

We gathered information and surveyed Minnesota bicyclists to improve the safety, comfort and connectivity of separated bike lanes. **Report 2021-12**



We investigated innovative materials to allow for early detection of pavement damage. **Report 2021-18**

FY2021 LOCAL ROAD RESEARCH BOARD

At-A-Glance

July 1, 2020, through June 30, 2021 | [LRRB.ORG](https://lrrb.org)



We refined an in-vehicle lane departure warning system that employs standard GPS data rather than expensive cameras or maps. **Report 2021-17**



We measured the impacts of COVID-19 on traffic safety. **Report 2021-21**

Welcome to the Local Road Research Board At-A-Glance for Fiscal Year 2021

The Local Road Research Board (LRRB) has been bringing innovations to local Minnesota researchers since 1959. Our mission is to serve local road practitioners through the development of new initiatives, the acquisition and application of new knowledge, and the exploration and implementation of new technologies.

How LRRB Works

Our research ideas come from local Minnesota transportation practitioners like you. Contact us anytime at lrrb.org. We'll let you know whether current solutions to your problem exist or help you take your idea to the next stage of consideration for funding.

To ensure that our research is responding to city and county needs, we have the following process for selecting new projects:

1. **October prescreening meetings:** LRRB representatives hold sessions at State Aid prescreening meetings, where city and county engineers, as well as maintenance superintendents, can discuss their research and technology transfer needs.
2. **January email survey:** We ask city and county engineers to prioritize the list of ideas generated from the prescreening meetings.

3. **January city/county association meetings:** We report on the ideas collected in step 1 and prioritized in step 2.
4. **February to December proposal development:** We work with you to develop need statements for the top ideas. Then the LRRB issues requests for proposals and selects proposals to fund.

When the LRRB approves a research proposal, the Minnesota Department of Transportation (MnDOT) provides administrative support and technical assistance. Researchers from MnDOT, universities and consulting firms conduct the research, and the LRRB monitors the progress.



Left to right:
Jim Foldesi,
LRRB Chair, St. Louis County

Mike Flaagan,
RIC Chair, Pennington County

Kristine Elwood,
Outreach Committee Chair,
MnDOT State Aid Division

Advancing Minnesota's Transportation Systems

Research sponsored by the LRRB helps to improve the quality of Minnesota's transportation systems. The impact multiplies as more and more engineers see potential applications through the technology transfer efforts of LRRB's Research Implementation Committee (RIC).

LRRB Marketing Plan

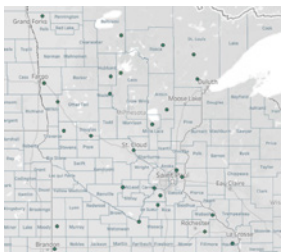
To increase our engagement with city and county staff and encourage the productive use of LRRB's research results, the LRRB Outreach Committee has established the following goals for the next year:

- Increase the pool of Technical Advisory Panel participants.
- Expand communication with all levels of transportation staff, including technicians and maintenance staff.
- Redesign the LRRB website to improve user experience, functionality and search engine.
- Create more marketing and communications content, including webinars and videos.
- Identify optimal level of ongoing marketing support and budget.

LRRB Research Highlights

Measuring the Impacts of COVID-19 on Traffic Safety

While fewer drivers were on the road last year, speeding and other unsafe driving behaviors increased. Researchers used data collected from existing automated traffic recording (ATR) stations and sensors to measure traffic volumes and speeds from March through December 2020. They also surveyed law enforcement about their experience with unsafe driving behavior. By understanding the magnitude of the problem, Minnesota's transportation agencies can plan more effective countermeasures. [Report 2021-21](#)



Investigators used data from 27 ATR sites located throughout the state to monitor traffic levels and speeds.

Other COVID-19 Research

- Telecommuting During COVID-19: How Does It Shape the Future Workplace and Workforce?
- Understanding How the Disparate Effects of COVID-19 are Affecting MnDOT's Efforts at Equitable Contracting
- Public Engagement Practices During the COVID-19 Pandemic and Other Disruptive Events

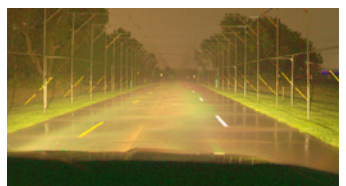
For up-to-date information, search "COVID" at lrrb.org.

Developing Speed Limit Guidelines for Municipal Roadways

The speed limit for Minnesota city streets was 30 mph until 2019, when state law changed to allow municipalities to set their own speed limits for city-owned roads. We're currently developing a unified, statewide approach for setting speed limits based on the law, safety information and the impacts of speed limit changes in areas where they have been enacted.

Identifying Wet Retroreflectivity Levels for Pavement Markings

Pavement marking visibility in rainy, nighttime conditions is essential to vehicle passenger safety. Researchers performed wet-night marking visibility tests to identify levels of wet retroreflectivity to include in state standards for wet-reflective pavement markings.



The American Association of State Highway and Transportation Officials took notice of this project, [honoring it with a Sweet Sixteen award](#) as one of the nation's top high-value research studies. [Report 2020-09](#)

System Preservation Guide: A Planning Process for Local Government Management of Transportation Networks

New training and implementation guidance for local engineers leverage a 2016 LRRB tool that emerged from an effort with five pilot counties to assess transportation system preservation needs, communicate those needs to elected officials and the public, and evaluate the full range of strategies available to close maintenance funding gaps. [Report 2021RIC03](#)

New Resources for Local Agencies

LRRB research has resulted in numerous tools to cost-effectively manage local transportation systems. Find our latest products under “Resources” at lrrb.org.

Recruitment Toolkit for Local Agencies ▶

A suite of tools was designed to help local agencies fill open positions and expand the transportation workforce. They provide support both for short-term recruitment, training and retention on the one hand and long-term efforts to promote career opportunities to students.

[Guidebook and Manual 2021RIC05](#)



Courtesy WSB Engineering

◀ A Guide to GIS Tools and Apps

A quick start guide describes various GIS tools, staffing and required data sources for asset management and their value for planning and other activities.

[Guide 2020RIC15](#)



Catch Basins and Manholes: Products, Installation, ▶ and Settlement and Heave Mitigation

Based on information gathered in surveys and interviews with engineers and municipalities, a new guide provides current information about manhole and catch basin installation and maintenance practices for municipal and county engineers.

◀ Full-Depth Reclamation Resource Guide for Urban and Suburban Streets

LRRB has developed a guidebook to help cities and counties determine the feasibility of using full-depth reclamation as a cost-effective roadway rehabilitation solution for urban and suburban streets.

[Guidebook 2021RIC02](#)



Quick Reference Guide for Mitigating ▶ Seasonal Movements at Culverts

Local agencies struggle with weather-related pavement deformations that develop over newly installed centerline culverts. A new guide helps agencies identify the cause of these “frost dips” and recommends solutions.

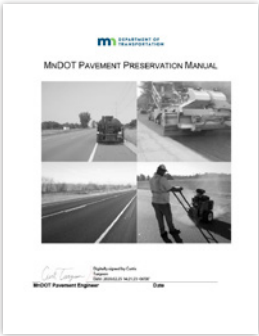
[Guide 2021RIC01](#)



Updated Pavement Preservation ▶ Guidance for Local Agencies

Based on findings from a survey of Minnesota cities and counties, extensive discussion with Minnesota advisors and a literature search, the LRRB is now recommending new treatments for your consideration to help preserve pavements, including rejuvenating sprays; thinlays; and scrub, slurry and cape seals.

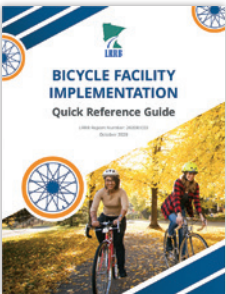
[Chapter 6 of MnDOT Pavement Preservation Manual](#)



◀ Bicycle Facility Selection Quick Guide

This quick reference directs local planners and designers to specific sections of MnDOT’s new design manual and other documents, answers common questions, and describes decision-making and local expertise.

[Guide 2020RIC03](#)



Strategies for Effective ▶ Roundabout Approach Speed Reduction

A new guide provides local agency engineers with a framework for standardizing design practices and remediation alternatives at roundabout intersections. This guidance will assist in determining what, where and how changes should be made to existing intersections.

[Coming Soon!](#)



◀ Roadside Turfgrass Installation and Management



An online, self-guided course on turfgrass installation and care guides participants through selection of salt-tolerant turfgrasses, seeding and soil preparation, mowing, irrigation and other practices.

[Course 202003](#)

Research behind the report on watering systems is available.

[Report 202003](#)

Investigators also developed a guide and video for homeowners about caring for new boulevard turfgrass.

[Homeowner Guidelines](#)

Virtual Workshop on ▶ Lightly Surfaced Roads

Recorded and posted online, this workshop describes light surface treatments of gravel and dirt roads to control dust, maintain grades or stabilize materials. The workshop webpage includes the recording, related documents and video.

[Virtual Workshop](#)



Request a Transportation Research Synthesis

A Transportation Research Synthesis (TRS) is a short-turnaround research report that you can request to answer your research question. A TRS can summarize completed and in-progress research or report about the state of practice among your peers in Minnesota and other states. For more information or to request a TRS, visit mndot.gov/research/TRS.html.

TRS 2001, Systems for Notifying the Public of Local Road Closures Using Smartphone Map Applications, surveyed state and local agencies to identify which agencies have experience developing a central repository for road closure and traveler information that is updated by state traveler information databases and widely used smartphone apps.



Other resources at lrrb.org:

- ▶ [Pavement Condition Forecasting Tool](#)
- ▶ [Minnesota Guide for Stream Connectivity and Aquatic Organism Passage Through Culverts](#)
- ▶ [Pedestrian Crosswalk Reference Guide](#)
- ▶ [Asset Management Guide for Local Agencies](#)
- ▶ [Best Practices for Boulevard Turf Design and Maintenance](#)
- ▶ [Best Practices for Managing Utility Congestion Within Rights of Way](#)
- ▶ [Design Guidelines for Timber Bridges](#)
- ▶ [Gravel Road Management Tool](#)



LRRB Research

Active Projects in FY2021



Find active and completed projects under the “Research” tab at lrrb.org.

COMMON FUNDING SOURCES

LRRB	Local Road Research Board
SRP	MnDOT State Research Program
SP&R	State Planning & Research (FHWA)

Bridges & Structures

LRRB Modifier	Title	Report #/ Status	Investigator	Technical Liaison	End Date	Funding Source	Total Cost
INV 645	Full Depth Reclamation Resource Guide for Urban and Suburban Street Application (and Appendices)	2021RIC02	Michael Marti, SRF Consulting Group, Inc.	Guy Kohlhofer	6/12/21	LRRB	\$34,676
INV 645	Culvert Type Evaluation: Concrete vs. Plastic vs. Corrugated Metal	In Progress	Michael Marti, SRF Consulting Group, Inc.	Karin Grandia	6/30/22	LRRB	\$45,999
INV 983	Development of Cost-Competitive Timber Bridge Designs for Long-Term Performance	2020-16A, 2020-16	Don Fosnacht, University of Minnesota Duluth	David Conkel	8/31/20	LRRB	\$212,883

Environmental

LRRB Modifier	Title	Report #/ Status	Investigator	Technical Liaison	End Date	Funding Source	Total Cost
INV 1016	Permeable Pavement for Road Salt Reduction	2020-15	John Gulliver, University of Minnesota	Richard McCoy	8/31/20	LRRB	\$197,835
INV 1027	Characterization of Runoff Quality From Paved Low-Volume Roads and Optimization of Treatment Methods	2020-27	John Gulliver, University of Minnesota	John Welle	11/30/20	LRRB	\$192,527
INV 1038	Regional Optimization of Roadside Turfgrass Seed Mixtures—Phase II: Regional Field Trials and Economic Analysis	In Progress	Eric Watkins, University of Minnesota	Dwayne Stenlund	8/31/22	LRRB	\$467,139
INV 1039	Design and Construction of Infiltration Facilities	2021-14	John Gulliver, University of Minnesota	Dwayne Stenlund	8/31/21	LRRB	\$238,572
INV 1041	Assessing Culverts in Minnesota: Fish Passage and Storm Vulnerability	In Progress	Jessica Kozarek, University of Minnesota	Nicole Bartelt	11/30/21	LRRB	\$158,374
INV 1059	Wet Pond Maintenance for Phosphorus Retention	In Progress	John Gulliver, University of Minnesota	Leslie Stovring	6/30/22	LRRB, SRP	\$222,467
INV 1060	Reuse of Regional Waste in Sustainably Designed Soils	In Progress	David Saftner, University of Minnesota Duluth	Dwayne Stenlund	1/31/22	LRRB	\$197,406
INV 1063	Evaluation of Environmental Impacts of Potassium Acetate Used as a Road Salt Alternative	In Progress	John Gulliver, University of Minnesota	Nicklas Tiedeken	7/31/22	LRRB	\$214,743
INV 1077	Stormwater Pond Maintenance and Wetland Management for Phosphorus Retention	In Progress	John Gulliver, University of Minnesota	Ross Bintner	6/30/23	LRRB	\$247,237
INV 1084	Cost-Effective Roadside Revegetation Methods to Support Insect Pollinators	In Progress	Emilie Snell-Rood, University of Minnesota	Dan MacSwain, Christopher Smith	8/31/22	LRRB, SRP	\$281,412
INV 1094	Comparison of Compost and Proprietary Soil Amendments for Vegetation Establishment	In Progress	Bora Cetin, Michigan State University	Warren Tuel	3/31/24	LRRB, SRP	\$260,000

FUNDED FOR FY2022: Boulevard Tree Selection—Best Practices; Reuse of Minnesota Waste Material in Sustainably Designed Soils—Phase II; Tire-Derived Aggregate (TDA): Lightweight Fill and as Stormwater Infiltration Media; Update of 2009 Stormwater Management Best Practices Manual

Maintenance Operations

LRRB Modifier	Title	Report #/ Status	Investigator	Technical Liaison	End Date	Funding Source	Total Cost
INV 645	Best Practices to Manage Effects of Settlement and Heave at Catch Basins and Manholes	2021RIC04	Derek Tompkins, American Engineering Testing, Inc.	Steven Bot	7/31/21	LRRB	\$59,676
INV 645	Minnesota Snow and Ice Field Handbook for Snowplow Operators Update	2022RIC05	Mindy Carlson, University of Minnesota	Kathleen Schaefer	2/28/22	LRRB	\$20,000
INV 645	Snowplow Optimization and GPS/AVL on Maintenance Equipment	In Progress	Susan Miller, SRF Consulting Group, Inc.	Joe MacPherson	1/31/23	LRRB	\$85,729
INV 1034	Adaptive Management to Improve Deicing Operations	2021-07	Larry Baker, University of Minnesota	Ross Bintner, Jessica Wilson	3/31/21	LRRB	\$204,000
INV 1047	Techno-Economic Analysis of Implementing Hybrid Electric Utility Vehicles in Municipal Fleets	2020-25	Will Northrop, University of Minnesota	Kevin Schlangen	7/31/20	LRRB	\$100,767
INV 1065	Implementation of Lane Boundary Guidance System for Snowplow Operations	In Progress	Max Donath, University of Minnesota	Daniel Rowe	10/31/22	LRRB, SRP, Other State Funds	\$723,034
INV 1078	Benefit/Cost of Applying a Higher Asphalt Film Thickness (AFT) vs. Doing a Chip Seal at One Year	In Progress	Charles Jahren, Iowa State University	Bruce Hasbargen	7/31/22	LRRB	\$145,001

FUNDED FOR FY2022: Asset Management Tools for Local Governments; Cutting Edges Performance User's Guide; Haul Road and Detour Maintenance; ROW Policies—Best Practices

Materials & Construction

LRRB Modifier	Title	Report #/ Status	Investigator	Technical Liaison	End Date	Funding Source	Total Cost
INV 645	RIC: Construction Inspection and Documentation Training Course	Completed	Stephanie Malinoff, University of Minnesota—CTS	Rollin Larson	12/30/20	LRRB	\$137,338
INV 645	Full Depth Reclamation Resource Guide for Urban and Suburban Street Application (and Appendices)	2021RIC02, 2021RIC02A	Michael Marti, SRF Consulting Group, Inc.	Steven Bot	6/12/21	LRRB	\$82,214
INV 645	Contractors Missing Deadlines/Overcommitting	Completed	Ross Jentink, WSB & Associates, Inc.	Michael Flaagan	6/30/21	LRRB	\$18,878
INV 645	Ride Quality of Asphalt Pavements (Overlays and New Construction), Performance of Overlays, Best Practices to Reduce Reflective Cracking	In Progress	Michael Marti, SRF Consulting Group, Inc.	Joe Triplett	7/31/21	LRRB	\$37,558
INV 645	Effectiveness of Fog Seal on Chip Sealed Low-Volume Roads	In Progress	Mike Rief, WSB & Associates, Inc.	Steven Bot	7/31/21	LRRB	\$44,620
INV 645	BMP of Drain Tile Within the Roadway	In Progress	Susan Miller, SRF Consulting Group, Inc.	John Brunkhorst	6/30/22	LRRB	\$52,373
INV 645	Drainage 101 County Roadways and City Streets: Best Practices and Resources Guide	In Progress	Anita Benson, Stonebrooke Engineering, Inc.	Steven Bot	7/31/22	LRRB	\$85,290
INV 645	Crack Treatments for Local Governments: Status of Saw and Seal	In Progress	Michael Marti, SRF Consulting Group, Inc.	Daniel Knapke	11/30/22	LRRB	\$83,352
INV 986	Performance Monitoring of Olmsted CR 117/104 and Aggregate Base Material Update	In Progress	Kyle Hoegh, MnDOT Materials and Road Research	Kaye Bieniek	11/30/23	LRRB	\$44,000
INV 1028	Is Seal Coating Counterproductive or Not?	2020-34	Zhanping You, Michigan Technological University	Steven Bot	12/31/20	LRRB	\$140,508
INV 1046	Innovative Materials and Advanced Technologies for a Sustainable Pavement Infrastructure	2021-18	Jia-Liang Le, University of Minnesota	Juan Pinero	6/30/21	LRRB	\$151,514
INV 1066	Evaluation of Curing Effects on Cold In-Place Recycling (CIR)	Completed	David Rettner, American Engineering Testing, Inc.	Joel Ulring	1/31/21	LRRB	\$19,800
INV 1066	Evaluation of Curing Effects on Cold In-Place Recycling (CIR)	In Progress	Eshan Dave, University of New Hampshire	Joel Ulring	4/30/22	LRRB	\$156,052

Materials & Construction <small>[cont.]</small>							
LRRB Modifier	Title	Report #/ Status	Investigator	Technical Liaison	End Date	Funding Source	Total Cost
INV 1067	Construction Incentives: Are They Working?	In Progress	Mohamed Diab, Minnesota State University, Mankato	Fausto Cabral Neto	11/30/22	LRRB	\$88,620
INV 1068	Effectiveness of Geotextiles/Geogrids in Roadway Construction: Determine a Granular Equivalent (GE) Factor	2021-26A, 2021-26	Vernon Schaefer, Iowa State University	Michael McCarty	10/31/21	LRRB	\$197,339
INV 1069	Optimizing Asphalt Mixture Designs for Low-Volume Roads of Minnesota	In Progress	Manik Barman, University of Minnesota Duluth	Joel Ullring	12/31/21	LRRB	\$161,333
INV 1070	Base Stabilization Additives: Effect on GE	In Progress	Halil Ceylan, Iowa State University	Chad Hausman	1/31/23	LRRB	\$197,864
INV 1071	Life Cycle Cost of Local Roads	TRS2002	Michael Marti, SRF Consulting Group, Inc.	Brian Giese	8/31/20	LRRB	\$15,356
INV 1086	Evaluation of SFDR Stabilizing Products	In Progress	Michael Marti, SRF Consulting Group, Inc.	Bruce Hasbargen	7/31/21	LRRB	\$66,293
INV 1103	Evaluation of Proprietary Rejuvenators	In Progress	M. Emin Kutay, Michigan State University	JinYeene Neumann	6/30/23	LRRB	\$199,336
INV 1104	Cost Estimate of B vs. C Grade Asphalt Binders	In Progress	Mihai Marasteanu, University of Minnesota	Jed Nordin	6/30/23	LRRB	\$171,777

FUNDED FOR FY2022: Asphalt Pavement Cracking Performance Data Analysis; Evaluation of Gravel Stabilizer Used on Gravel Roads and Gravel Shoulders; Improving and Developing Pavement Design Inputs and Performance Functions for Cold Recycled Pavement Layers in Minnesota; Mitigation of Tenting of Transverse Cracks and Joints in Asphalt Pavement; Pavement Design Around Utilities—Best Practices; Residential Roadway Width—Best Practices

Multimodal							
LRRB Modifier	Title	Report #/ Status	Investigator	Technical Liaison	End Date	Funding Source	Total Cost
INV 645	Bicycle Facility Implementation: Quick Reference Guide	2020RIC03	Michael Marti, SRF Consulting Group, Inc.	Chad Millner	10/31/20	LRRB	\$62,994
INV 1044	How Do Complete Streets Matter for Communities? The Case of Richfield, Minnesota	2020-22	Zhirong Jerry Zhao, University of Minnesota	Jack Broz	10/31/20	LRRB	\$103,834
INV 1049	Guidance for Separated/Buffered Bike Lanes With Delineators	2021-12	John Hourdos, University of Minnesota	Paul Oehme	5/31/21	LRRB	\$90,578
INV 1082	Guidelines for Safer Pedestrian Crossings: Understanding the Factors That Positively Influence Vehicle Yielding to Pedestrians at Unsignalized Intersections	In Progress	Raphael Stern, University of Minnesota	Jason Radde	12/31/22	LRRB, SRP	\$165,278
INV 1090	Designing an Autonomous Service to Cover Transit Last Mile in Low-Density Areas	In Progress	Alireza Khani, University of Minnesota	James Gittemeier	6/30/23	LRRB	\$100,000

Policy & Planning							
LRRB Modifier	Title	Report #/ Status	Investigator	Technical Liaison	End Date	Funding Source	Total Cost
INV 645	System Preservation Guide and Fact Sheets	2021RIC03, 2021RIC03F	Michael Marti, SRF Consulting Group, Inc.	Andrew Witter	6/12/21	LRRB	\$91,193
INV 645	Training Roadmap for Civil Engineering Technicians User Guide	2021RIC05 (6 reports)	Stephanie Malinoff, University of Minnesota—CTS	Chris Byrd	8/31/21	LRRB	\$99,983
INV 1037	Fact Sheet: Strategies for Recruiting and Retaining Minnesota's Transportation Workforce	2021-06, 2021-06FS	Kenneth Bartlett, University of Minnesota	Lyndon Robjent	3/31/21	LRRB	\$137,281
INV 1043	Local Contributions to State and Regional Transportation Facilities in Minnesota	2020-12	Zhirong Jerry Zhao, University of Minnesota	Russ Matthys	8/31/20	LRRB	\$121,668
INV 1073	The Impact of Deferred Maintenance in Minnesota	In Progress	Camila Fonseca-Sarmiento, University of Minnesota	Paul Oehme	4/30/22	LRRB	\$144,353
INV 1102	MnDOT Haul/Detour Routes: Impacts on Local Roads	In Progress	Bora Cetin, Michigan State University	Tim Stahl	6/30/23	LRRB	\$184,389

FUNDED FOR FY2022: Complete Streets Speed Impacts; Evaluating Local Funding in Regional Projects; Understanding How Street Reconstruction Affects Property Value

Traffic & Safety							
LRRB Modifier	Title	Report #/ Status	Investigator	Technical Liaison	End Date	Funding Source	Total Cost
INV 645	Autonomous Vehicles: What Should Local Agencies Expect?	In Progress	Michael Marti, SRF Consulting Group, Inc.	Wayne Sandberg	7/31/21	LRRB	\$30,865
INV 645	Strategies for Effective Roundabout Approach Speed Reduction	In Progress	Tim Arvidson, Stonebrooke Engineering, Inc.	Joe Gustafson	9/30/21	LRRB	\$32,853
INV 645	Guidelines for Determining Speed Limits on Municipal Roadways	In Progress	Tim Arvidson, Stonebrooke Engineering, Inc.	William Manchester	10/31/22	LRRB	\$69,484
INV 645	Cost-Effectiveness of Various Pavement Markings	In Progress	Michael Marti, SRF Consulting Group, Inc.	Jon Pratt	10/31/22	LRRB	\$51,800
INV 645	Best Practice Guidelines for Intelligent (Active) Warning Devices	In Progress	Renae Kuehl, SRF Consulting Group, Inc.	Justin Femrite	11/30/22	LRRB	\$46,128
INV 1024	Evaluation of the Effectiveness of Stop Lines in Increasing the Safety of Stop-Controlled Intersections	2020-17	John Hourdos, University of Minnesota	Nick Bauler	8/31/20	LRRB	\$150,528
INV 1048	Criteria and Guidelines for Three-Lane Road Design and Operation	In Progress	Gary Davis, University of Minnesota	Jack Broz	8/31/22	LRRB	\$155,559
INV 1051	Development and Demonstration of an In-Vehicle Lane Departure Warning System Using Standard GPS Technology	2021-17	Imran Hayee, University of Minnesota Duluth	Victor Lund	6/30/21	LRRB	\$133,656
INV 1061	Toward Implementation of Max-Pressure Signal Timing on Minnesota Roads	In Progress	Michael Levin, University of Minnesota	Ben Hao	2/28/22	LRRB	\$177,000
INV 1064	Establishing a Repeatable Method for Presenting Nontraditional Traffic Treatments to Maximize Stakeholder Support	In Progress	Nichole Morris, University of Minnesota	Scott Thompson	6/30/22	LRRB, SRP	\$348,994
INV 1074	Taconite as a Lower Cost Alternative High Friction Surface Treatment to Calcined Bauxite for Low-Volume Roads in Minnesota	In Progress	Lawrence Zanko, University of Minnesota Duluth	Tracey Von Bargaen	8/31/24	LRRB	\$322,225
INV 1075	Transverse Rumble Strips at Rural Intersections	In Progress	Shauna Hallmark, Iowa State University	Victor Lund	7/31/22	LRRB	\$181,686
INV 1079	Development of a Smartphone App to Warn the Driver of Unintentional Lane Departure Using GPS Technology	In Progress	Imran Hayee, University of Minnesota Duluth	Victor Lund	6/30/23	LRRB	\$147,145
INV 1080	Assessing Pavement Markings for Automated Vehicle Readiness	In Progress	Adam Pike, Texas A&M Transportation Institute	Ethan Peterson	6/30/22	LRRB, SRP	\$228,183
INV 1083	Pedestrian User Experience at Roundabouts	In Progress	Ranjit Godavarthy, North Dakota State University	Joe Gustafson	9/30/22	LRRB, SRP	\$120,000
INV 1085	Impact of Speed Limit Changes on Urban Streets	In Progress	Gary Davis, University of Minnesota	Victor Lund	6/30/23	LRRB, SRP	\$156,561
INV 1089	COVID-19 Impacts on Speed and Safety for Rural Roads and Work Zones	2021-21	Shauna Hallmark, Iowa State University	Derek Leuer, Victor Lund	7/31/21	LRRB, SRP	\$35,919
INV 1091	User-Centered Smart Traffic Sign Development Study	In Progress	Nichole Morris, University of Minnesota	Wayne Sandberg	6/30/23	LRRB	\$240,793
INV 1098	Pavement Marking/Colored Pavement Friction Differential and Product Durability	In Progress	Mihai Marasteanu, University of Minnesota	Ethan Peterson	6/30/23	LRRB, SRP	\$136,861
INV 1099	Performance Evaluation of Different Detection Technologies for Signalized Intersections in Minnesota	In Progress	John Hourdos, University of Minnesota	Steven Misgen	11/30/23	LRRB, SRP	\$179,950
INV 1105	Multi-Method Investigation of Pedestrian Safety Impacts of Right-Turn Lanes	In Progress	Curtis Craig, University of Minnesota	Bradley Estochen	6/30/23	LRRB, SRP	\$156,540

FUNDED FOR FY2022: Development and Demonstration of a Novel Red Light Running Warning System Using Connected Vehicle-to-Infrastructure (V2I) Technology; Evaluation of Static and Dynamic No Right Turn on Red Signs at Traffic Signals; Identification and Assessment of Preventative Methods to Mitigate Cognitive and Physical Declines That Influence Driving Performance of Older Drivers; Mini-Roundabout FAQs; Development of a System to Report School Bus Stop—Arm Violations; Pedestrian Safety Around Roundabouts; Using Apps to Notify the Public of Local Road and Bridge Closure

Administrative							
LRRB Modifier	Title	Report #/ Status	Investigator	Technical Liaison	End Date	Funding Source	Total Cost
INV 645	Research Implementation Committee (RIC): Implementation of Research Findings (FY2017-2019)	Completed	Michael Marti, SRF Consulting Group, Inc.	Michael Flaagan	6/12/21	LRRB	\$792,295
INV 645	Implementation of Research Findings (FY2021-2024)	In Progress	Stonebrooke Engineering, Inc.	Michael Flaagan	6/30/24	LRRB	
INV 645	Research Implementation Committee (RIC): Implementation of Research Findings (FY2022-2026)	In Progress	Michael Marti, SRF Consulting Group, Inc.	Michael Flaagan	6/30/24	LRRB	\$600,000
INV 645B	LRRB Outreach and Marketing Support (2019-2020)	Completed	Rena Kuehl, SRF Consulting Group, Inc.	Kristine Elwood	7/31/20	LRRB	\$99,965
INV 645B	LRRB Outreach and Marketing Support (2020-2021)	In Progress	Rena Kuehl, SRF Consulting Group, Inc.	Shannon Fiecke	7/31/21	LRRB	\$99,985
INV 668	Local Technical Assistance Program (LTAP) (FY2020)	Completed	Stephanie Malinoff, University of Minnesota-CTS	Kristine Elwood	9/30/20	LRRB, Other Federal Funds	\$450,500
INV 668	Local Technical Assistance Program (LTAP) (FY2021)	In Progress	Stephanie Malinoff, University of Minnesota-CTS	Kristine Elwood	9/30/21	LRRB, Other Federal Funds	\$300,000
INV 686	LTAP Expanded Activities (FY2021-2022)	In Progress	Stephanie Malinoff, University of Minnesota-CTS	Kristine Elwood	6/30/22	LRRB, Other Federal Funds	\$438,000
INV 916	LRRB Technical Summaries and Project Evaluation Forms (LRRB Technical Transfer Materials Development) (FY2019)	Completed	Patrick Casey, CTC & Associates, LLC	Shannon Fiecke	12/31/20	LRRB	\$99,913
INV 916	LRRB Technical Transfer Materials Development (FY2020)	Completed	Patrick Casey, CTC & Associates, LLC	Shannon Fiecke	6/30/21	LRRB	\$48,961
INV 916	LRRB Technical Summaries (FY2021)	In Progress	Patrick Casey, CTC & Associates, LLC	Shannon Fiecke	7/31/21	LRRB	\$40,344
INV 936	Developing LRRB Need Statements	Completed	Michael Marti, SRF Consulting Group, Inc.	Kristine Elwood	6/30/21	LRRB	\$36,956
INV 998	Operational Research Program for Local Transportation Groups (OPERA) (FY2019-2020)	In Progress	Mindy Carlson, University of Minnesota-CTS	Kristine Elwood	10/31/21	LRRB	\$140,900
INV 998	Operational Research Program for Local Transportation Groups (OPERA) (FY2021-2023)	In Progress	Mindy Carlson, University of Minnesota	Kristine Elwood	8/31/22	LRRB	\$160,000
INV 999	Office of Research & Innovation Report Publication Services (FY2020-2021)	Completed	Arlene Mathison, University of Minnesota	Shannon Fiecke	6/30/21	LRRB, SRP, COPTRS	\$109,169
INV 1087	LRRB Marketing Assessment and Plan	In Progress	Arlene Mathison, University of Minnesota	Shannon Fiecke	10/31/21	LRRB	\$32,508

2022 LRRB and RIC Meetings

Get up-to-date information on these meetings at lrrb.org.

RIC: March 16 – TBD
LRRB: March 23 – TBD

The spring meeting is devoted to programming and idea selection. The LRRB determines annual program funding commitments, selects ideas for inclusion in the July research RFP, and approves the next year’s travel budget. The RIC reviews recently completed research and new ideas from practitioners for possible research implementation funding.

LRRB Presentations at State Aid Prescreening Meetings: May

LRRB representatives attend State Aid prescreening meetings across the state to present the results of completed research and share project updates.

LRRB and RIC: June 23-24, Brainerd

Each summer, LRRB and RIC members meet in a joint session. The meeting takes place outside of the metro area, and when possible, LRRB staff arranges a field tour of a nearby research installation or project site. LRRB and RIC members finalize research and research implementation need statements for proposal solicitation.

RIC: September 14, TBD
LRRB: November 9, St. Cloud

At the fall meeting, the RIC selects implementation proposals for funding and forwards unfunded proposals for consideration at the LRRB winter meeting. The LRRB selects academic research proposals for presentation in December.

LRRB Focus Group at State Aid Prescreening Meetings: October

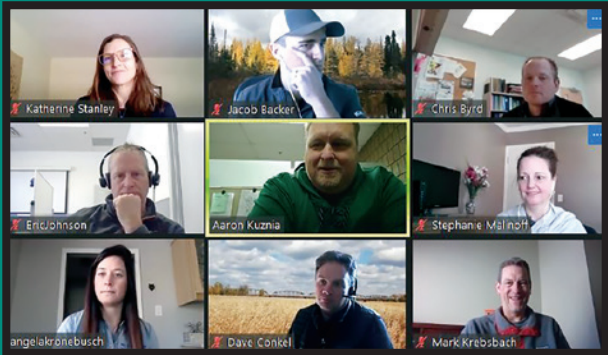
LRRB representatives hold focus group sessions at State Aid prescreening meetings. (Some sessions are held every other year.) City and county engineers are encouraged to bring research or technology transfer ideas to discuss with the group.

RIC: November 16, Hutchinson
LRRB: December 7-8, Minneapolis

At the final meeting of the year, the LRRB selects research proposals for funding in the upcoming fiscal year, following presentations by academic researchers. The LRRB also considers unfunded RIC proposals, following brief presentations from researchers.

Join a Technical Advisory Panel

Participating on a Technical Advisory Panel ensures that research results fit your needs and are applied in the most productive way in the field. Participation involves helping guide researchers, attending a limited number of meetings (in person or remotely) and reviewing research results. To participate, email research.dot@state.mn.us.



Stay Up to Date on LRRB Research

If you don’t already receive LRRB e-news via the State Aid Listserv, sign up today at lrrb.org. You can also subscribe to individual research projects by selecting the “subscribe” button on a project’s webpage.



LRRB By the Numbers:



IN ANNUAL
FUNDING



NEW PROJECTS
EACH YEAR



ACTIVE
PROJECTS



**100+ TAP CITY/
COUNTY MEMBERS**



**12 CITY/COUNTY
BOARD/RIC MEMBERS**

A World-Class Transportation Library



MnDOT's expert librarians are still here to serve not just MnDOT employees but also Minnesota city and county engineers. Request a literature search, interlibrary loan or special publication at 651-366-3791, library.dot@state.mn.us or mndot.gov/library.

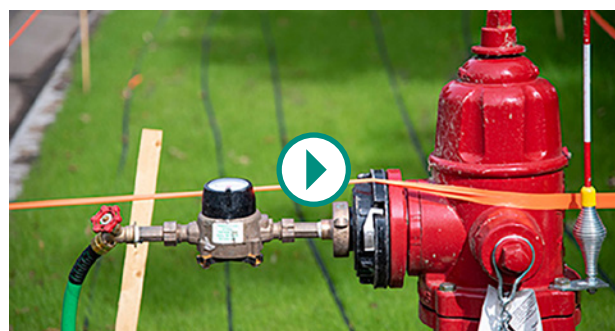


The LRRB partners with the National Road Research Alliance, a multi-state pooled fund focused on solving widespread problems impacting road owners and users.

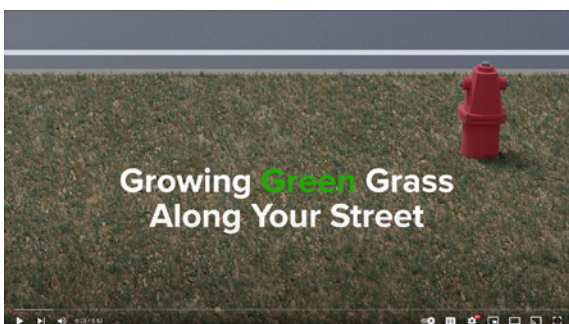
Members help direct the research program at the MnROAD pavement testing facility. For more information, see mndot.gov/mnroad/nrra.

OPERA Program for Local Agencies

Administered by the Minnesota Local Technical Assistance Program, the Operational Research Assistance (OPERA) Program funds innovative maintenance and construction methods developed and demonstrated by local agencies. Read more at mnltp.umn.edu/opera/.



A recent OPERA project tested a temporary roadside turf irrigation system in Edina. The system uses inexpensive common parts to provide a more cost-effective alternative to water truck irrigation for smaller city roads and utilities reconstruction projects. Watch a demonstration at <https://www.youtube.com/watch?v=AFEazAJ3XIU>.



Watch LRRB Videos

The LRRB funds videos that communicate research results to transportation practitioners as well as the public. Check out the [LRRB YouTube channel](#).



Produced by CTC & Associates for **Local Road Research Board,**
Minnesota Department of Transportation, Office of Research & Innovation,
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