

RESEARCH AT-A-GLANCE

Informing, Improving and Innovating
Transportation in Minnesota

FY2024: JULY 1, 2023 – JUNE 30, 2024



DIRECTOR'S MESSAGE



Welcome to the MnDOT Office of Research & Innovation FY2024 At-A-Glance. We are proud to manage over \$18 million in research from the State Research Program, federal funds from State Planning & Research, and city and county funds on behalf of the Minnesota Local Road Research Board. Everyone at MnDOT is an innovator—contributing to safe, equitable and sustainable transportation for all. We're proud to support leading research, ranging from materials and construction to policy and planning, and everything in between. I'm excited to share our new research strategic plan, which will serve as an enterprise blueprint for research investments over the next five years.

Katie Walker, Director
MnDOT Office of Research & Innovation

RESEARCH IN ACTION

Managing Your Project, Sourcing Information and Sharing Results

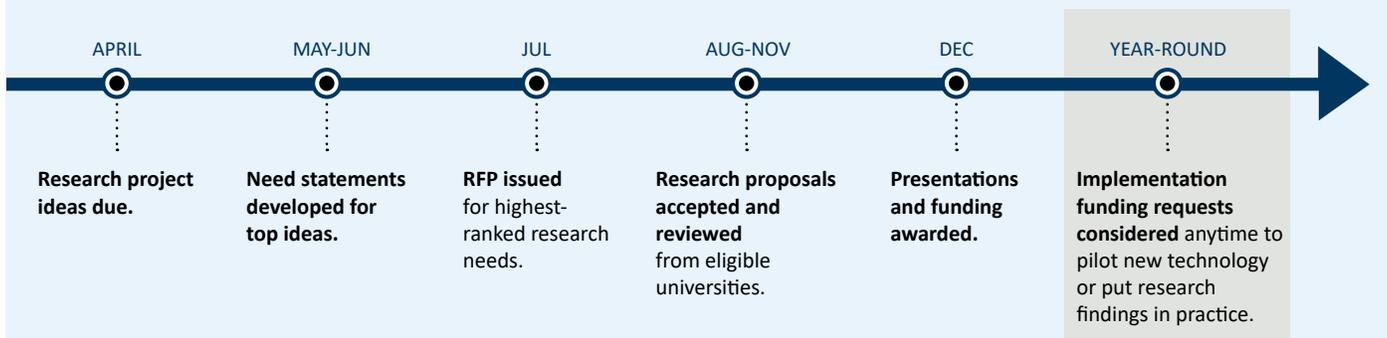
Our two dozen staff members serve industry professionals and officials locally, nationally and internationally. Our team is ready to help you with research management, finance and contract services, library services, and marketing and communications.



VALUE OF RESEARCH

The Value of Research is a joint initiative by MnDOT and LRRB to develop a customized, data-driven approach to monitoring the benefits of research projects. MnDOT staff will partner with researchers to analyze transportation system benefits associated with the outcomes of select projects. Analyzing the benefits of several completed projects each year aims to show the return on investment for research projects funded by MnDOT and LRRB, and will enable agency leaders to communicate the value of research to a broad range of stakeholders.

RESEARCH FUNDING CYCLE



NOTES: Dates subject to change. Check mndot.gov/research for current schedule. Out-of-cycle funding requests are accepted in some circumstances.

2023-2027

MINNESOTA DEPARTMENT OF TRANSPORTATION

RESEARCH STRATEGIC PLAN



Vision

A people-centered transportation system that provides safe, equitable and sustainable transportation for all through purpose-driven research and innovation.

Mission

Conduct research to transform our transportation system creating a better future for all.

Guiding principle

Develop a portfolio of research that supports MnDOT's commitment to equity, innovation, safety, stewardship and sustainability.

Values

- *Informing*
- *Forward thinking*
- *Innovating and implementing*
- *Communicating*
- *Knowledge building*
- *Partnering*

WHAT WE'LL DO: GOALS AND STRATEGIES

Conduct research to inform decision-making.

- *Meet with specialty offices, districts, functional groups and other stakeholders to share research and understand research needs.*
- *Conduct annual research briefings for the Senior Leadership Team, providing insights to shape policy, planning and operational decisions.*
- *Report annually on our research portfolio, documenting and showcasing the benefits of research.*

Proactively identify and address emerging issues to adapt to rapid change.

- *Expedite research to address time-sensitive research opportunities.*
- *Promote participation in national, state, academic and industry research.*
- *Facilitate and engage in forums focusing on emerging research topics.*
- *Foster stronger connections with academia, industry experts, practitioners and community members in research idea generation and need statement development to address emerging issues.*

Expedite research implementation and pilots to improve product and service delivery.

- *Proactively identify implementation potential throughout the research process.*
- *Streamline the process for transitioning completed research into implementation.*
- *Promote and share the implementation program to raise awareness and encourage participation.*
- *Explore national funding opportunities to support piloting innovations.*
- *Identify and pursue industry partnerships to facilitate implementation and pilots.*

Deploy new and better ways to share research.

- *Explore and pilot communication tools to broaden the dissemination of research results.*
- *Increase staff awareness of research and innovation through enhanced communications.*
- *Create a centralized location for research to expand accessibility and utilization.*
- *Tailor research communications, using the right tools to deliver the right messages to the right audiences.*
- *Expand communication events to build a diverse and inclusive research community.*

Use research to cultivate a skilled interdisciplinary workforce.

- *Advance equity by including diverse perspectives in the research process.*
- *Encourage participation in the research program as a professional development opportunity.*
- *Participate in agency development programs to expand staff knowledge of transportation.*
- *Host educational sessions on engaging with research.*

Engage in strategic partnerships to maximize the impact of research.

- *Foster existing and diversify new research partnerships to expand research opportunities.*
- *Expand research partnerships to prevent redundancy in research.*
- *Utilize partnerships to leverage funding resources and maximize return on investment.*
- *Explore new funding sources for research.*

RESEARCH HIGHLIGHTS

BRIDGES AND STRUCTURES

Evaluating Pipes Manufactured with Recycled Content



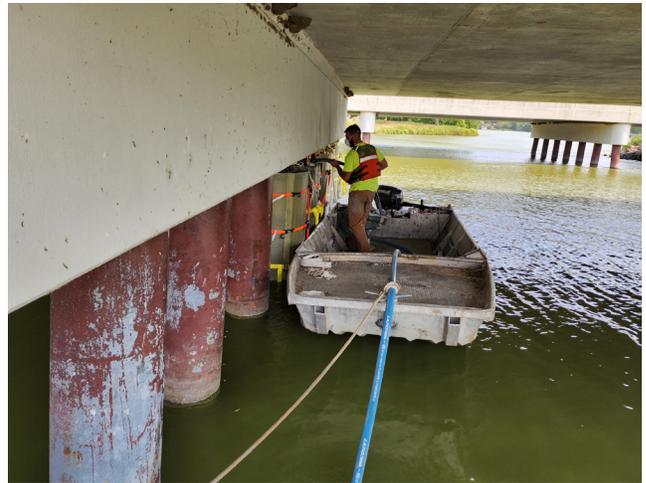
Evaluating the performance, benefits and costs of pipes made with recycled materials will expand decision-makers' material choices for future projects.

Updated federal regulations allow MnDOT to consider pipes made with recycled materials for applications such as stormwater diversion. Recognizing an opportunity to provide more options when choosing pipe products and help meet the agency's environmental goals, MnDOT compared the performance of two culverts: one made with recycled content and one with new materials. Short- and long-term monitoring data and an assessment of the environmental and operational benefits and costs provide decision-makers with information to better inform pipe choices. ([Ongoing Project](#))

Innovative Repairs for In-Water Bridge Supports

Repairing a bridge's in-water foundation is critical and challenging as water and traffic must typically be diverted. Advancements in bridge repair technology provided an opportunity to evaluate new products on a bridge needing structural reinforcement. Researchers used fiberglass-reinforced plastic jackets or forms and steel-reinforced grout, refining the method throughout the project. Observations of the repairs after about a year illustrated the technique's effectiveness and is expected to extend bridge life by 20 years, giving transportation agencies another tool to support sustainable bridges.

[Report 2024-28](#)



New methods and tools give bridge engineers options for challenging repairs with minimal traffic disruption.

ENVIRONMENTAL

Designing Sustainable Soils with Waste Material



Roadside soil amended with local industrial by-products can support plant growth and filter stormwater.

Vegetated roadsides help control stormwater and polluted runoff before it reaches lakes, streams and communities. Because leftover road construction soil generally does not support filtration and plant growth, MnDOT research has identified organically rich, locally available industrial byproducts to amend soil. A design guide detailing engineered soil mixes with materials such as recycled concrete aggregate and ash sawdust shows high potential for a sustainable, efficient solution. [Report 2024-23](#)

Gathering Solar Energy with Snow Fences



Besides reducing blowing snow on highways, snow fences can serve another purpose: generating electricity. Along about one-third of a mile on U.S. Highway 10, researchers constructed a snow fence that replaced traditional slats with 6-inch-wide solar panels. The pilot project proved effective in both controlling snow drift and producing electricity, enough that a mile of fence could power 50 average homes. Noise walls could also house solar panels, powering highway infrastructure, farm systems or power grids. Initial benefit–cost analyses are promising and will be monitored over the long term. [\(Ongoing Project\)](#)

MULTIMODAL

Grand Rapids GoMARTI Self-Driving Shuttle Pilot Program

MnDOT and numerous partners seek to improve transit options for passengers in rural areas. In a first-of-its-kind collaborative autonomous vehicle pilot program, on-demand rides were provided to Grand Rapids area residents and visitors. Five autonomous shuttle vans, including three wheelchair-accessible vans, tested the system across approximately 75 pickup and drop-off locations. Lessons learned regarding winter weather, community education and engagement will inform future efforts to provide accessible mobility options and aid workforce and economic development.



The goMARTI pilot programs illustrated potential benefits to rural residents who may have transportation challenges.

[Report 2024-20](#)

MATERIALS AND CONSTRUCTION

Strengthening Roads with Base Stabilization Additives



New pavement design standards for base stabilizers can guide road engineers in choosing the best products for sustainable roads.

Full-depth reclamation is a sustainable road construction method with many economic and environmental benefits. Strengthening the road base with stabilizing additives can make the pavement even more durable. Laboratory and field testing of proprietary stabilizers illustrated improvements in pavement stiffness and economic benefits over time. Continued observations of field test sites will monitor performance and refine life-cycle costs for each stabilizer tested.

[Report 2024-15](#)

Keeping Pedestrian Areas Clear in Winter

Walkways, curb ramps, refuge islands and other roadway features help MnDOT prioritize pedestrian safety. Keeping these areas clear in winter weather, however, can be challenging due to snowplow impacts, other equipment needs and jurisdictional uncertainties. A review of best practices used by Minnesota's local agencies and other states led to recommendations to keep pedestrian areas clear in winter, including identifying safety feature designs, clarifying roles and responsibilities, and establishing snow removal priorities. [Report 2023-18](#)



Pedestrian safety measures can be designed for effective snow and ice removal.

POLICY AND PLANNING

Utilizing Arts and Culture to Mitigate the Negative Impacts of Transportation Infrastructure on Communities



Incorporating arts and culture in transportation projects throughout the planning process helps MnDOT engage local communities to create places that reflect community identity and history.

Historically, transportation projects have had a disproportionately negative effect on BIPOC (Black, Indigenous and people of color) and low-income communities. MnDOT seeks to mitigate these negative effects by reaching out to these communities and incorporating their ideas and feedback into transportation planning. Local artists and culture bearers could serve as ambassadors for these communities by participating in the transportation planning process based on their creative placemaking ideas and connection to the community. [Report 2024-12](#)

TRAFFIC AND SAFETY

Improving Pedestrian Safety on Reservations in Minnesota

To address high rates of pedestrian injury and death among Native Americans, MnDOT monitored pedestrian counts, driver interactions and yielding at 36 sites on the Anishinaabe Nations reservations for roughly four years. Results led to safety countermeasures at eight sites. Post-implementation monitoring showed that while some pedestrian and driver behaviors changed, risks to pedestrians cannot be entirely eliminated. Lessons learned about successful countermeasures will guide future collaborative efforts to increase Native American pedestrian safety. [Report 2024-18](#)



Targeted safety measures can improve pedestrian safety on Native American reservations in Minnesota.



TRAFFIC AND SAFETY

Optimizing Minnesota's Queue Warning Systems

Active traffic management strategies to address highway congestion in real time evolve with technological advancements. To prevent the cascade of sudden braking that results from vehicle queuing, a system to warn drivers of downstream congestion was developed in [previous research](#) and deployed in a single location. After collecting two additional years of data, MnDOT evaluated the system's performance and added a second installation location. Despite some mixed results, the system has promise for decreasing crashes and near-crashes. [Report 2023-05](#)

Queue warning systems can trigger signs alerting drivers to upcoming traffic congestion by combining real-time traffic data, including data from cameras, vehicle trajectories and computer algorithms.

MAINTENANCE OPERATIONS

Reducing Snowplow Fuel Use with Advanced Data Analytics



A snowplow's fuel economy is impacted by many factors that can be explored with a new energy analysis method.

Reducing the amount of fuel used by snowplows to keep winter roads safe and accessible would support MnDOT in meeting sustainability goals and lower operating costs. An analysis of several years of routinely collected data on fuel usage, weather and road conditions, and other parameters from onboard snowplows illustrated the significant impact of idling on fuel consumption. MnDOT will continue to seek ways to reduce snowplow idling and identify other fuel-saving strategies. [Report 2023-03](#)

A Lane Boundary Guidance System for Snowplow Operations

Keeping roads clear of ice and snow when visibility is low or lane markings are obscured can be challenging and, at times, hazardous. In 2018, a system based on GPS and high-accuracy road maps was developed to provide lane boundary guidance to snowplow operators. Operator feedback after two seasons of system testing enabled researchers to redesign and refine the tool, readying it for deployment in several MnDOT districts. The agency will move toward widespread and long-term implementation of the guidance system. [Report 2023-27](#)



A lane guidance system used by snowplow operators in low-visibility conditions increases plowing efficiency.

LEVERAGING OUR RESEARCH

For every \$1 invested in a pooled fund study with other states,

MnDOT leverages \$10 worth of research.

Combining Our Resources

The **Transportation Pooled Fund (TPF) Program** allows federal, state and local agencies and other organizations to combine resources to support research into shared transportation priorities.

Minnesota leads eight pooled funds and participates in another 26. Find a summary of all pooled fund activity at mndot.gov/research/pooled.html. Some of our notable studies are part of the Clear Roads program, the National Road Research Alliance and North/West Passage (see below).

Track National Trends



Get the latest research news in your subject area from across the country by searching the national database (trid.trb.org), watching webinars (webinar.mytrb.org) and signing up for the e-newsletter (trb.org).

How to Participate in National Research Projects

Pooled Funds — If your research idea addresses an issue that affects multiple states, we can help establish a TPF project to leverage resources and collaborate with other state departments of transportation (DOTs) to solve a problem. Find guidance at mndot.gov/research/pooled.html



The **Clear Roads research program** brings together transportation professionals and researchers from around the country to drive innovation in winter maintenance. By evaluating materials, equipment and methods in real-world conditions, the program identifies the most effective techniques and technologies to save agencies money, improve safety and mobility, and increase efficiency. clearroads.org

CLEAR ROADS HIGHLIGHT

[Clear Roads Project CR 18-06](#) refined a new ice melting test method using a mechanical rocker to give state



transportation agencies a simple, low-cost way to ensure they are using the most effective deicers to clear winter roads. This was the first Clear Roads project to produce an AASHTO-approved test method.

Clear Roads Winter Maintenance Research received a [2024 Transportation Pooled Fund Excellence Award](#). This new annual award is only given to two pooled fund studies per year in recognition of “meaningful collaboration and partnership to advance national transportation research priorities in the areas of safety, economic strength, equity, sustainability and organizational excellence.”



TPF
Excellence
Awards



National Road Research Alliance **National Road Research Alliance.**

The National Road Research Alliance (NRRRA) was created by MnDOT to help fund and direct research at the MnROAD cold-weather pavement test track. NRRRA finds ways to build roads faster and make them last longer, perform better, cost less to build and maintain, and have less impact on the environment. mndot.gov/mnroad/nrrra



North/West Passage.

Minnesota initiated this pooled fund to investigate intelligent transportation systems solutions to traffic management, traveler information and commercial vehicle operations on Interstates 90 and 94 between Washington and Minnesota. nwpassage.info

NRRRA HIGHLIGHTS

NRRRA tested eight innovative alternative cementitious concrete materials on MnROAD’s interstate mainline. These test sections align with those built in 2022, when 16 other materials were used with identical designs. These materials may reduce our carbon footprint while still getting as good or better pavement performance. Projects included:

- [Use of Alternative Cementitious Materials in Concrete Pavements](#)
- [Use of Alternative Pozzolanic Materials Towards Reducing Cement Content in Concrete Pavements](#)
- [Use of Carbon Dioxide for Sustainable and Resilient Concrete Pavements](#)



NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP Research. If you are trying to solve a problem of regional or national significance, we can help you develop a problem statement through the National Cooperative Highway Research Program (NCHRP). Contact us at research.dot@state.mn.us.

MnDOT LIBRARY



Sheila Hatchell (center), our recently retired library director, received a 2024 Professional Achievement Award from the Special Libraries Association Transportation Community.

Our librarians are experts at tracking down hard-to-find information and can keep you up to date in your field. Request a literature search, interlibrary loan, periodical or special publication at 651-366-3791, library.dot@state.mn.us or mndot.gov/library. Be sure to look at our new selection of [e-books](#)!

JOIN A TECHNICAL ADVISORY PANEL

You can help shape research and innovation projects in your subject area by serving on a Technical Advisory Panel (TAP). Involvement may include a few meetings and assistance developing work plans and reviewing final deliverables.



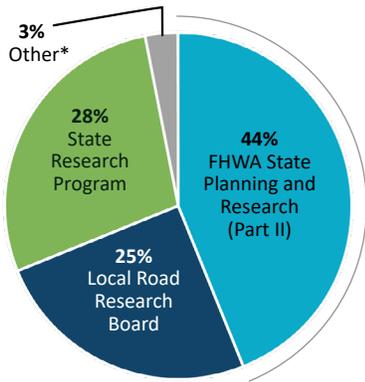
TAP members watch a demonstration of a new red-light running warning system in Scott County.

FY2024 RESEARCH ACTIVITIES

FINANCIAL OVERVIEW

MnDOT research is funded through the MnDOT State Research Program (SRP) and Federal Highway Administration (FHWA) State Planning and Research (SP&R) Program (Part II). MnDOT’s Office of Research & Innovation also manages research for the Minnesota Local Road Research Board (LRRB).

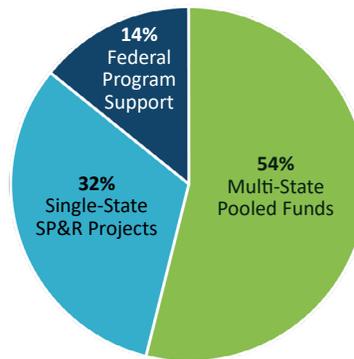
FY2024 Research Funds by Funding Source



FHWA State Planning and Research (Part II)	\$ 8,138,927
Local Road Research Board	\$ 4,618,039
State Research Program	\$ 5,148,422
Other*	\$ 487,534
Total	\$ 18,392,922

* Includes contributions from other MnDOT funds, partnerships with other agencies and other federal sources.

Subset: FY2024 SP&R (Part II) Funding Distribution



FHWA SP&R (Part II) funds are allocated to MnDOT for eligible state-specific needs and to participate in multi-state initiatives as shown below:

Multi-State Pooled Funds	\$ 4,371,100
a: Participation in Pooled Funds Led by Other States	\$ 781,100
b: MnDOT-Led Pooled Funds	\$ 3,590,000
Single-State SP&R Projects	\$ 2,641,292
Federal Program Support	\$ 1,126,535
a: National Cooperative Highway Research Program	\$ 924,475
b: Transportation Research Board	\$ 164,435
c: AASHTO	\$ 37,625
Total	\$ 8,138,927

FY2024 RESEARCH CONTRACTS

Each research topic area on the following pages includes two tables:

- Research reports completed in fiscal year 2024 (FY2024) followed by other research contracts active during FY2024, sorted by contract end date.
- Multi-state pooled funds and American Association of State Highway and Transportation Officials (AASHTO) projects, with MnDOT-led pooled funds listed first.

Prefixes in project titles indicate funding for projects not supported entirely by the MnDOT SRP:

- **INV** – Partial or full LRRB funded
- **MP** – 80% federally funded/20% state funded
- **TPF** – MnDOT-administered pooled fund (100% federal funds)

For more information about projects, including two-page research summaries for completed reports, search by the title on the “Search Projects” page at mndot.gov/research.projects. For more information about pooled funds, search at pooledfund.org.

BRIDGES & STRUCTURES

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
2024-29	<u>Bridge Pile Repair Using Underwater Fiber Reinforced Polymer Sleeve and Steel Reinforced Grout</u>	2/29/24	William Schilling, AECOM Technical Services, Inc.	Nickolas Haltvick	\$99,751
Complete	<u>Vehicle-Based Ground-Penetrating Radar (GPR) System Evaluating Rebar Cover on 198 Minnesota Bridges</u>	4/30/24	Adam Carmichael, Infrasense, Inc.	Paul Pilarski	\$110,000
Complete	<u>MP-21(009): Evaluation of Corrugated HDPE Pipes Manufactured with Recycled Content</u>	9/30/24	Michael Pluimer, University of Minnesota Duluth	Erik Brenna	\$85,032
In Progress	<u>INV-645: Precast vs. Cast in Place</u>	1/31/25	Michael Marti, SRF Consulting Group, Inc.	David Conkel, Aaron Holmbeck	\$174,997
In Progress	<u>MP-22(001): Develop Element Level Bridge Performance Measures and Targets</u>	4/30/25	Basak Aldemir Bektas, Minnesota State University, Mankato	David Hedeem	\$215,704
In Progress	<u>MP-23(005): Correlation Between Deck Patching Quantities and Chloride Concentration Levels</u>	6/30/25	Qindan Huang, Marquette University	Paul Pilarski	\$185,233
In Progress	<u>INV 1093: Quantifying Benefits of Bridge Maintenance</u>	7/31/25	Basak Aldemir Bektas, Minnesota State University, Mankato	Sarah Sondag	\$166,709
In Progress	<u>INV 1134: Deck Reinforcement Detailing and Concrete Mix Additives to Reduce Bridge Deck Cracking</u>	7/31/25	Brock Hedegaard, University of Minnesota Duluth	Paul Gronvall	\$147,000
In Progress	<u>MP-23(009): Understanding Causes of Concrete Culvert Pipe Joint Separation</u>	8/31/25	Brock Hedegaard, University of Minnesota Duluth	Nicholas Olson	\$232,337
In Progress	<u>Performance Evaluation of Reinforced Concrete Box Culverts</u>	8/31/25	Lauren Linderman, University of Minnesota	Yihong Gao	\$270,078
In Progress	<u>INV 1133: Understanding Driving Causes of Bridge Replacement</u>	9/30/25	Basak Aldemir Bektas, Minnesota State University, Mankato	David Hedeem	\$163,730
In Progress	<u>Assessing the Need for Floodplain Culverts Based on Geomorphology</u>	2/28/26	Jessica Kozarek, University of Minnesota	Solomon Woldeamlak	\$228,635
In Progress	<u>Ice Loading on Piers for Minnesota's Bridges</u>	8/31/26	Jessica Kozarek, University of Minnesota	Daniel Freiburger	\$294,913

Bridges & Structures Pooled Fund Studies

Study Number	Title	Lead State or Agency	Technical Liaison	Number of Participating Agencies	2024 MnDOT Contribution	Total MN Contribution
TPF-5(372)	<u>Building Information Modeling (BIM) for Bridges and Structures</u>	IA	Benjamin Jilk	24	\$0	\$80,000
TPF-5(464)	<u>Hydrologic and Hydraulic Software Enhancements (SMS, WMS, Hydraulic Toolbox and HY-8)</u>	FHWA	Aislyn Ryan	16	\$10,000	\$50,000
TPF-5(468)	<u>Structural Behavior of Ultra-High Performance Concrete</u>	FHWA	Scot Larson	9	\$10,000	\$50,000
TPF-5(474)	<u>Bridge Deck Preservation Portal</u>	IA	Sarah Sondag	6	\$0	\$60,000
TPF-5(480)	<u>Building Information Modeling (BIM) for Infrastructure</u>	IA	Angela Boardman	21	\$37,500	\$150,000
TPF-5(486)	<u>Center for the Aging Infrastructure: Steel Bridge Research, Inspection, Training and Education Engineering Center - SBRITE (Continuation)</u>	IN	Kevin Western	23	\$30,000	\$150,000

Bridges & Structures Pooled Fund Studies [cont.]

Study Number	Title	Lead State or Agency	Technical Liaison	Number of Participating Agencies	2024 MnDOT Contribution	Total MN Contribution
TPF-5(503)	<u>Standardizing Rigid Inclusions for Transportation Projects—Phase I</u>	KS	Richard Lamb	7	\$30,000	\$60,000
TPF-5(508)	<u>Concrete Bridge Engineering Institute (CBEI)</u>	TX	Karl Johnson	16	\$50,000	\$200,000

ENVIRONMENTAL

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
2023-38	<u>MP-21(002): Identifying Deer-Vehicle Collision Concentrations in Minnesota</u>	11/30/23	Raphael Stern, University of Minnesota	Christopher Smith	\$165,450
2024-08	<u>MP-20(009): Effect of Increased Precipitation (Heavy Rain Events) on Minnesota Pavement Foundations</u>	5/31/24	Halil Ceylan, Iowa State University	Raul Velasquez	\$169,999
2024-23	<u>INV 1120: Re-Use of Minnesota Waste Material in Sustainably Design Soils: Part 2</u>	9/30/24	David Saftner, University of Minnesota Duluth	Dwayne Stenlund	\$186,280
2024RIC04, 2024RIC04A	<u>INV 645: Appendices to 2024RIC04: Best Practices for Boulevard Tree Selection</u>	5/31/24	Susan Miller, SRF Consulting Group, Inc.	Daniel Wattenhofer	\$54,741
TRS2305	<u>Transportation Options and Vehicle Miles Traveled Reduction Field Scan</u>	7/31/23	Chris McCahill, University of Wisconsin—Madison	Nissa Tupper	\$58,380
Complete	<u>Culture Building and Behavior Change Strategies for Vehicle Miles Traveled Reduction</u>	2/28/24	Adam Wood, Toole Design Group	Kristina Heggedal	\$44,847
Complete	<u>INV 1108: Update of Stormwater Management: Best Practices Manual (From 2009)</u>	6/30/24	Andrew Erickson, University of Minnesota	Brian Giese	\$126,895
Complete	<u>INV 645: Best Practices for Dust Control/Issues with CaCl</u>	6/30/24	Michael Marti, SRF Consulting Group, Inc.	Bruce Hasbargen	\$64,718
In Progress	<u>MP-22(007): Assessing a New Tool for Early Detection of Endangered Turtles on Proposed Transportation Projects</u>	2/28/25	Mark Davis, University of Illinois	Christopher Smith	\$251,676
In Progress	<u>MP-23(008): Assessing the Deterioration of Pedestrian Assets</u>	2/28/25	Inya Nlenanya, Iowa State University	Kristie Billiar	\$100,732
In Progress	<u>INV 1094: Comparison of Compost and Proprietary Soil Amendments for Vegetation Establishment</u>	3/31/25	Bora Cetin, Michigan State University	Warren Tuel	\$380,500
In Progress	<u>MP-22(006): Statistical and Process-Based Models of Stormwater Treatment Basin Aging to Quantify Infiltration Rate Sustainability and Maintenance Intervals</u>	5/31/25	Anthony Parolari, Marquette University	Dwayne Stenlund, Steven Gebauer	\$199,128
In Progress	<u>Evaluating Treatment and Options for Wastewater Treatment at Rest Areas and Truck Stations</u>	6/30/25	Sara Heger, University of Minnesota	None	\$307,888
In Progress	<u>INV 1115: Addressing the Research Needs for the Sustainable Application of Threshold Discharge Area (TDA) in Stormwater Infiltration/Treatment</u>	6/30/25	John Gulliver, University of Minnesota	Mark Hansen	\$257,765
In Progress	<u>INV 1135: Development of Biochar Specification Criteria as Soil Amendment for Slopes, Conveyances and Stormwater Treatment Systems</u>	6/30/25	Brian Barry, University of Minnesota Duluth	Dwayne Stenlund	\$231,476
In Progress	<u>INV-645: Roadside Vegetation Management</u>	9/30/25	Michael Marti, SRF Consulting Group, Inc.	Darrick Anderson	\$99,999
In Progress	<u>TPF-5(466): Use of Carbon Dioxide for Sustainable and Resilient Concrete Pavements</u>	1/31/26	Peter Taylor, Iowa State University	Bernard Izevbekhai	\$149,275

ENVIRONMENTAL [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
In Progress	<u>INV 1127: Wet Pond Modeling for Contaminant Retention and Maintenance</u>	4/30/26	John Gulliver, University of Minnesota	Ross Bintner	\$255,529
In Progress	<u>Development of Erosion Control Product Longevity Test Methodology</u>	6/30/26	John Chapman, University of Minnesota	Dwayne Stenlund	\$300,665
In Progress	<u>MP-24(008): Investigating Real Storms and the Impact of Potential Climate Change Adaptations</u>	6/30/26	Andrew Erickson, University of Minnesota	Rachel Pichelmann	\$327,214
In Progress	<u>MP-22(008): Regional Optimization of Roadside Turfgrass Seed Mixtures—Phase III</u>	7/31/26	Eric Watkins, University of Minnesota	Dwayne Stenlund	\$275,928
In Progress	<u>INV 1147: Assessing Effectiveness of Pond Sediment Removal for Phosphorus Management in Stormwater Ponds</u>	4/30/27	John Gulliver, University of Minnesota	Derek Asche	\$217,696

Environmental Pooled Fund Study

Study Number	Title	Lead State or Agency	Technical Liaison	Number of Participating Agencies	2024 MnDOT Contribution	Total MN Contribution
TPF-5(460)	<u>Flood-Frequency Analysis in the Midwest: Addressing Potential Nonstationary Annual Peak-Flow Records</u>	SD	Andrea Hendrickson	8	\$55,600	\$222,400

MAINTENANCE OPERATIONS

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
2023-31	<u>Maintenance Operations Research/Operations: Evaluation of Slurry Spreaders and Plows (Underbody, Wing and Two-Way Reversible)</u>	8/31/23	Brian Hirt, CTC & Associates	Thomas Peters	\$43,676
2023RIC10	<u>INV 645: Advancing Asphalt Pavement: Strategies for Enhancing Ride Quality and Mitigating Reflective Cracking</u>	12/31/23	Michael Marti, SRF Consulting Group, Inc.	Joe Triplett	\$99,577
2024RIC01, 2024RIC01V	<u>INV 645: Using AVL/GPS Telematics to Optimize Snowplowing</u>	10/31/23	Susan Miller, SRF Consulting Group, Inc.	Joe MacPherson	\$94,585
CR 20-05	<u>TPF-5(353): Using GIS to Highlight Highway Segments Sensitive to Deicing Material</u>	3/31/24	Erik Minge, SRF Consulting Group, Inc.	Thomas Peters	\$155,002
Complete	<u>TPF-5(353): Efficacy, Cost and Impacts of Non-Chloride Deicers: An Educational Primer and Product Information Sheets</u>	9/30/23	Laura Fay, Montana State University, Western Transportation Institute	Thomas Peters	\$114,946
Complete	<u>TPF-5(466): Thinlays as Preventive Maintenance Treatment</u>	12/31/23	Andrea Blanchette, Terracon Consultants, Inc.	Joel Ulring	\$42,504
Complete	<u>TPF-5(353): Clear Roads II Standard Test Procedure for Ice Melting Capacity of Deicers</u>	3/31/24	Xianming Shi, Washington State University	Thomas Peters	\$74,087
Complete	<u>TPF-5(353): Calculating Plow Cycle Times From AVL Data</u>	4/1/24	Ming Shiun Lee, AECOM Technical Services, Inc.	Thomas Peters	\$125,378
Complete	<u>INV 645: Cutting Edges: Performance User's Guide</u>	5/31/24	Susan Miller, SRF Consulting Group, Inc.	Joe Wiita	\$52,169
Complete	<u>INV 645: Roadway Pavement Maintenance 101</u>	7/31/24	Rick West, Stonebrooke Engineering, Inc.	Christopher Cheney	\$59,988

MAINTENANCE OPERATIONS [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
Complete	<u>TPF-5(353): Training Module Development for Evaluation of SSI and WSI Variables</u>	7/31/24	Randeep Kaur Sethi, Focus EduSolutions, Inc.	Thomas Peters	\$31,585
Complete	<u>TPF-5(353): Grip Sensor Technology and Salt Applications</u>	8/31/24	Laura Fay, Montana State University, Western Transportation Institute	Thomas Peters	\$149,977
Complete	<u>TPF-5(353): Update to CR 13-04: Best Practices for Protecting DOT Equipment from the Corrosive Effect of Chemical Deicers</u>	8/31/24	Xianming Shi, Washington State University	Thomas Peters	\$99,985
Complete	<u>TPF-5(353): Third-Party Laboratory Testing for the Clear Roads Qualified Products Lists</u>	9/5/24	Analytical Laboratories, Inc.	Thomas Peters	\$60,000
In Progress	<u>TPF-5(479): Determining the Migration of Chloride-Based Deicers Through Different Soil Types</u>	10/31/24	Xianming Shi, Washington State University	Thomas Peters	\$99,978
In Progress	<u>MP-22(004): Effective Strategies to Extend Remaining Life of Alkali-Silica Reaction (ASR) Affected Pavements</u>	12/31/24	Fatih Bektas, Minnesota State University, Mankato	Greg Ous	\$67,998
In Progress	<u>TPF-5(353): Salt Shed Design Template</u>	12/31/24	Wilfrid Nixon, Wilfrid A. Nixon and Associates	Thomas Peters	\$125,000
In Progress	<u>TPF-5(479): 22-02 Best Management Practices for Liquid Chloride Storage and Pumping Systems</u>	12/31/24	Karalyn Clouser, Montana State University, Western Transportation Institute	Thomas Peters	\$75,000
In Progress	<u>TPF-5(479): 22-05 Use of Dashboards for Winter Operations</u>	12/31/24	Ming Shiun Lee, AECOM Technical Services, Inc.	Thomas Peters	\$74,477
In Progress	<u>INV 645: Gravel Shoulder/Road Maintenance</u>	2/28/25	John Brunkhorst, Stonebrooke Engineering, Inc.	Mike Suska	\$89,163
In Progress	<u>TPF-5(479): 22-03 Effects of Additives in Deicing Salts at Lower Temperatures</u>	2/28/25	Laura Fay, Montana State University, Western Transportation Institute		\$149,993
In Progress	<u>INV-645: Winter Maintenance: Deicing Products User Guide</u>	3/31/25	Connie Fortin, Bolton & Menk	Ryan Thilges	\$119,789
In Progress	<u>TPF-5(479): 23-01 Development of a Public Service Announcement (PSA) Library</u>	3/31/25	Laura Fay, Montana State University, Western Transportation Institute	Thomas Peters	\$149,957
In Progress	<u>TPF-5(479): Comprehensive Guide to Pre-Wetting Application Rates and Methods</u>	3/31/25	Xianming Shi, Washington State University	Thomas Peters	\$199,975
In Progress	<u>TPF-5(466): Flooded Pavements Assessment App—Phase II</u>	5/31/25	Majid Ghayoomi, University of New Hampshire	Timothy Andersen	\$200,234
In Progress	<u>Harnessing Solar Energy Through Solar Snow Fence: Implementation</u>	6/30/25	Mijia Yang, North Dakota State University	Daniel Gullickson	\$227,221
In Progress	<u>INV 1136: Fleet: Life Cycle</u>	6/30/25	Jennifer Shane, Iowa State University	Mike Suska	\$87,068
In Progress	<u>TPF-5(479): 23-02 Quantifying the Economic Value of Snow and Ice Operational Success</u>	6/30/25	Mallory Crow, AECOM Technical Services, Inc.	Thomas Peters	\$98,062
In Progress	<u>TPF-5(479): Clear Roads Project Management</u>	6/30/25	Brian Hirt, CTC & Associates	Thomas Peters	\$1,423,545
In Progress	<u>INV 645: Patching (Asphalt) Best Practices</u>	8/31/25	Michael Marti, SRF Consulting Group, Inc.	None	\$60,590
In Progress	<u>INV 1130: Human-Centered Testing of Rear-Facing Display to Reduce Vehicle Collisions with Snowplows</u>	8/31/25	Nichole Morris, University of Minnesota	Steven Blaufuss	\$353,087

MAINTENANCE OPERATIONS [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
In Progress	<u>INV 1078: Benefit/Cost of Applying a Higher Asphalt Film Thickness (AFT) vs. Doing a Chip Seal at One Year</u>	10/31/25	Zhanping You, Michigan Technological University	Bruce Hasbargen	\$220,000
In Progress	<u>TPF-5(479): 23-03 Updating the Impact of Capital Projects Decision Support Tool</u>	12/31/25	James Sullivan, University of Vermont	Thomas Peters	\$148,018
In Progress	<u>Snowplow Driver Assist System Implementation Plan</u>	12/31/25	Brian Davis, University of Minnesota	Cory Johnson	\$488,623
In Progress	<u>TPF-5(479): 22-04 Evaluation of Direct Liquid Application of Salt Brine vs. Granular Salt as Measured Through Various Performance and Safety Metrics</u>	12/31/25	David Noyce, University of Wisconsin–Madison	Thomas Peters	\$125,000
In Progress	<u>MP-23(002): Protection of Precious Waters from Road Salt: Mitigation Through Roadside Ditch Capture</u>	2/28/26	Stephen Druschel, Minnesota State University, Mankato	Jed Falgren	\$312,375
In Progress	<u>TPF-5(466): MnROAD Reflective Cracking Challenge</u>	9/30/26	Eshan Dave, University of New Hampshire	Michael Vrtis	\$230,499

Maintenance Operations Pooled Fund Studies

Study Number	Title	Lead State or Agency	Technical Liaison	Number of Participating Agencies	2024 MnDOT Contribution	Total MN Contribution
TPF-5(479)	<u>Clear Roads Winter Highway Operations—Phase III</u>	MN	Thomas Peters	42	\$25,000	\$125,000
TPF-5(347)	<u>Development of Maintenance Decision Support System</u>	SD	Joseph Huneke	15	\$30,000	\$200,000

MATERIALS & CONSTRUCTION

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
2023-34	<u>INV 1069: Optimizing Asphalt Mixture Designs for Low-Volume Roads of Minnesota</u>	8/31/23	Manik Barman, University of Minnesota Duluth	Joel Ulring	\$156,333
2023-35	<u>INV 1101: BMP for Issues with Asphalt Centerline Joint and Intelligent Compaction for Local Agencies</u>	10/31/23	Syed Haider, Michigan State University	Naomi Eckerd	\$192,622
2023RIC09	<u>INV 645: Pavement Design Around Utilities: Best Practice</u>	6/30/24	Jeff Stempihar, Nichols Consulting Engineers, Chtd.	Tom Trowbridge	\$51,194
2024-01	<u>INV 986: Performance Monitoring of Olmsted CR 117/104 and Aggregate Base Material Update</u>	12/31/23	Kyle Hoegh, MnDOT Office of Materials and Road Research Section	Kaye Bieniek	\$44,000
2024-15	<u>INV 1070: Base Stabilization Additives: Effect on Granular Equivalency (GE)</u>	5/31/24	Halil Ceylan, Iowa State University	Chad Hausman	\$197,864
NCAT24-01	<u>TPF-5(375): Findings from the Pavement Preservation Group (PG) Study</u>	12/31/23	Adriana Vargas-Nordbeck, Auburn University	Gerard Geib	\$2,695,546
NRRA202303	<u>TPF-5(341): Long-Term Testing and Analysis on Asphalt Mix Reclaimed Asphalt Field Sections</u>	8/31/24	Jo Sias, University of New Hampshire	Michael Vrtis	\$148,981
NRRA202306	<u>TPF-5(341): Biomaterial Maintenance Treatments</u>	9/30/23	Christopher Williams, Iowa State University	Gerard Geib	\$50,000

MATERIALS & CONSTRUCTION [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
NRRA202307	<u>TPF-5(341): Continuous Moisture Measurement During Pavement Foundation Construction</u>	8/31/23	Soheil Nazarian, University of Texas at El Paso	Terrence Beaudry	\$100,000
NRRA202308	<u>TPF-5(466): Validation of Loose Mix Aging Procedures for Cracking Resistance Evaluation in Balanced Mix Design</u>	12/31/24	Fan Yin, Auburn University	Joseph Podolsky	\$100,000
NRRA202402	<u>TPF-5(341): Solutions to Mitigate Dowel/Tie-Bar Propagated Cracking—Phase I</u>	4/30/24	Shreenath Rao, Applied Research Associates, Inc.	Thomas Burnham	\$101,083
NRRA202403	<u>TPF-5(341): National Road Research Alliance (NRRA): Toward the Development of Pavement-Specific Structural Synthetic Fibers</u>	6/30/24	Manik Barman, University of Minnesota Duluth	David Lim	\$99,972
Complete	<u>TPF-5(443): Precision, Bias and Accuracy of Simultaneous Dielectric and Roughness Profiling</u>	1/31/24	Charles Oden	Kyle Hoegh	\$41,100
Complete	<u>TPF-5(341): Asphalt Pavement Milling Best Practices Through Enhanced Understanding of Milling Process</u>	3/31/24	Eshan Dave, University of New Hampshire	Emil Bautista	\$100,000
Complete	<u>INV 1117: Mitigation of Tenting of Transverse Cracks and Joints in Asphalt Pavement</u>	6/30/24	Manik Barman, University of Minnesota Duluth	Matthew Hemmila	\$150,900
Complete	<u>TPF-5(341): An Innovative Practical Approach to Assessing Bitumen Compatibility as an End Means of Material Specification</u>	7/31/24	Eshan Dave, University of New Hampshire	Michael Vrtis	\$204,119
Complete	<u>INV 645: Seal Coats: Synthesis of Minnesota Research</u>	8/31/24	Michael Marti, SRF Consulting Group, Inc.	Joel Ulring	\$63,213
In Progress	<u>INV 645: Spray Asphalt Rejuvenators</u>	10/31/24	Michael Marti, SRF Consulting Group, Inc.	Steven Bot	\$57,605
In Progress	<u>MP-22(003): Development of Process to Lower Global Warming Potential of Construction Materials</u>	10/31/24	Audra Morse, Michigan Technological University	Curt Turgeon	\$260,278
In Progress	<u>TPF-5(341): Analysis of Long-Term Field Performance of Spray-On Rejuvenators</u>	10/31/24	Raquel Moraes, Auburn University	Michael Vrtis	\$133,912
In Progress	<u>INV 1103: Evaluation of Proprietary Rejuvenators</u>	12/31/24	Muhammed Kutay, Michigan State University	JinYeene Neumann	\$199,336
In Progress	<u>INV-645: Texas Underseal</u>	12/31/24	Michael Marti, SRF Consulting Group, Inc.	Benjamin Worel	\$60,618
In Progress	<u>TPF-5(443): Density Profiling System (DPS) Pooled Fund Study Data Statistical Analysis and Protocol Recommendations</u>	12/31/24	Jo Sias, University of New Hampshire	Kyle Hoegh	\$163,234
In Progress	<u>INV 1112: Asphalt Pavement Cracking Performance Data Analysis</u>	3/31/25	Eshan Dave, University of New Hampshire		\$130,993
In Progress	<u>TPF-5(466): Reclamation and Recycling Techniques to Achieve Perpetual Pavements Characteristics</u>	3/31/25	Mohammad Sabouri, Braun Intertec Corporation	Emil Bautista	\$150,002
In Progress	<u>TPF-5(466): Standardization of a Stripping Inflection Point Calculation for Hamburg Wheel Tracking Test</u>	3/31/25	Fan Yin, Auburn University	Joseph Podolsky	\$47,500
In Progress	<u>INV 1095: Benefits of Preventive Maintenance</u>	5/31/25	Basak Aldemir Bektas, Minnesota State University, Mankato	Joel Ulring	\$157,926
In Progress	<u>INV 1110: Improving and Developing Pavement Design Inputs and Performance Functions for Cold Recycled Pavement Layers in Minnesota</u>	6/30/25	Eshan Dave, University of New Hampshire	Timothy Andersen	\$163,943

MATERIALS & CONSTRUCTION [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
In Progress	<u>INV 1124: Sawing and Sealing Joints in Bituminous Pavements to Control Cracking</u>	6/30/25	Mihai Marasteanu, University of Minnesota	Tom Wesolowski	\$160,850
In Progress	<u>INV 1128: Investigation on Mix Design of Recycled Asphalt Pavement (RAP) Materials</u>	6/30/25	Jia-Liang Le, University of Minnesota	Eddie Johnson	\$137,419
In Progress	<u>INV 1137: Pavement Design: Performance of Base vs. Subbase</u>	6/30/25	Erol Tutumluer, University of Illinois	Raul Velasquez	\$218,809
In Progress	<u>INV 1138: Use of Plastics in Road Materials (Paving)</u>	6/30/25	Halil Ceylan, Iowa State University	Jim Johnson	\$139,446
In Progress	<u>MP-21(001): Bridge Low Slump Concrete Overlay Mix Design for Mobile Mixers</u>	6/30/25	Tyler Ley, Oklahoma State University	Kyle Fritz, Jacob Gave	\$354,612
In Progress	<u>MP-23(004): Novel Durability Screening Method for Stabilized Geomaterials</u>	6/30/25	Bora Cetin, Michigan State University	Raul Velasquez	\$235,000
In Progress	<u>MP-23(006): Using Electric Vehicle Onboard Data for Pavement Quality Assessment and Management</u>	6/30/25	Mihai Marasteanu, University of Minnesota	Curt Turgeon	\$261,891
In Progress	<u>TPF-5(466): MnROAD Data Portal Contract</u>	6/30/25		Benjamin Worel	\$300,000
In Progress	<u>TPF-5(466): Use of Recycled Materials in Pavement Preservation</u>	6/30/25	Adriana Vargas-Nordbeck, Auburn University	Emil Bautista	\$86,319
In Progress	<u>Using LCA to Reduce Embodied Carbon in Pavement Infrastructure at MnDOT</u>	7/31/25	Zhanping You, Michigan Technological University	Curt Turgeon	\$390,000
In Progress	<u>TPF-5(466): Performance Evaluation of Wicking Geotextiles for Improving Drainage and Stiffness of Road Foundation</u>	8/31/25	Bora Cetin, Michigan State University	Raul Velasquez	\$238,451
In Progress	<u>INV 645: The Future of Weigh Tickets</u>	8/31/25	Michael Marti, SRF Consulting Group, Inc.	Michael Flaagan	\$60,042
In Progress	<u>MP-22(005): A Synthesis of Usage and Performance of Daylighted Bases in Comparison to Edge Drains</u>	10/31/25	Bora Cetin, Michigan State University	Bernard Izevbekhai	\$244,988
In Progress	<u>TPF-5(466): Improving Moisture Resistance/Control of Pavement Foundation Systems via Engineered Water Repellency</u>	11/30/25	Bora Cetin, Michigan State University	Emil Bautista	\$160,000
In Progress	<u>TPF-5(466): Field Validation of Using Warm-Mix Asphalt at Reduced Production Temperatures for Balanced Mix Design</u>	12/31/25	Fan Yin, Auburn University	Emil Bautista	\$160,000
In Progress	<u>TPF-5(466): Hot Rubber Seal Coating to Survive Wet and Frozen Environments</u>	12/31/25	Zhanping You, Michigan Technological University	Joseph Podolsky	\$181,912
In Progress	<u>TPF-5(466): Veta Enhancements for MDMS Standardized and Web Conversion</u>	12/31/25	George Chang, The Transtec Group, Inc.	Rebecca Embacher	\$2,276,041
In Progress	<u>INV 1107: Evaluation of Gravel Stabilizer Used on Gravel Roads and Gravel Shoulders</u>	1/31/26	Bora Cetin, Michigan State University	Terrence Beaudry	\$319,967
In Progress	<u>TPF-5(466): Automated 3D GPR Analysis for Concrete Pavement Evaluation</u>	1/31/26	Kenneth Maser	Shongtao Dai	\$156,905
In Progress	<u>TPF-5(466): Instrumentation and Data Management/Analyses for Measurement While Drilling (MWD) Technology</u>	3/28/26	Mohammadhossein Sadeghiamirshahidi	Raul Velasquez	\$216,845
In Progress	<u>TPF-5(466): Use of Alternative Pozzolanic Materials Toward Reducing Cement Content in Concrete Pavements</u>	4/30/26	Nick Weitzel	Maria Masten	\$173,148

MATERIALS & CONSTRUCTION [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
In Progress	<u>TPF-5(466): Effective Use of Traffic Speed Deflectometer for Network-Based and Project-Based Applications</u>	4/30/26	Soheil Nazarian, University of Texas at El Paso	Eyoab Zegeye	\$150,000
In Progress	<u>INV 1150: Long-Term Field Performance Evaluation of Chip Seals</u>	6/30/26	Raquel Moraes, Auburn University	Joel Ulring	\$136,347
In Progress	<u>TPF-5(466): Validation of Loose Mix Aging Procedures for Cracking Resistance Evaluation in Balanced Mix Design—Phase IIA</u>	9/30/26	Fan Yin, Auburn University	Joseph Podolsky	\$300,000
In Progress	<u>TPF-5(466): Reducing Embodied Carbon with Mineral-Blended Polymeric Microspheres</u>	1/31/27	Peter Taylor, Iowa State University	Jacob Gave	\$137,500
In Progress	<u>TPF-5(466): The Use of Alternative Cementitious Materials in Concrete Pavements</u>	3/31/27	Prashant Ram, Applied Pavement Technology, Inc.	Thomas Burnham	\$150,000
In Progress	<u>TPF-5(522): National Partnership to Improve the Quality of Preventive Maintenance: Treatment Construction and Data Collection Practices (Research)</u>	8/31/28	Adriana Vargas-Nordbeck, Auburn University	Joel Ulring	\$1,712,363
In Progress	<u>TPF-5(522): Improving the Quality of Preventive Maintenance Construction and Data Collection Practices</u>	12/31/28	Choubane Bouzid, Michigan State University	Joel Ulring	\$2,446,933

Materials & Construction Pooled Fund Studies

Study Number	Title	Lead State or Agency	Technical Liaison	Number of Participating Agencies	2024 MnDOT Contribution	Total MN Contribution
TPF-5(375)	<u>National Partnership to Determine the Life-Extending Benefit Curves of Pavement Preservation (MnROAD/NCAT Joint Study)</u>	MN	Benjamin Worel	21	\$0	\$300,000
TPF-5(443)	<u>Continuous Asphalt Mixture Compaction Assessment Using Density Profiling System (DPS)</u>	MN	Kyle Hoegh	14	\$25,000	\$125,000
TPF-5(466)	<u>National Road Research Alliance (NRRRA)—Phase II</u>	MN	Glenn Engstrom	14	\$150,000	\$750,000
TPF-5(504)	<u>Continuous Bituminous Pavement Stripping Assessment Through Non-Destructive Testing</u>	MN	Eyoab Zegeye	9	\$25,000	\$125,000
TPF-5(522)	<u>Improving the Quality of Preventive Maintenance Construction and Data Collection Practices</u>	MN	Joel Ulring	19	\$25,000	\$125,000
TPF-5(437)	<u>Technology Transfer Concrete Consortium</u>	IA	Maria Masten	37	\$12,000	\$60,000

MULTIMODAL

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
2024-06	<u>INV 1090: Designing an Autonomous Service to Cover Transit's Last Mile in Low-Density Areas</u>	3/31/24	Alireza Khani, University of Minnesota	Chris Belden	\$100,000
2024-18	<u>Pedestrian Risk on Anishinaabe Reservations in Minnesota: Overview and Phase II Results</u>	6/12/24	Greg Lindsey, University of Minnesota	Michael Petesch, Hannah Pritchard	\$311,434
2024-19	<u>INV 1097: Mobile-Device Data, Nonmotorized Traffic Monitoring and Estimation of Annual Average Daily Bicyclist and Pedestrian Flows</u>	6/30/24	Raphael Stern, University of Minnesota	Michael Petesch, Suzanne Scotty	\$165,829

MULTIMODAL [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
In Progress	<u>INV 645: Pedestrian Crossings</u>	12/31/24	John Brunkhorst, Stonebrooke Engineering, Inc.	Jonathan Large	\$85,054
In Progress	<u>MP-23(013): School Times Impact on Students Walking or Biking to School: Safe Routes to School</u>	4/30/25	Michael Levin, University of Minnesota	Kelly Corbin, Sophie Kalow	\$179,187
In Progress	<u>INV-645: Crash Benefit of Nonmotorized Facilities</u>	5/31/25	Rena Kuehl, SRF Consulting Group, Inc.	Mark Vizecky	\$99,767
In Progress	<u>TPF-5(455): National Accessibility Evaluation—Phase II</u>	12/31/25	Eric Lind, University of Minnesota	Deanna Belden	\$2,106,000

Multimodal Pooled Fund Studies

Study Number	Title	Lead State or Agency	Technical Liaison	Number of Participating Agencies	2024 MnDOT Contribution	Total MN Contribution
TPF-5(455)	<u>Access Across America: National Accessibility Evaluation—Phase II</u>	MN	Deanna Belden	12	\$36,000	\$180,000
TPF-5(509)	<u>Mid-America Freight Coalition (MAFC)—Phase IV</u>	WI	Andrew Andrusko	10	\$52,000	\$156,000

POLICY & PLANNING

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
2023-30	<u>MP-21(007): The Effects of Highway Improvement Projects on Nearby Business Activity</u>	8/31/23	Yingling Fan, University of Minnesota	Kimberly Zlimen	\$100,000
2023-32	<u>MP-21(006): Centering the Margins: The Transportation Experience of Underserved Communities</u>	9/30/23	Yingling Fan, University of Minnesota	Lisa Austin	\$149,648
2023-33	<u>Transportation Equity Video</u>	7/31/23	Frank Douma, University of Minnesota	Abdullahi Abdulle	\$112,405
2024-07	<u>MP-22(010): MnDOT Research Program Strategic Plan 2023-2027</u>	4/30/24	Donald Ludlow, CPCS Transcom, Inc.	Catherine Walker	\$148,140
2024-12	<u>Utilizing Arts and Culture to Mitigate the Negative Impacts of Transportation Infrastructure on Communities</u>	7/31/24	Julie Cidell, University of Illinois	Jessica Oh	\$235,702
2024-20	<u>Grand Rapids GoMARTI Self-Driving Shuttle Pilot Program</u>	7/31/24	Gina Baas, University of Minnesota—CTS	Thomas Johnson-Kaiser	\$109,105
2024-21FG, 2024-21	INV 645: Minnesota Transportation Maintenance Careers	8/31/24	Katherine Stanley, University of Minnesota—CTS	Mark Ray	\$75,625
2024RIC02	<u>INV 645: Using Apps to Notify the Public of Local Road and Bridge Closures</u>	3/31/24	Dean Deeter, Athey Creek Consultants, LLC	Perry Clark	\$51,535
TRS2401, TRS2401A	TRS2401, Appendix A to Research Synthesis	2/29/24	Haila Maze, Bolton & Menk	Isabel Goldfarb	\$14,924
TRS2403	<u>Electric Vehicle Fee Structuring</u>	4/30/24	Damon Fordham, HighStreet	Cole Norgaarden	\$20,000

POLICY & PLANNING [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
Complete	<u>INV 645: Public Works 101 for Elected Officials and the Public</u>	4/30/24	Michael Marti, SRF Consulting Group, Inc.	William Manchester	\$73,221
In Progress	<u>INV 645: Capital Improvement Plan (CIP) Tool</u>	10/31/24	Susan Miller, SRF Consulting Group, Inc.	Ryan Thilges	\$53,988
In Progress	<u>INV 645: Promoting a Career as a County/City Engineer</u>	11/30/24	Michael Marti, SRF Consulting Group, Inc.	Lon Aune	\$64,824
In Progress	<u>INV 645: Asset Management Tools for Local Governments</u>	12/31/24	Michael Marti, SRF Consulting Group, Inc.	Lyndon Robjent	\$102,411
In Progress	<u>INV-645: Guide for Commercial Driver's License Certification</u>	2/28/25	Michael Marti, SRF Consulting Group, Inc.	Josh Peterson	\$60,343
In Progress	<u>Value of Dedicated Right of Way: Transit Service Reliability and User Impacts</u>	2/28/25	Ying Song, University of Minnesota	Amrish Patel	\$99,732
In Progress	<u>INV 645: Rule/Guidelines for Prescriptive Right of Way</u>	3/31/25	John Brunkhorst, Stonebrooke Engineering, Inc.	Anthony Pirkel	\$84,722
In Progress	<u>INV-645: Managing Utilities in the Right of Way</u>	3/31/25	John Brunkhorst, Stonebrooke Engineering, Inc.	Darrick Anderson	\$2,259
In Progress	<u>INV 645: Right of Way Acquisition Issues</u>	4/30/25	Susan Miller, SRF Consulting Group, Inc.	Ryan Thilges	\$76,889
In Progress	<u>INV 1102: MnDOT Haul/Detour Routes: Impacts on Local Roads</u>	6/30/25	Bora Cetin, Michigan State University	Tim Stahl	\$294,389
In Progress	<u>INV 1118: Haul Road and Detour Maintenance</u>	6/30/25	Mihai Marasteanu, University of Minnesota	Timothy Andersen	\$153,003
In Progress	<u>INV 1139: Advancing Equity in Capital Investment Decision-Making</u>	6/30/25	Frank Douma, University of Minnesota	Dillon Dombrovski	\$186,503
In Progress	<u>INV 645: Evaluating Local Funding in Regional Projects</u>	6/30/25	Tim Arvidson, Stonebrooke Engineering, Inc.	Russ Matthys	\$44,615
In Progress	<u>INV 645: Residential Roadway Width: Best Practices</u>	6/30/25	Tim Arvidson, Stonebrooke Engineering, Inc.	Matt Leonard	\$49,346
In Progress	<u>INV 1129: Impacts of Shared Mobility on Infrastructure Usage, Greenhouse Gas Emissions and Accessibility</u>	8/31/25	Michael Levin, University of Minnesota	Elliott McFadden	\$161,526
In Progress	<u>INV 1141: Transitioning to Electric Vehicle Fleets: Best Practices and a Decision Tool</u>	12/31/25	Alireza Khani, University of Minnesota	Lyndon Robjent	\$188,800
In Progress	<u>INV 1151: Analyzing Truck Size and Weight Impacts on Vehicle Miles Traveled</u>	6/30/26	Alireza Khani, University of Minnesota	Duane Hill, Laura Roads	\$159,000
In Progress	<u>INV 1148: Use of MnCORS to Support AV Operations in Rural Minnesota</u>	8/31/26	Rajesh Rajamani, University of Minnesota	Victor Lund, Matt Wegwerth	\$178,775
In Progress	<u>Arts + Culture for Construction Mitigation: Highway 250 in Lanesboro, Minnesota</u>	6/30/27	Frank Douma, University of Minnesota	Jeanne Aamodt, Kayla Dean	\$139,569

Policy & Planning Pooled Fund Study

Study Number	Title	Lead State or Agency	Technical Liaison	Number of Participating Agencies	2024 MnDOT Contribution	Total MN Contribution
TPF-5(453)	<u>Automated Vehicle Pooled Fund Study</u>	OH	Cory Johnson	9	\$50,000	\$250,000

TRAFFIC & SAFETY

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
2023-04	<u>MP-19(005): Work Zone Intrusion Mobile Application</u>	2/29/24	Brian Davis, University of Minnesota	Steven Blaufuss	\$386,653
2023-26	<u>INV 1091: User-Centered Smart Traffic Sign Development Study</u>	6/30/25	Nichole Morris, University of Minnesota	Wayne Sandberg	\$240,793
2023-42	<u>INV 1076: Driver Comprehension of Flashing Yellow Arrows</u>	12/31/23	Gary Davis, University of Minnesota	Victor Lund	\$213,656
2023RIC07	<u>INV 645: Guidelines for Determining Speed Limits on Municipal Roadways</u>	9/30/23	Tim Arvidson, Stonebrooke Engineering, Inc.	William Manchester	\$76,963
2024-02	<u>Assessment of Pedestrian Safety and Driver Behavior Near an Automated Vehicle</u>	1/31/24	Nichole Morris, University of Minnesota	Cory Johnson	\$241,816
2024-10	<u>INV1099: Performance Evaluation of Different Detection Technologies for Signalized Intersections in Minnesota</u>	5/31/24	Yao-Yi Chiang, University of Minnesota	Michael Fairbanks	\$179,950
2024-13	<u>INV 1109: Complete Streets Speed Impacts</u>	6/30/24	Peter Savolainen, Michigan State University	Duane Hill	\$155,939
2024-16	<u>INV 1080: Assessing Pavement Markings for Automated Vehicle Readiness</u>	6/30/24	Adam Pike, Texas A&M Transportation Institute	Ethan Peterson	\$228,183
2024-17	<u>INV 1119: Evaluation of Static and Dynamic No Right Turn on Red Signs at Traffic Signals</u>	6/30/24	Christopher Day, Iowa State University	Susan Zarling	\$81,782
2024-25	<u>INV 1079: Development of a Smartphone App to Warn the Driver of Unintentional Lane Departure Using GPS Technology</u>	10/31/24	Imran Hayee, University of Minnesota Duluth	Victor Lund	\$147,145
2024-26	<u>INV 1113: Toward Implementation of Max-Pressure Control on Minnesota Roads—Phase II</u>	10/31/24	Raphael Stern, University of Minnesota	Ben Hao	\$140,034
2024-27	<u>Assessment of Travel-Time Reliability and Operational Resilience of Metro Freeway Corridors</u>	12/31/24	Eil Kwon, University of Minnesota Duluth	Michael Iacono	\$113,500
2024-29	<u>Implementing Inductive Loop Signature Technology for Vehicle Classification Counts</u>	10/31/24	Erik Minge, SRF Consulting Group, Inc.	Gene Hicks	\$77,728
2024RIC03	<u>INV 645: Mini-Roundabout FAQs</u>	8/31/24	Michael Marti, SRF Consulting Group, Inc.	Jon Pratt	\$63,784
2024RIC05	<u>INV-645: Methods for Maintaining Pavement Marking Retroreflectivity</u>	7/31/24	Michael Marti, SRF Consulting Group, Inc.	Girma Feyissa	\$55,913
TRS2402	<u>Administrative Rules and Structures of Speed Safety Camera (SSC) Systems</u>	12/31/24	Chelsea Moore-Ritchie, Short Elliott Hendrickson, Inc.	Mark Wagner	\$44,983
TRS2404	<u>Effects of Legalization of Marijuana on Traffic</u>	5/31/24	Christine Kline, CTC & Associates, LLC	Mark Wagner	\$23,064
TRS2405	<u>Public Education on Automated Driver Assist Systems</u>	10/31/24	Christine Kline, CTC & Associates, LLC	Scott Meier	\$19,830
Complete	<u>TPF-5(376): FY2023 Program Support Services for North/West Passage—Phase IV Pooled Fund</u>	7/31/23	Athey Creek Consultants, LLC	Cory Johnson	\$99,681
Complete	<u>TPF-5(376): North/West Passage Website Maintenance</u>	2/29/24	Patrick Nichols, North Dakota State University	Cory Johnson	\$20,844
Complete	<u>Pavement Marking Patterns and Widths: Human Factors Study</u>	3/31/24	Adam Pike, Texas A&M Transportation Institute	Ethan Peterson	\$208,890
Complete	<u>TPF-5(376): Program Support Services and Technical Writing for the North/West Passage Pooled Fund Research Program</u>	6/30/24	Athey Creek Consultants, LLC	Cory Johnson	\$44,868

TRAFFIC & SAFETY [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
In Progress	<u>TPF-5(376): North/West Passage Freight Task Force—Year 7</u>	10/31/24	Erika Witzke, CPCS Transcom, Inc.	Cory Johnson	\$37,295
In Progress	<u>INV 1114: Development of a System to Report School Bus Stop Arm Violations</u>	11/30/24	Brian Davis, University of Minnesota	Scot Edgeworth, Mike Krukowski	\$196,194
In Progress	<u>INV 1098: Pavement Marking/Colored Pavement Friction Differential and Product Durability</u>	12/31/24	Mihai Marasteanu, University of Minnesota	Ethan Peterson	\$152,473
In Progress	<u>INV 1121: Development and Demonstration of a Novel Red Light Running Warning System Using Connected Vehicle to Infrastructure (V2I) Technology</u>	12/31/24	Michael Levin, University of Minnesota	Victor Lund	\$258,010
In Progress	<u>INV 1125: Pedestrian Safety and Accessibility Best Practices for Channelized Right-Turn Lanes</u>	12/31/24	Tim Gates, Michigan State University	Joe Gustafson	\$68,160
In Progress	<u>TPF-5(506): North/West Passage: Vehicle Data, Mapping and Business Models</u>	12/31/24	Athey Creek Consultants, LLC	Cory Johnson	\$119,907
In Progress	<u>TPF-5(506): North/West Passage Transportation Pooled Fund Study: Freight Task Force</u>	12/31/24	Erika Witzke, CPCS Transcom, Inc.	Cory Johnson	\$79,968
In Progress	<u>INV 645: Guidelines for Determining Speed Limits on Municipal Roadways</u>	1/31/25	John Brunkhorst, Stonebrooke Engineering, Inc.	William Manchester	\$19,997
In Progress	<u>INV 645: Safety: Developing Tools to Address Behavioral Factors</u>	1/31/25	Rena Kuehl, SRF Consulting Group, Inc.	Sara Buermann	\$93,809
In Progress	<u>INV 1100: Tool to Estimate the Safety Impact of Vehicle Levels of Automation on Minnesota Roads</u>	2/28/25	Gary Davis, University of Minnesota	Scott Meier	\$109,518
In Progress	<u>INV 1132: Behavioral Investigation of Temporary and Permanent Pedestrian Infrastructure</u>	5/31/25	Curtis Craig, University of Minnesota	Mitchell Kiecker	\$205,944
In Progress	<u>INV 1074: Taconite as a Lower Cost Alternative High Friction Surface Treatment to Calcined Bauxite for Low-Volume Roads in Minnesota</u>	6/30/25	Mihai Marasteanu, University of Minnesota Duluth	Victor Lund	\$322,250
In Progress	<u>INV 1105: Multi-Method Investigation of Pedestrian Safety Impacts of Right-Turn Lanes</u>	6/30/25	Curtis Craig, University of Minnesota	Bradley Estochen	\$203,696
In Progress	<u>INV 1111: Identification and Assessment of Preventive Methods to Mitigate Cognitive and Physical Declines That Influence Driving Performance of Older Drivers</u>	6/30/25	Nichole Morris, University of Minnesota	Derek Leuer	\$359,847
In Progress	<u>INV 1131: Improving Safety for People Walking and Biking at Roundabouts</u>	6/30/25	Peter Savolainen, Michigan State University	Mark Wagner	\$108,011
In Progress	<u>INV 645: Pedestrian Safety Around Roundabouts</u>	6/30/25	Tim Arvidson, Stonebrooke Engineering, Inc.	Zachary Johnson	\$47,456
In Progress	<u>Understanding Risks and Opportunities for Ramp Metering Control in a Mixed-Autonomy Future</u>	6/30/25	Raphael Stern, University of Minnesota	Garrett Schreiner	\$148,495
In Progress	<u>Vehicle Mount Debris Removal Tool</u>	6/30/25	Dean Deeter, Athey Creek Consultants, LLC	John McClellan	\$24,960
In Progress	<u>INV 1091: User-Centered Smart Traffic Sign Implementation Development Study</u>	7/31/25	Rajesh Rajamani, University of Minnesota	Wayne Sandberg	\$198,058
In Progress	<u>MP-23(010): Enhanced Safety of Highway Construction Site Using Low-Cost, Wearable Sensor Network</u>	8/31/25	Youjin Jang, North Dakota State University	Michelle Moser	\$149,974
In Progress	<u>INV 1146: Alternative Deicer Performance Characterization: Know Before the Snow</u>	1/31/26	Stephen Druschel, Minnesota State University, Mankato	Thomas Peters	\$121,466
In Progress	<u>INV 1145: Rural Intersection Enhancement and Driver Behavior Study</u>	6/30/26	Nichole Morris, University of Minnesota	Victor Lund	\$240,927

Traffic & Safety Pooled Fund Studies

Study Number	Title	Lead State or Agency	Technical Liaison	Number of Participating Agencies	2024 MnDOT Contribution	Total MN Contribution
TPF-5(506)	<u>North/West Passage Transportation Pooled Fund Study—Phase V</u>	MN	Cory Johnson	6	\$30,000	\$150,000
TPF-5(385)	<u>Pavement Structural Evaluation with Traffic Speed Deflection Devices (TSDDs)</u>	VA	Eyoab Zegeye	26	\$0	\$55,000
TPF-5(430)	<u>Midwest States Pooled Fund Crash Test</u>	NE	Khamsai Yang	22	\$66,000	\$330,000
TPF-5(435)	<u>Aurora Program (FY2020-2024)</u>	IA	Joseph Huneke	19	\$25,000	\$125,000
TPF-5(438)	<u>Smart Work Zone Deployment Initiative (FY2020-2024)</u>	IA	Michelle Moser	9	\$25,000	\$50,000
TPF-5(444)	<u>Traffic Safety Culture—Phase II</u>	MT	Kristine Hernandez	19	\$10,000	\$50,000
TPF-5(447)	<u>Traffic Control Device Consortium</u>	FHWA	Tiffany Kautz	32	\$10,000	\$10,000
TPF-5(451)	<u>Road User Charge America</u>	OR	Peter Olson	23	\$25,000	\$50,000
TPF-5(487)	<u>Transportation Management Centers Pooled Fund Study—Phase II</u>	FHWA	John McClellan	24	\$25,000	\$150,000
TPF-5(489)	<u>Safety Service Patrol Standardization and Management Practices</u>	FHWA	John McClellan	19	\$25,000	\$125,000
TPF-5(490)	<u>Evaluating New Technologies for Roads Program Initiatives in Safety and Efficiency (ENTERPRISE)—Phase III</u>	MI	Cory Johnson	7	\$30,000	\$150,000
TPF-5(501)	<u>Roadside Safety Pooled Fund—Phase III</u>	WA	Khamsai Yang	27	\$65,000	\$195,000
TPF-5(519)	<u>Enhanced Traffic Signal Performance Measures</u>	IN	Derek Lehrke	11	\$40,000	\$180,000
TPF-5(520)	<u>Improving Traffic Detection Through New Innovative i-LST Technology Demonstration Pilot</u>	FHWA	Gene Hicks	22	\$15,000	\$30,000

ADMINISTRATIVE

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
2023-39	<u>INV 1106: Evaluating and Communicating the Value of Research</u>	12/31/23	Rahil Saedi, CPCS Transcom, Inc.	Catherine Walker	\$98,618
Complete	<u>INV 916: LRRB Technical Summaries (FY2022)</u>	7/31/23	Brian Hirt, CTC & Associates, LLC	Micaela Kranz	\$29,679
Complete	<u>INV 936: LRRB Idea Solicitation and Need Statement Development</u>	7/31/23	Michael Marti, SRF Consulting Group, Inc.	Kristine Elwood	\$99,948
Complete	MP-19(007): MnDOT Technical Summaries (FY2022)	7/31/23	Brian Hirt, CTC & Associates, LLC	Micaela Kranz	\$63,450
Complete	<u>University of Minnesota Snow Control Web Tools—Maintenance and Administration (FY2022-2023) (Non-Research & Innovation Funded)</u>	7/31/23	Arlene Mathison, University of Minnesota—CTS	None	
Complete	INV 936: LRRB Research Need Statement Development (FY2024)	6/15/24	Michael Marti, SRF Consulting Group, Inc.	Kristine Elwood	\$122,008
Complete	<u>Roadway Safety Design Workshop (FY2024) (Non-Research & Innovation Funded)</u>	6/30/24	Katherine Stanley, University of Minnesota—CTS	None	\$33,833
Complete	<u>OPMTS: Guardrail Installer Training Workshop (FY2023) (Non-Research & Innovation Funded)</u>	6/30/24	Stephanie Malinoff, University of Minnesota—CTS	None	

ADMINISTRATIVE [cont.]

Report Number	Title	End Date	Investigator	Technical Liaison	Total Cost
Complete	Office of Research & Innovation Organizational Assessment	6/30/24	Minnesota Management & Budget	Catherine Walker	\$56,140
Complete	<u>INV 916: LRRB Technology Transfer (T2) Material Development: LRRB At-A-Glance, Videos, Other T2 Materials (FY2022-2024)</u>	7/31/24	Mark Linsenmayer, CTC & Associates, LLC	Julie Swiler	\$99,975
Complete	<u>Shared Mobility Collaborative Administration and Engagement (Non-Research & Innovation Funded)</u>	9/30/24	Gina Baas, University of Minnesota-CTS	None	
In Progress	<u>University of Minnesota Snow Control Web Tools— Maintenance and Administration (FY2024) (Non-Research & Innovation Funded)</u>	10/31/24	Elizabeth Andrews, University of Minnesota	None	\$100,140
In Progress	<u>TPF-5(443): Communication Coordination and Reporting for Continuous Asphalt Mixture Compaction Assessment Using Density Profiling System (DPS) Pooled Fund</u>	12/31/24	Katie Johnson, CTC & Associates, LLC	Kyle Hoegh	\$145,442
In Progress	MP-22(009): MnDOT Technical Summaries (FY2023)	4/30/25	Mark Linsenmayer, CTC & Associates, LLC	Micaela Kranz	\$174,972
In Progress	<u>INV 927: LRRB Website Hosting and Maintenance (FY2022-2023)</u>	6/30/25	Mark Linsenmayer, CTC & Associates, LLC	Julie Swiler	\$15,004
In Progress	<u>INV 936: FY25 LRRB Research Need Statements</u>	6/30/25	Michael Marti, SRF Consulting Group, Inc.	Kristine Elwood	\$129,759
In Progress	INV999: Office of Research & Innovation Report Publication Services (FY2024-2025)	6/30/25	Elizabeth Andrews, University of Minnesota	Micaela Kranz	\$117,740
In Progress	<u>INV 645: Implementation of Research Findings (FY2021-2024)</u>	3/8/26	Stonebrooke Engineering, Inc.	William Manchester	\$1,150,000
In Progress	INV 645: Research Implementation Committee (RIC) Implementation of Research Findings (FY2022-2026)	3/18/26	Michael Marti, SRF Consulting Group, Inc.	William Manchester	\$2,250,000
In Progress	<u>Geometric Design Training Series</u>	6/30/26	Katherine Stanley, University of Minnesota-CTS	None	
In Progress	<u>Truck Weight Education and Outreach Program (FY2024-2026) (Non-Research & Innovation Funded)</u>	6/30/26	Katherine Stanley, University of Minnesota-CTS	None	
In Progress	MP-19(007): Technology Transfer (T2) Material Development: Research & Innovation At-A-Glance, Other T2 Materials (FY2022-2024)	9/12/26	Brian Hirt, CTC & Associates, LLC	Micaela Kranz	\$174,934
In Progress	INV 916: LRRB Technology Transfer Material Development (FY2025-2027)	6/30/27	Mark Linsenmayer, CTC & Associates, LLC	Micaela Kranz	\$157,830

Federal Program Support

Study Number	Title	2024 MnDOT Contribution
TPF-5(423)	National Cooperative Highway Research Program (FY2023) (NCHRP Dues)	\$906,213
TPF5(424)	National Cooperative Highway Research Program (FY2024) (NCHRP Dues)	\$924,475
MP-23(011)	AASHTO Technical Services Program: Transportation Performance Management (TPM) (FY2023)	\$15,000
MP-24(001)	AASHTO Technical Services Program: Transportation Performance Management (TPM) (FY2024)	\$37,625

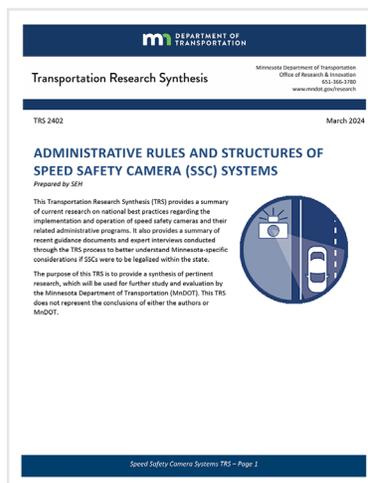
DEDICATED PROGRAMS

Title	End Date	Investigator	Technical Liaison	Total Cost
INV 668: Local Technical Assistance Program (LTAP) (FY2023-2024)	9/30/23	Stephanie Malinoff, University of Minnesota–CTS	Kristine Elwood	\$300,000
INV 668: Local Technical Assistance Program (LTAP) Expanded Activities (FY2023-2024)	6/30/24	Stephanie Malinoff, University of Minnesota–CTS	Kristine Elwood	\$660,000
INV645B: LRRB Outreach (FY2023)	6/30/24	Michael Marti, SRF Consulting Group, Inc.	Kristine Elwood	\$172,973
MnDOT Research Librarian Services (2023-2024)	6/30/24	Annette Fritze, University of Minnesota–CTS	Sheila Hatchell	\$78,616
AirTAP Program (FY2021-2022) (Non-Research & Innovation Funded)	6/30/24	Mindy Carlson, University of Minnesota	None	
Local Technical Assistance Program (LTAP) Base Operations (FFY2024)	9/30/24	Stephanie Malinoff, University of Minnesota–CTS	Kristine Elwood	\$420,000
Center for Transportation Studies Operations (FY2024-2025)	6/30/25	Kyle Shelton, University of Minnesota–CTS	None	\$5,450,115
INV 645B: LRRB Outreach and Marketing Support (2024-2025)	6/30/25	Michael Marti, SRF Consulting Group, Inc.	Micaela Kranz	\$96,582

TRANSPORTATION RESEARCH SYNTHESIS

A Transportation Research Synthesis (TRS) helps answer your research questions without the time or expense of a full research project. These reports may summarize existing research or assess the state of practice through a practitioner survey. For more information, visit mndot.gov/research/TRS.html.

A recent TRS, ***Administrative Rules and Structures of Speed Safety Camera (SSC) Systems***, summarized national best practices and conducted expert interviews regarding the implementation and operation of speed safety cameras, including the administrative programs that agencies use to manage these devices. This TRS aided legislatures to authorize the use of cameras in Minneapolis and Mendota Heights after a bill was approved in February, ***as reported by CBS News***.



Innovation Hour Webinar Series:

Supporting a culture of innovation at MnDOT, we hosted three innovation hour webinars, exploring the three E's of the E3 mindset:

- **Empathy:** Focus on understanding the needs and desires of those we serve internally and externally.
- **Experimentation:** Recognize success requires collaboration, rapid iteration and patience.
- **Empowerment:** Provide support and tools to get things done. Empower people to take calculated risks, voice dissenting opinions and secure resources.



MnDOT'S RESEARCH PROGRAM RECEIVES STATE AND NATIONAL RECOGNITION

High Value Research Award

The High Value Research Award is an annual award given by the Research Advisory Committee of the American Association of State Highway and Transportation Officials (AASHTO) that recognizes recently completed research projects of high value. This year, MnDOT won two awards, recognizing the projects as high priorities across the country: Implementation of Lane Boundary Guidance System for Snowplow Operations won first place overall, while Influence of Autonomous and Partially Autonomous Vehicles on Minnesota Roads received second place in the Safety, Security and Emergencies category.



Transportation Pooled Fund Excellence Award

The Federal Highway Administration and AASHTO selected MnDOT's Clear Roads Winter Maintenance Research as the recipient of a 2024 Transportation Pooled Fund (TPF) Excellence Award. The biennial TPF award highlights the importance of meaningful partnerships in transportation that advances national research efforts in safety, economic strength, equity, sustainability and organizational excellence.

CTS Transportation Research Partnership Award



With pedestrian deaths at a 30-year high nationally, families experience severe emotional and financial losses. Two University of Minnesota research projects worked with community members, government agencies and law enforcement specialists to explore solutions to reduce these fatalities. Research team members personally crossed streets more than 20,000 times to gather data for the studies. The Center for Transportation Studies (CTS) honored their hard work and dedication with the 2024 CTS Research Partnership Award.

The CTS Research Partnership Award recognizes teams of individuals who have drawn on their diverse expertise to accomplish goals with significant impacts in transportation.

Minnesota Association of Government Communicators

Voted by fellow government communicators, two Research & Innovation video projects, "MnDOT has a Library!" and "Transportation Career Series" took home first place, Northern Lights Awards.

LOCAL ROAD RESEARCH BOARD



Administered by the MnDOT Office of Research & Innovation, the LRRB has been bringing innovations to local Minnesota engineers since 1959. LRRB research ideas come from local Minnesota transportation professionals, either through the IdeaScale button at lrrb.org or at LRRB sessions during October State Aid prescreening meetings held around the state. MnDOT Office of Research & Innovation helps to identify existing solutions and formulate need statements to elicit project proposals. In December, the LRRB evaluates all proposals and makes funding selections.



KEEP UP WITH MnDOT RESEARCH



Email Updates: Subscribe at mndot.gov/research/subscribe.html.



Social Media: Follow us at [@MnDOTResearch](https://twitter.com/MnDOTResearch) using your favorite social media channels.



Crossroads Blog: Check out our recent stories on Minnesota transportation research at mntransportationresearch.org.



Presentations: Schedule a visit to learn how the research program or library can help your office or district.

Videos: Local transportation agencies in Minnesota continue to face the challenge of hiring and retaining workers. To help agencies with recruitment efforts, MnDOT and the LRRB developed a new suite of videos to build awareness of exciting transportation career opportunities for students. Access the videos and learn more on the [Minnesota Transportation Career Videos page](#).



BY THE NUMBERS

 **39**
research ideas submitted

 **34,623**
digital library page views


868

active Technical Advisory Panel members

17,804
e-newsletter subscribers



33,789
transportation research blog visitors



7,758
library information transactions



236
active and completed research projects during FY2024



1,175
digital and print materials circulated



DEPARTMENT OF
TRANSPORTATION
OFFICE OF RESEARCH & INNOVATION

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