor with a roller attachment followed the truck, rolling the TruPave material out on top of the asphalt emulsion. The roadway was then overlaid with 1.5 inches of new bituminous. Another half-mile section of CSAH 9, immediately north of the TruPave test section, was overlaid without the mat as a control. The two test sections experienced the same traffic and environmental conditions.

Results A June 2006 visual inspection of the roadway found an average of 36 cracks per 100 feet in the half-mile of road with TruPave. The half-mile control section averaged 79 cracks per 100 feet.

Approximate Cost \$12,000 (\$10,000 approved for project)

Implementation More testing will be conducted over the coming years to determine the long-term durability of the material.

Status Completed



Recycled Tear-off Shingles Road Construction Demonstration



Project Title Recycled Tear-off Shingles Road Construction Demonstration

Project Number 2006-03

Project Leader Bill Boettner

Agency Town of Hassan Public Works
25000 Hassan Parkway
Rogers, MN 55374

Phone 763-428-4100



Problem Mn/DOT has an existing specification for use of 5 percent manufacturers' (post-industrial) recycled asphalt shingles (RAS) as a partial asphalt and aggregate supplement in hot-mix asphalt (HMA). This practice is generally well accepted and used by at least three HMA producers in Minnesota. However, more field experience is needed to demonstrate the successful use of tear-off (postconsumer) RAS. Such demonstrations will provide data and encourage Mn/DOT to develop a new bituminous materials specification that would allow tear-off RAS in HMA. Two controlled field demonstrations successfully used tear-off RAS, but in the base course only. In these studies, manufacturers' RAS was used in the wear course.

Solution Determine pavement performance difference with a controlled field demonstration of six types of hot-mix asphalt: tear-off shingle scrap HMA at 5 and 10 percent, 10 percent tear-off shingle scrap HMA with a softer binder, 5- and 10-percent manufacturers' shingle scrap, and a shingle-free control section.

Procedure In August 2006, several HMA blends were laid on a 600-foot pavement test strip in the Town of Hassan on Park Drive immediately south of Tucker Rd. The strip was divided into six 200-foot-long test strips.

Mn/DOT, one of many project partners, surveyed the test strip in March 2007 and will return in fall of 2007 for more tests. Mn/DOT also tested core samples in its laboratory and gave other samples to the University of Minnesota's Civil Engineering Lab for further testing.

Results There was no cracking in any of the test sections, but there was some slight rutting at the intersection, which may be from traffic slowing to turn or paving inconsistencies. Laboratory results are expected in summer 2007.

Approximate Cost \$21,000 (\$10,000 approved)

Implementation Hassan plans to use RAS in future road projects. With additional information and impetus for a new Mn/DOT specification allowing the use of tear-off RAS, use of tear-off shingle recycling is expected to accelerate throughout Minnesota.

Status Completed

Millings for Gravel Road Stabilization



Project Title Millings for Gravel Road Stabilization

Project Number 2006-04

Project Leader Gene Busacker

Agency Scott County Public Works
600 County Trail E.
Jordan, MN 55352

Phone 952-496-8478



Problem Red rock or gravel as a road surface requires expensive maintenance under heavy traffic, in this case 350 to 400 vehicles per day on County Roads 87 and 64.

Solution Use millings, a cheap alternative that stands up to wear better.

Procedure Millings from overlay projects were routed to county roads and added on top of gravel roadbeds at a depth of 8 to 12 inches. The roads were leveled, watered, reshaped, and compacted. After topping the millings with 2 inches of class-five gravel, a reclaimer mixed the top half foot, followed by more reshaping, watering, and compacting, and a dust-control application.

Results The millings provided less-expensive roadbeds that were sturdier, cost less to maintain, and weren't as dusty in dry weather or as slick in wet weather. Roads are now graded once a month instead of two or three times a week.

Approximate Cost \$81,000 (\$5,000 approved for project)

Implementation The county will continue to use millings in its roads.

Status Completed

Pick Cutting Edges

Project Title	Pick Cutting Edges
Project Number	2006-05
Project Leader	Gene Busacker
Agency	Scott County Public Works 600 County Trail E. Jordan, MN 55352
Phone	952-496-8031
Problem	Using straight cutting edges to cut out washboarded roads disturbs more gravel than necessary.
Solution	Use a pick cutting edge to comb the road top instead.
Procedure	Replace the straight cutting edges with pick cutting edges; install a roller/packer on the back of the grader for compaction.
Results	The picks cut out the washboarding and left the gravel mostly in place, and had many other beneficial uses. In winter, the picked blades removed snow and ice from the road surface but left the gravel, cutting down on time and money spent on spring gravel replacement operations. The picks also evenly spread vegetation caught up during roadside cutting instead of leaving chunks of sod and grass along the shoulder. The pick blades have lasted since June 2004, while regular cutting blades are replaced monthly. The rubber-tired roller/packer mounted on the back of the grader compacted the freshly graded gravel back into the road top, ensuring a smooth and well-compacted road top without float or loose gravel. Heavily traveled roads, once graded three times a week, are now graded once a week.
Approximate Cost	\$37,000 (\$5,000 approved for project)
Implementation	The county will continue to use the pick cutting edges and the roller/packer on its gravel roads.
Status	Completed



Frost Boil Correction

Project Title Frost Boil Correction

Project Number 2006-06

Project Leader Gene Busacker

Agency Scott County Public Works
600 County Trail E.
Jordan, MN 55352

Phone 952-496-8478



Problem Water that seeps into gravel or red rock roadbeds can cause frost boils and other road defects, as happened on heavily traveled Scott County roads on a yearly basis. These road conditions resulted in complaints and shoulder damage.

Solution Instead of red rock or gravel, use millings and Geo-Tec fabric to seal the road bed.

Procedure After laying Geo-Tec fabric across the road top (the entire 24-foot width and 50 feet past any bad spots to ensure a good, hard road bed), three 6-inch layers of millings are laid, graded out, watered, and compacted with a roller for a total depth of 18 inches. Two inches of class-five gravel are laid on top of the millings, and a reclaimer mixes gravel and the top 2 inches of millings. After further watering, blading, and compacting, the new road bed is ready.

Results The fabric kept clay and mud from being pushed up into the millings layers, and the millings sealed water out of the road bed. There have been no signs of frost boils or weak spots in the road beds after two spring seasons, and there have been no complaints.

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

Implementation The county plans to use the material in future road repairs.

Status Completed

Past OPERA Projects

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.

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

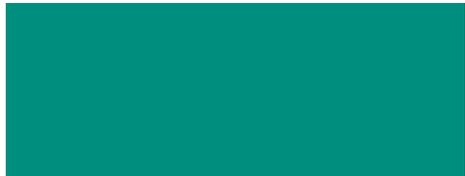
A blower mounted to the front end of a Marshall County motor grader cleared gravel roads of grass clippings, which not only maintained the safety of the roads but also reduced the cost of replacing gravel that previously would have been discarded.

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.



UNIVERSITY OF MINNESOTA
CENTER FOR TRANSPORTATION STUDIES



MINNESOTA LOCAL TECHNICAL ASSISTANCE PROGRAM

Minnesota 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

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Web: www.mnltp.umn.edu