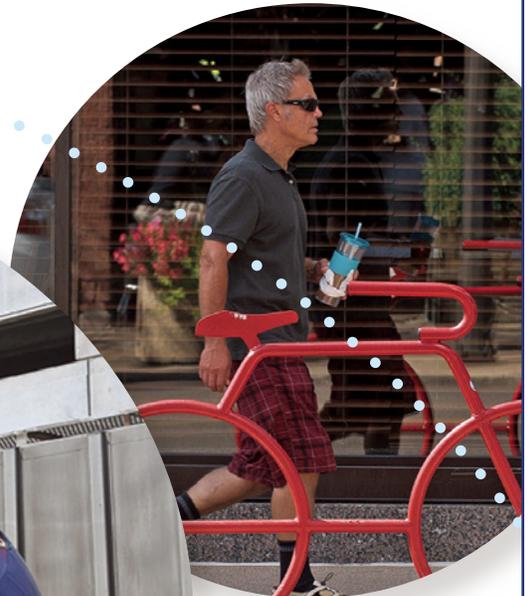




## MnDOT RESEARCH SERVICES & LIBRARY

# FY2013 AT-A-GLANCE

July 1, 2012, through June 30, 2013



# Director's Message



LINDA TAYLOR  
*Director*  
*MnDOT Research Services & Library*  
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Welcome to the new, enhanced *MnDOT Research Services & Library At-A-Glance* for FY2013. This document serves as a quick-reference guide to our research program.

Over the last year, we have conducted surveys, interviews and workshops to help us better understand our customers' needs. Based on their input, we have replaced our annual report with this expanded version of the *At-A-Glance*, which now includes FY2013 project highlights, an overview of the research process and information about our Transportation Research Synthesis program.

We welcome your feedback on these changes. For more information about the projects and services described in this report, please feel free to contact me or any Research Services & Library staff member.

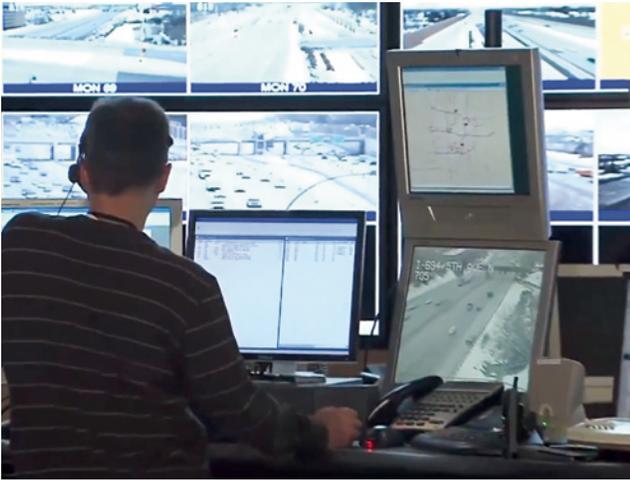
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The back cover lists our websites and other communications outlets.



# FY2013 Research Highlights



## Developing a Low-Cost, Portable Weigh-in-Motion System

**Policy & Planning** — Installing permanent weigh-in-motion (WIM) stations on local roads is very expensive and requires recurring costs of maintenance trips, electricity and communication. In this cutting-edge project, researchers developed an easy-to-install portable system to be used for short-duration traffic counting operations. The study showed that it is possible to build and deploy a durable system with data quality similar to that of much more expensive permanent WIM systems. The system is demonstrated in a [Research Services & Library video](#). [Technical Summary 2012-38](#)

## Improving Traffic Signal Timing with SMART-SIGNAL

**Traffic & Safety** — The Systematic Monitoring of Arterial Road Traffic and Signals (SMART-SIGNAL) system collects arterial traffic data by leveraging existing traffic signal infrastructure such as in-pavement sensors at vehicle-activated stoplights. This information can be used to improve traffic flow. In this project, researchers updated this system by making field hardware more compact and easier to install. They also developed a Web-based interface for traffic control center software, allowing the generation of real-time arterial performance measures and historical statistical reports. Investigators implemented the refined system at 13 intersections along Trunk Highway 13 in Burnsville, Minnesota. [Technical Summary 2013-06](#)

## Helping Local Agencies with Complete Streets

**Multimodal** — A Complete Streets approach to transportation infrastructure design and maintenance takes into account the needs and safety of motorists as well as pedestrians, bicyclists and transit riders. This means planning for walkways, bike lanes and other infrastructure elements. While such an approach was already in use informally by many local agencies, they needed a guide to share best practices in this area and to help them create a program optimal to their agency characteristics and needs. This project compiled sample Complete Streets policy language from agencies in Minnesota, systems for classifying roadways that are appropriate for use in context-sensitive planning and a worksheet to help develop specific project plans. [Implementation Product 2013RIC02](#)

## How Does Transportation Affect Quality of Life?

**Policy & Planning** — This project sought Minnesota citizen input through focus groups and mail surveys to define quality of life, identify the role transportation-related factors play in it and investigate how MnDOT is performing on those factors. Accessibility, safety, maintenance and mobility were rated the most important factors. Overall, Minnesota residents were fairly well-satisfied with MnDOT services, with 84 percent rating performance at least 5 on a 7-point scale. [Technical Summary 2013-05](#)



# How We Can Help You

MnDOT Research Services & Library is here to help you solve transportation problems. Here's how:

**Defining the Problem.** Before starting a research project, we can flesh out existing research for you with a literature search or a Transportation Research Synthesis. (See page 22.)

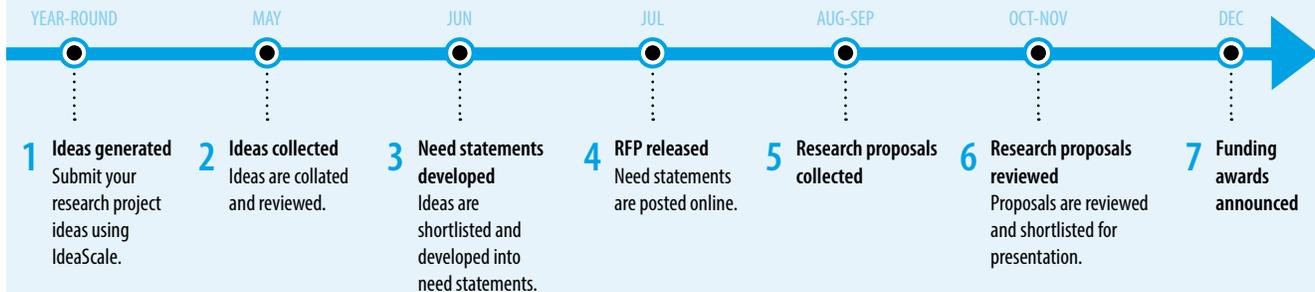
**Kick-Starting Your Project.** We can help you articulate your research needs, develop a need statement, issue a request for proposals and finalize the project work plans.

**Managing the Research.** From start to finish, our staff will help manage your research project by tracking timelines and deliverables, managing contracts, and handling invoices and amendment requests.

**Implementing the Results.** We will help identify opportunities to implement the research results and develop marketing and communications materials for your project.

**Figure 1. Overview of MnDOT's Annual Research RFP Process**

## From idea to project



NOTE: Exact dates may change from year to year. Contact us or visit [mndot.gov/research](http://mndot.gov/research) for details.

## RESEARCH SERVICES & LIBRARY ROLES

Technical Advisory Panel (TAP)	The TAP guides the research, reviewing and approving all deliverables. Typically four to six people serve on each TAP, and if you're requesting the research, you're most likely a good candidate to be one of them. Research Services & Library will coach you through the process with documentation and resources like our <a href="#">Technical Advisory Panels video series</a> . Additionally, other stakeholders may attend TAP meetings to stay informed of project progress, though these "friends of the TAP" don't influence project scope or task approvals.
Technical Liaison (TL)	The TL represents the sponsoring agency's (MnDOT or LRRB) interest. The TL helps develop the initial need into a contract; helps the Principal Investigator create deliverables; and approves the deliverables, work plan and amendment requests. As requestor of the project, you may be the best person to guide the overall direction and scope of the contract and to provide technical guidance, or Research Services & Library can help you find an optimal TL.
Project Advisor (PA)	The PA is a senior Research Services & Library representative who facilitates project startup and provides a link between the TAP and other related efforts occurring within the LRRB, MnDOT and national programs. The PA may or may not be a TAP member.
Project Coordinator (PC)	The PC is the Research Services & Library team member who ensures that contract provisions are followed and that deliverables are submitted and approved on schedule and within budget. The PC works with the TL to help manage projects throughout their life cycles. The PC also coordinates the activities of project TAPs. Each PC reports to a particular PA, and PCs are typically assigned to particular topic areas to help ensure continuity over potentially related projects.
Principal Investigator (PI)	The PI is the contractor/researcher responsible for developing the project and completing contract obligations. With TAP guidance and input, the PI designs, develops and performs tasks to carry out contract deliverables.

# FY2013 Budget Summary

Research Services & Library managed more than \$10.5 million in research funds in FY2013. Figure 2 shows the sources of these funds, which were distributed across research topic areas as shown in Figure 3.

**State Planning and Research (SP&R) Program.** The Federal Highway Administration (FHWA) provides SP&R funding, at least 25 percent of which must go to state-specific research needs. The SP&R program supports funding for federal programs, pooled fund projects and single-state projects. Figure 4 illustrates the distribution of these funds.

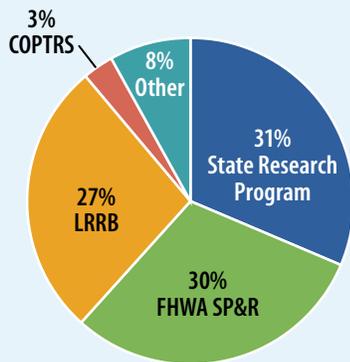
**MnDOT's State Research Program (SRP).** SRP funds come from the Minnesota state government to ensure that agency research needs are addressed and to support MnDOT's strategic directions. SRP funds are often used to match dollars from other funding sources, including FHWA SP&R, the University of Minnesota's Center for Transportation Studies (CTS) and the Intelligent Transportation Systems (ITS) Institute.

**Local Road Research Board (LRRB).** Research Services & Library administers the budget and research program for the LRRB, an organization created in 1959 to facilitate transportation research and information sharing among Minnesota city and county engineers.

**Cooperative Program for Transportation Research and Studies (COPTRS).** COPTRS was established in 1983 to foster cooperation in basic and applied sciences and engineering to solve transportation problems and speed technology transfer. Funding for this program is determined by legislative action.

**Figure 2.**

**FY2013 Research Funds by Funding Source**

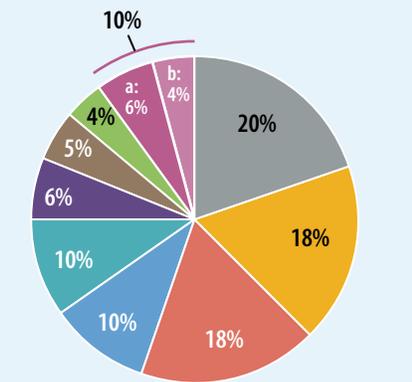


State Research Program	\$ 3,284,000
FHWA State Planning and Research (Part II)	\$ 3,190,840
Local Road Research Board	\$ 2,902,378
Cooperative Program for Transportation Research and Studies	\$ 363,000
Other*	\$ 876,443
<b>Total</b>	<b>\$ 10,616,661</b>

\*Includes contributions from other MnDOT offices and districts along with the Twin Cities Metropolitan Council and the ITS Institute.

**Figure 3.**

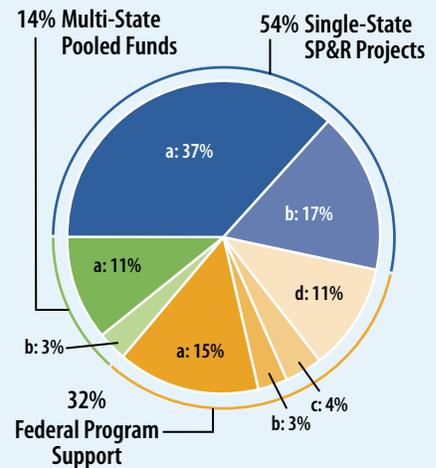
**FY2013 Research Funds Allocated by Topic Area**



Dedicated Programs (CTS & LTAP)	\$ 1,630,625
Traffic & Safety	\$ 1,486,369
Materials & Construction	\$ 1,473,417
Maintenance Operations & Security	\$ 873,845
Bridges & Structures	\$ 812,282
Policy & Planning	\$ 471,121
Multimodal	\$ 412,312
Environmental	\$ 346,567
Administrative	\$ 837,047
a: Research Administration	\$ 527,396
b: LRRB/RIC Administration	\$ 309,651
<b>Total</b>	<b>\$ 8,343,585</b>

**Figure 4.**

**FY2013 SP&R Part II Funding Distribution**



Single-State SP&R Projects	\$ 2,424,952
a: Research and Implementation	\$ 1,680,952
b: Program and Administrative Support	\$ 744,000
Federal Program Support	\$ 1,437,389
a: NCHRP	\$ 659,419
b: TRB	\$ 119,482
c: AASHTO	\$ 163,707
d: SHRP 2	\$ 494,781
Multi-State Pooled Funds	\$ 634,200
a: Participation in Pooled Funds Led by Other States	\$ 511,700
b: MnDOT-Led Pooled Funds	\$ 122,500
<b>Total</b>	<b>\$ 4,496,541</b>

# MnDOT FY2013 Research

THESE TABLES ARE ORGANIZED BY RESEARCH TOPIC AREA:

## RESEARCH PROJECTS:

- Completed research reports and Transportation Research Syntheses that were released in fiscal year 2013: July 2012 to June 2013
- Research contracts with end dates during FY2013 that did not result in a final report
- Other research contracts active during FY2013, including some tasks or contracts that are part of larger programs that MnDOT tracks individually

## POOLED FUND TABLES\*:

- Multi-state transportation pooled fund studies led by MnDOT
- Other multi-state transportation pooled fund studies in which MnDOT participates, either through an FY2013 contribution or through past contributions that are still producing value for Minnesota.

\*Project titles are active hyperlinks in the online PDF version of this document.

## FUNDING SOURCE KEY

<b>COPTRS</b>	<b>Cooperative Program for Transportation Research and Studies</b>
<b>LRRB</b>	<b>Local Road Research Board</b>
<b>SRP</b>	<b>MnDOT State Research Program</b>
<b>SP&amp;R</b>	<b>State Planning and Research (FHWA)</b>

A mark in the "TS" column indicates that a Technical Summary for this project can be found at [mndot.gov/research](http://mndot.gov/research).

"Number of Participating States" for some pooled funds includes Canadian provinces and agencies such as FHWA.

## Bridges & Structures

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
2012-16	89261 W0200	Validation of Prestressed Concrete I-Beam Deflection and Camber Estimates	University of Minnesota	Cathy French	Brian Homan	Daniel Warzala	5/11/10	7/31/12	COPTRS	\$100,000	\$100,000	100%	X
2012-24	89261 W0131	Instrumentation, Monitoring and Modeling of the I-35W Bridge	University of Minnesota	Cathy French	Benjamin Jilk	Shirlee Sherkow	2/2/09	8/30/12	Partnership Funds	\$235,431	\$176,573	75%	X
2012-27	89261 W0244	A Research Plan and Factors Affecting Culvert Pipe Service Life in Minnesota	University of Minnesota	Jeff Marr	Andrea Hendrickson	Shirlee Sherkow	4/18/11	9/30/12	SRP	\$29,999	\$29,999	100%	X
2012-30	89261 W0142	Full-Depth Precast Concrete Bridge Deck System—Phase II	University of Minnesota	Cathy French	Keith Molnau, Paul Rowekamp	Daniel Warzala	7/30/09	10/31/12	SRP	\$165,000	\$165,000	100%	X
2013-09	96271	Synthesis of Bridge Approach Panels Best Practices	Minnesota State University, Mankato	Farhad Reza	Paul Rowekamp	Shirlee Sherkow	7/15/10	5/31/13	SRP	\$25,000	\$25,000	100%	X
2013-11, 2013-12	89261 W0145	Wakota Bridge Thermal Monitoring Program Part II: Data Analysis and Model Comparison	University of Minnesota	Arturo Schultz	Arielle Ehrlich	Shirlee Sherkow	6/19/09	5/31/13	SRP	\$193,990	\$193,990	100%	X
N/A	98166	MPR-9(004): Load and Resistance Factor Design (LRFD) Pile Driving Static Load Test Data Collection	American Engineering Testing, Inc.	Gregory Reuter	Derrick Dasenbrock	Bruce Holdhusen	1/21/11	7/31/12	SP&R, SRP	\$110,263	\$110,263	100%	
N/A	99586	INV 926: Innovative Bridge Construction for Minnesota Local Roads—Synthesis Report	HDR Engineering	Daniel Dorgan	John Welle	Shirlee Sherkow	12/9/11	7/31/12	LRRB	\$24,976	\$24,976	100%	
N/A	97918	Clarification of NBIS Laws and MnDOT Bridge Policies	HDR Engineering	Nick Sovell	Thomas Styrbicki	Bruce Holdhusen	12/10/10	7/31/12	SRP	\$19,534	\$14,694	75%	
N/A	99136	MPR-1(004): Partially Grouted Riprap Implementation Matrix Riprap Implementation	Ayers Associates	Paul Clopper	Nicole Danielson-Bartelt	Shirlee Sherkow	12/14/11	7/31/13	SP&R, SRP	\$27,075	\$27,075	100%	
N/A	01558	MPR-1(009): Ultra-Thin Polymer Concrete Overlays for Bridge Decks—Installation	American Engineering Testing, Inc.	Dave Rettner	Clark Moe, Edward Lutgen	Nelson Cruz	8/15/12	8/31/13	SP&R, SRP	\$5,562	\$5,562	100%	
N/A	01557	MPR-1(009): Ultra-Thin Polymer Concrete Overlays for Bridges	Minnesota State University, Mankato	Farhad Reza	Edward Lutgen	Nelson Cruz	7/27/12	7/31/16	SP&R, SRP	\$9,930	\$9,930	100%	
N/A	03758	TRS: Applications of Computational Fluid Dynamics for River Simulation: State of the Practice	Wenck Associates Inc.	Joel Toso	Solomon Woldeamlak	Shirlee Sherkow	5/2/13	7/31/13	SRP	\$9,704	\$9,704	100%	
N/A	02888	TRS: Bridge Safety Inspection and NBIS Bridge Inspection Program Administration	HDR Engineering	Nick Sovell	Eric Evens	Shirlee Sherkow	2/6/13	9/30/13	SRP	\$45,692	\$41,964	92%	
N/A	98640	MPR-0(005): Analysis of Bridge Deck Cracking Data	American Engineering Testing, Inc.	Dave Rettner	Ronald Mulvaney	Shirlee Sherkow	5/25/11	1/31/14	SP&R, SRP	\$44,993	\$36,605	81%	

## Bridges & Structures [cont.]

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
N/A	95439	MPR-9(002): Concrete Bridge Deck Crack Sealant Evaluation and Implementation	Braun Intertec Corporation	Matthew Oman	Sarah Sondag	Daniel Warzala	9/11/09	9/10/14	SP&R, SRP	\$80,918	\$62,513	77%	
N/A	99620	MPR-0(002): Culvert Repair Best Practices, Specifications and Special Provisions	CNA Consulting Engineers, Inc.	Bruce Wagener	Lisa Saylor	Bruce Holdhusen	11/1/11	1/31/14	SP&R, SRP	\$79,972	\$60,948	76%	
N/A	02345	Vacuum Grouting of Post-Tensioned Bridges	Wiss, Janney, Elstner Associates, Inc.	Mark Chauvin	Paul Kivisto	Shirlee Sherkow	4/19/13	1/31/15	SRP	\$134,807	\$94,466	70%	
N/A	96272	Load and Resistance Factor Design (LRFD) Pile Driving Project—Phase II Study	Minnesota State University, Mankato	Aaron Budge	Paul Rowekamp, Gary Person	Nelson Cruz	8/18/10	8/31/13	SRP	\$160,000	\$112,000	70%	
N/A	89261 W0183	Development of an Advanced Warning System for Fracture Critical Steel Bridges—Phase II	University of Minnesota	Arturo Schultz	Moises Dimaculangan	Shirlee Sherkow	9/24/10	9/30/13	SRP	\$71,950	\$48,661	68%	
N/A	89261 W0261	MPR-0(004): Scour Monitoring Technology Implementation	University of Minnesota	Jeff Marr	Andrea Hendrickson	Shirlee Sherkow	4/18/11	11/30/14	SP&R, SRP	\$38,233	\$25,681	67%	
N/A	99008 W02	INV 910: Partially Grouted Riprap Lab Flume Study (Matrix Riprap)	University of Minnesota	Jeff Marr	Nicole Danielson-Bartelt	Shirlee Sherkow	11/1/11	8/31/14	SRP, LRRB	\$130,373	\$73,341	56%	
N/A	99008 W062	INV 930: Development and Integration of Advanced Timber Bridge Inspection Techniques for NBIS	University of Minnesota – Duluth	Brian Brashaw	David Conkel	Daniel Warzala	8/6/12	1/31/15	LRRB, Other DOTs	\$199,786	\$89,903	45%	
N/A	99008 W041	Anchorage of Shear Reinforcement in Prestressed Concrete Bridge Girders	University of Minnesota	Cathy French	Benjamin Jilk	Shirlee Sherkow	6/29/12	11/30/14	SRP	\$175,000	\$72,000	41%	
N/A	99008 W049	MPR-2(006): Monitoring of Fracture Critical Steel Bridges—Phase III	University of Minnesota	Arturo Schultz	Moises Dimaculangan	Shirlee Sherkow	6/29/12	7/31/15	SP&R, SRP	\$166,000	\$67,000	40%	
N/A	99008 W042	MPR-2(002): Time-Dependent Considerations of I-35W St. Anthony Falls Bridge Including Long-Term Monitoring Applications	University of Minnesota	Cathy French	Benjamin Jilk	Shirlee Sherkow	6/29/12	12/31/14	SP&R, SRP	\$100,000	\$39,670	40%	
N/A	02782	Factors Influencing the Durability of MnDOT Bridge Decks	Olson & Nesvold Engineers	Steven Olson	Dustin Thomas	Daniel Warzala	1/14/13	7/31/14	Other State Funds	\$95,000	\$20,478	22%	
N/A	99008 W01	Investigation of Shear Distribution Factors in Prestressed Concrete Girder Bridges	University of Minnesota	Cathy French	Yihong Gao	Shirlee Sherkow	9/27/11	3/31/15	SRP	\$320,000	\$35,700	11%	
N/A	99004 W05	INV 940: Development of Cost-Effective Timber Bridge Repair Techniques for Minnesota	Iowa State University	Brent Phares	David Conkel	Daniel Warzala	12/14/12	3/31/15	LRRB, Other DOTs	\$299,582	\$16,780	6%	
N/A	99004 W09	MPR-4(010), INV 945: Next Generation Bridge Management Tools and Inspection	Iowa State University	Basak Aldemir Bektas	Thomas Martin	Daniel Warzala	6/14/13	12/31/14	SP&R, SRP, LRRB	\$72,072	\$0	0%	

## Bridges & Structures Pooled Fund Studies

Study Number	Title	Technical Liaison	Project Coordinator	Lead State or Agency	Number of Participating States	Current MN Commitment End Date	Total Cost	MN 2013 Commitment	Total MN Commitment	TS
TPF-5(174)	Construction of Crack-Free Bridge Decks—Phase II	Paul Kivisto	Deb Fick	KS	14	2011	\$995,000	\$0	\$75,000	
TPF-5(179)	Evaluation of Test Methods for Permeability (Transport) and Development of Performance Guidelines for Durability	Bernard Izevbekhai	Deb Fick	IN	11	2011	\$843,000	\$0	\$87,000	
TPF-5(238)	Design and Fabrication Standards to Eliminate Fracture Critical Concerns in Two Girder Bridge Systems	Duane Hill	Deb Fick	IN	9	2013	\$860,000	\$20,000	\$60,000	
TPF-5(247)	Field Testing Handheld Thermographic Inspection Technologies—Phase II	Paul Rowekamp	Deb Fick	MO	12	2013	\$760,000	\$0	\$60,000	
TPF-5(253)	Member-Level Redundancy in Built-Up Steel Members	Todd Nieman	Deb Fick	IN	8	2013	\$575,000	\$25,000	\$75,000	
TPF-5(254)	Evaluation and Analysis of Decked Bulb T Beam Bridge	Duane Hill	Deb Fick	MI	5	2014	\$380,000	\$15,000	\$60,000	
TPF-5(256)	HY-12 Storm Drain Hydraulic Analysis Program—Phase II of Development Efforts	Lisa Saylor	Deb Fick	FHWA	6	2012	\$90,000	\$0	\$10,000	

## Bridges & Structures Pooled Fund Studies [cont.]

Study Number	Title	Technical Liaison	Project Coordinator	Lead State or Agency	Number of Participating States	Current MN Commitment End Date	Total Cost	MN 2013 Commitment	Total MN Commitment	TS
TPF-5(264)	Passive Force-Displacement Relationships for Skewed Abutments	David Conkel	Deb Fick	UT	7	2013	\$255,000	\$15,000	\$30,000	
TPF-5(265)	Watershed Modeling System License Renewal Agreement	Lisa Sayler	Deb Fick	FHWA	8	2013	\$112,000	\$0	\$5,000	
TPF-5(266)	Surface-Water Model System License Renewal Agreement	Lisa Sayler	Deb Fick	FHWA	7	2013	\$86,000	\$0	\$10,000	
TPF-5(272)	Evaluation of Lateral Pile Resistance Near MSE Walls at a Dedicated Wall Site	Nickolas Haltvick	Deb Fick	UT	10	2013	\$255,000	\$15,000	\$30,000	

## Environmental

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
2012-21	96273	Concrete Slurry, Wash and Loss Water Mitigation	Minnesota State University, Mankato	Stephen Druschel	Dwayne Stenlund	Bruce Holdhusen	5/11/10	8/31/12	SRP	\$104,945	\$104,945	100%	X
N/A	89261 WO211	INV 897: Developing Salt-Tolerant Sod Mixtures for Use as Roadside Turf in Minnesota	University of Minnesota	Eric Watkins	Dwayne Stenlund	Daniel Warzala	6/8/10	8/31/14	LRRB	\$176,516	\$132,387	75%	
N/A	89258 WO2	Wetblade to Control Invasive Species Along Roadway Corridors	Michigan Technological University	Catherine Tarasoff	Kenneth Graeve	Nelson Cruz	6/25/09	5/31/14	SRP	\$139,966	\$89,617	64%	
N/A	89261 WO250	Development of Stormwater Effluent Turbidity Monitoring Methods for Linear Construction	University of Minnesota	Bruce Wilson	Dwayne Stenlund	Bruce Holdhusen	6/27/11	2/28/14	SRP	\$193,500	\$115,425	60%	
N/A	89261 WO252	Wetland Mitigation in Abandoned Borrow Areas	University of Minnesota – Duluth	Kurt Johnson	Sarma Straumanis	Shirlee Sherkow	3/28/11	8/31/14	SRP	\$142,023	\$82,868	58%	
N/A	89261 WO207	INV 894: Assessing and Improving Pollution Prevention by Swales	University of Minnesota	John Gulliver	Barbara Loida	Bruce Holdhusen	7/30/10	3/31/14	SRP, LRRB	\$314,000	\$122,000	39%	
N/A	00734	Flocculation Treatment BMPs for Construction Water Discharges	Minnesota State University, Mankato	Stephen Druschel	Dwayne Stenlund	Bruce Holdhusen	6/22/12	12/31/13	SRP	\$79,464	\$28,333	36%	
N/A	99008 WO45	Laboratory Study of Culvert Sedimentation for Fish Passage	University of Minnesota	Jessica Kozarek	Petronella DeWall	Shirlee Sherkow	8/1/12	9/30/14	SRP	\$105,638	\$13,632	13%	
N/A	99008 WO54	INV 932: Determination of Effective Impervious Area in Urban Watersheds	University of Minnesota	John Gulliver	Scott Anderson	Shirlee Sherkow	6/29/12	7/31/15	LRRB	\$150,000	\$10,000	7%	
N/A	99008 WO120	MPR-4(001): Assessing the Use of Willow Shrub Species on Living Snow Designs to Manage the Damaging Effects of Salt	University of Minnesota	Diomy Zamora	Daniel Gullickson	Daniel Warzala	5/9/13	12/31/15	SP&R, SRP	\$145,034	\$0	0%	
N/A	99008 WO94	Web-Based Preventive Blowing and Drifting Snow Control Calculator Decision Tool	University of Minnesota	Gary Wyatt	Daniel Gullickson	Daniel Warzala	4/17/13	11/30/14	Other State Funds	\$65,925	\$0	0%	

## Environmental Pooled Fund Studies

Study Number	Title	Technical Liaison	Project Coordinator	Lead State or Agency	Number of Participating States	Current MN Commitment End Date	Total Cost	MN 2013 Commitment	Total MN Commitment	TS
TPF-5(139)	PCC Surface Characteristics: Tire-Pavement Noise Program Part 3—Innovative Solutions/Current Practices	Bernard Izevbekhai	Deb Fick	IA	8	2008	\$705,000	\$0	\$55,000	
TPF-5(187)	Precipitation Frequency Estimates for the Midwestern Region	Andrea Hendrickson	Deb Fick	FHWA	9	2010	\$1,642,013	\$0	\$300,001	X

# Maintenance Operations & Security

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
2012-20	96319	Salt Brine Blending to Optimize Deicing and Anti-Icing Performance and Cost-Effectiveness	Minnesota State University, Mankato	Stephen Druschel	Thomas Peters	Daniel Warzala	7/12/10	7/31/12	SRP	\$69,600	\$69,600	100%	X
2012-40	89261 W0199	Estimation of Winter Snow Operation Performance Measures with Traffic Data	University of Minnesota – Duluth	Eil Kwon	Thomas Peters	Daniel Warzala	8/20/10	12/31/12	COPTRS	\$58,000	\$58,000	100%	X
2013-08	LAB904	INV 904: Stripping of Hot-Mix Asphalt Pavements Under Chip Seals	MnDOT Materials and Road Research Section	Thomas Wood	Thomas Tesch	Daniel Warzala	7/19/10	4/30/13	LRRB	\$40,000	\$34,000	85%	X
2013RIC6.7	93465 Task 6.7	INV 645: Aggregate Roads Dust Control: A Brief Synthesis of Current Practices	SRF Consulting Group, Inc.	Mike Marti	Rich Sanders	Farideh Amiri	1/22/11	12/31/12	LRRB	\$31,350	\$31,350	100%	X
N/A	99716	TPF-5(218): Clear Roads Administration, Research Support and Information Services for FY2012	CTC & Associates LLC	Kim Linsenmayer	Thomas Peters	Deb Fick	10/13/11	9/30/12	SP&R, Partnership Funds	\$97,306	\$97,160	100%	
N/A	98248	TPF-5(218): Clear Roads Winter Highway Operations— Mapping Weather Severity Zones	Meridian Environmental Technology, Inc.	John Mewes	Thomas Peters	Deb Fick	8/17/11	7/31/12	SP&R, Partnership Funds	\$49,725	\$49,308	99%	
N/A	01191	MPR-1(006): 1440 Guardrail Project Systems Inventory and Survey Grade Pilot Study 2013	Data Transfer Solutions, LLC	None	None	Bruce Holdhusen	10/18/12	6/30/13	SP&R, SRP, Other State Funds	\$249,535	\$245,358	98%	
N/A	99083	TPF-5(218): Determining the Toxicity of Deicing Materials	Barr Engineering Company	Keith Pilgrim	Thomas Peters	Deb Fick	2/1/12	6/30/13	SP&R, Partnership Funds	\$85,103	\$78,774	93%	
N/A	01387	TPF-5(218): AASHTO SCOM Meeting and Support for the Clear Roads September 2012 TAC Meeting	CTC & Associates LLC	Kim Linsenmayer	Thomas Peters	Deb Fick	6/12/12	1/31/13	SP&R, Partnership Funds	\$13,520	\$12,364	91%	
N/A	99085	TPF-5(218): Snow Removal at Extreme Temperatures	Montana State University, Western Transportation Institute	Xianming Shi	Thomas Peters	Deb Fick	3/20/12	1/31/13	SP&R, Partnership Funds	\$50,000	\$32,871	66%	
N/A	02133	TPF-5(218): Clear Roads Administration, Research Support and Information Services	CTC & Associates LLC	Kim Linsenmayer	Thomas Peters	Deb Fick	9/19/12	7/31/13	SP&R, Partnership Funds	\$89,413	\$89,413	100%	
N/A	99008 W056	INV 934: Friction Measurement System for Polk County	University of Minnesota	Rajesh Rajamani	Rich Sanders	Daniel Warzala	6/29/12	11/30/13	LRRB	\$40,000	\$38,000	95%	
N/A	99392	TPF-5(218): Developing a Totally Automated Spreading System for Clear Roads	Thompson Engineering Company	Gregory Thompson	Thomas Peters	Deb Fick	2/1/12	7/31/13	SP&R, Partnership Funds	\$69,550	\$63,655	92%	
N/A	03713	TRS: Pedestrian Snow Removal Best Practices and Lessons Learned	SRF Consulting Group, Inc.	Rena Kuehl	Trisha Nelson	Shirlee Sherkow	5/6/13	7/31/13	SRP	\$9,894	\$8,330	84%	
N/A	99556	I-35 Emergency Alternate Route Signage—District 6 Pilot Project	SRF Consulting Group, Inc.	Andy Mielke	Michael Schweyen	Nelson Cruz	1/25/12	1/31/14	SRP	\$98,101	\$62,090	63%	
N/A	98247	TPF-5(218): Clear Roads Winter Highway Operations— Understanding the True Costs of Snow and Ice Control	PB America, Inc.	Patrick Hughes	Thomas Peters	Deb Fick	8/25/11	7/31/13	SP&R, Partnership Funds	\$192,720	\$106,235	55%	
N/A	95099	TPF-5(153), INV 863: Optimal Timing of Preventive Maintenance for Addressing Environmental Aging in HMA Pavements	Asphalt Institute	Mike Anderson	Thomas Wood	Bruce Holdhusen	3/30/10	11/30/13	LRRB, SP&R, Other Federal Funds	\$286,185	\$149,503	52%	
N/A	01531	TPF-5(218): Comparison of Material Distribution Systems for Winter Maintenance—Phase I	Thompson Engineering Company	Gregory Thompson	Thomas Peters	Deb Fick	12/28/12	1/31/14	SP&R, Partnership Funds	\$44,960	\$23,395	52%	

## Maintenance Operations & Security [cont.]

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
N/A	99082	TPF-5(218): Cost-Benefit Analysis Tool Kit—Phase II	Montana State University, Western Transportation Institute	Jeralyn Brodowy	Thomas Peters	Deb Fick	2/6/12	7/31/13	SP&R, Partnership Funds	\$109,999	\$41,300	38%	
N/A	99008 WO46	Estimation of Winter Snow Operation Performance Measures with Traffic Flow Data—Phase II	University of Minnesota – Duluth	Eil Kwon	Thomas Peters	Daniel Warzala	11/7/12	9/30/14	COPTRS	\$88,700	\$25,000	28%	
N/A	94079	INV 886: Cost-Effective Pavement Preservation Solutions for the Real World	Minnesota State University, Mankato	W. James Wilde	Gregory Coughlin, Malaki Ruranika	Nelson Cruz	9/8/09	9/30/13	SRP, LRRB	\$94,984	\$26,704	28%	
N/A	LAB886	INV 886: Cost-Effective Pavement Preservation Solutions for the Real World	MnDOT Materials and Road Research Section	Thomas Wood	Gregory Coughlin	Nelson Cruz	9/10/09	9/30/13	SRP, LRRB	\$15,000	\$2,000	13%	
N/A	99084	TPF-5(218): Environmental Factors Causing Fatigue in Equipment Operators During Winter Operations	Virginia Polytechnic Institute and State University	Frank Fitzgerald	Thomas Peters	Deb Fick	7/19/12	9/30/13	SP&R, Partnership Funds	\$124,991	\$12,709	10%	
N/A	02000	TPF-5(218): Establishing Effective Salt and Anti-Icing Application Rates	Blackburn and Associates	Robert Blackburn	Thomas Peters	Deb Fick	4/3/13	9/30/14	SP&R, Partnership Funds	\$107,025	\$10,350	10%	
N/A	03715	Implementation of Automatic Flagger Assistance Devices for MnDOT's Flagger Operations	Wenck Associates Inc.	Edward Terhaar	Thomas Dumont	Alan Rindels	5/17/13	1/31/14	SRP	\$39,963	\$1,040	3%	
N/A	99008 WO93	INV 952: Best Management Practices for Establishment of Salt-Tolerant Grasses on Roadsides	University of Minnesota	Eric Watkins	Dwayne Stenlund	Daniel Warzala	5/30/13	9/30/17	LRRB	\$193,677	\$0	0%	
N/A	99006 W02	TPF-5(218): Clear Roads Winter Highway Operations—Phase II	Montana State University, Western Transportation Institute	Michelle Akin	Thomas Peters	Deb Fick	1/28/13	9/30/14	SP&R, Partnership Funds	\$185,000	\$0	0%	
N/A	89261 WO191	Comparative Performance Study of Chip Seal and Bonded Wear Course Systems Applied to Bridge Decks and Approaches	University of Minnesota – Duluth	Eshan Dave	Thomas Peters	Nelson Cruz	7/8/10	6/30/15	COPTRS	\$90,872	\$0	0%	
N/A	02829	Salt Brine Blending to Optimize Deicing and Anti-Icing Performance and Cost-Effectiveness—Phase II	Minnesota State University, Mankato	Stephen Druschel	Thomas Peters	Daniel Warzala	6/11/13	12/31/14	SP&R, SRP	\$116,444	\$0	0%	

## Maintenance Operations & Security Pooled Fund Studies

Study Number	Title	Technical Liaison	Project Coordinator	Lead State or Agency	Number of Participating States	Current MN Commitment End Date	Total Cost	MN FY2013 Commitment	Total MN Commitment	TS
TPF-5(153)	Optimal Timing of Preventive Maintenance for Addressing Environmental Aging in HMA Pavements	Thomas Wood	Bruce Holdhusen	MN	6	2013	\$482,205	\$0	\$131,205	
TPF-5(218)	Clear Roads Winter Highway Operations—Phase II	Thomas Peters	Deb Fick	MN	26	2013	\$2,555,000	\$25,000	\$100,000	X
SPR-3(042)	Aurora Program	Curt Pape	Deb Fick	IA	21	2013	\$4,272,500	\$25,000	\$425,000	
TPF-5(054)	Maintenance Decision Support System (MDSS)	Curt Pape	Deb Fick	SD	20	2013	\$5,045,903	\$25,000	\$250,000	
TPF-5(225)	Validation and Implementation of Hot-Poured Crack Sealant	Jim McGraw	Deb Fick	VA	9	2013	\$875,000	\$25,000	\$100,000	

# Materials & Construction

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
2012-15	97281	Lump Sum Estimating: Discovery and Simulation	Minnesota State University, Mankato	Brian Wasserman	Thomas Wiener, Christopher Anderson	Alan Rindels	7/30/10	7/31/12	SRP	\$17,000	\$17,000	100%	X
2012-17	96885	INV 902: Material Control Testing Rates for Low-Volume Roads	Minnesota State University, Mankato	Brian Wasserman	Joseph MacPherson	Farideh Amiri	6/1/10	7/31/12	LRRB	\$25,000	\$25,000	100%	X
2012-23	89261 W0103	TPF-5(132), INV 865: Investigation of Low-Temperature Cracking in Asphalt Pavements National Pooled Fund Study—Phase II	University of Minnesota	Mihai Marasteanu	Timothy Clyne	Bruce Holdhusen	6/17/08	8/31/12	SP&R, SRP, LRRB	\$475,000	\$475,000	100%	X
2012-25	89256 W011	Construction Manager/General Contractor Issue Identification	Iowa State University	Jennifer Shane	Jay Hietpas	Nelson Cruz	5/31/11	8/31/12	SRP	\$59,092	\$59,092	100%	X
2012-35	89264 W02	TPF-5(129): Recycled Unbound Materials	University of Wisconsin – Madison	Tuncer Edil	John Siekmeier	Nelson Cruz	6/4/08	11/30/12	SP&R	\$349,910	\$349,910	100%	X
2012-36	89261 W0156	INV 887: Structural Evaluation of Asphalt Pavements with Full-Depth Reclaimed Base	University of Minnesota	Joseph Labuz	Merle Earley	Daniel Warzala	6/4/09	11/30/12	LRRB, Other State Funds	\$38,260	\$38,260	100%	X
2012-39	LAB864	MPR-6(022), INV 864: Recycled Asphalt Pavement: MnROAD Study of RAP and Fractionated RAP	MnDOT Materials and Road Research Section	Eddie Johnson	Gregory Johnson	Bruce Holdhusen	1/4/08	12/31/12	SP&R, LRRB, Other State Funds	\$275,000	\$219,000	80%	X
2012RIC11	95937	INV 895: Traffic-Generating Development and Roadway Life Consumption	Minnesota State University, Mankato	W. James Wilde	Tim Stahl	Farideh Amiri	1/22/10	12/31/12	LRRB	\$37,038	\$37,038	100%	X
2013-02	89261 W090	TPF-5(149), INV 867: Design and Construction Guidelines for Thermally Insulated Concrete Pavements	University of Minnesota	Lev Khazanovich	Timothy Clyne	Nelson Cruz	1/30/08	1/30/13	SP&R, LRRB	\$438,980	\$438,980	100%	X
2013-10	94262	MPR-8(004): Development of a Concrete Maturity Test Protocol	Minnesota State University, Mankato	W. James Wilde	Alexandra Akkari	Sandra McCully	4/2/09	5/31/13	SP&R, SRP	\$113,952	\$113,952	100%	X
2013-16	99576	TPF-5(134): Pavement Texture Evaluation and Relationships to Rolling Resistance at MnROAD	Transtec Group, Inc.	Robert Rasmussen	Bernard Izevbekhai	Bruce Holdhusen	10/12/11	6/30/13	SP&R	\$79,991	\$53,135	66%	
2013-18	93028	TPF-5(134): PCC Surface Characteristics—Rehabilitation MnROAD Study	Minnesota State University, Mankato	W. James Wilde	Bernard Izevbekhai	Bruce Holdhusen	7/23/08	6/30/13	SP&R	\$118,760	\$118,760	100%	
N/A	01955	INV 924: LRRB Video on Potholes	CTC & Associates LLC	Patrick Casey	Joseph MacPherson	Farideh Amiri	9/7/12	1/31/13	LRRB	\$11,755	\$11,755	100%	
N/A	99008 W012	MPR-1(013): Use of Non-Woven Fabric Interlayer for Unbonded Concrete Overlays	University of Minnesota	Lev Khazanovich	Thomas Burnham	Daniel Warzala	11/1/11	12/31/12	SP&R, SRP	\$74,998	\$74,998	100%	
N/A	98488	Impact of Vibratory Equipment to Surrounding Environments During Construction	CNA Consulting Engineers, Inc.	Bruce Wagener	Charles Howe	Shirlee Sherkow	5/4/11	7/31/12	SRP	\$9,262	\$9,262	100%	
N/A	LAB868	MPR-6(029), INV 868: HMA Surface Characteristics	MnDOT Materials and Road Research Section	Melissa Cole	Gregory Johnson	Bruce Holdhusen	9/18/07	2/28/13	SP&R, LRRB, Other State Funds	\$137,625	\$122,625	89%	
N/A	93103 W016	INV 645: Best Value Procurement Development	HNTB Corporation	Steve Howe	Kevin Kosobud	Farideh Amiri	8/5/09	7/31/12	LRRB, Partnership Funds	\$140,547	\$90,626	64%	
N/A	LAB887	INV 887: Structural Evaluation of Asphalt Pavements with Full-Depth Reclaimed Base	MnDOT Materials and Road Research Section	Shongtao Dai	Merle Earley	Daniel Warzala	10/5/09	5/31/13	LRRB, Other State Funds	\$41,548	\$26,660	64%	
N/A	99008 W026	MPR-1(003): Implementation of Pavement Evaluation Tools	University of Minnesota	Joseph Labuz	Shongtao Dai	Deb Fick, Nelson Cruz	11/1/11	6/30/13	SP&R, SRP	\$78,000	\$32,000	41%	
N/A	03739	MPR-4(002): GEMINI Geotechnical Mobile/Web Gateway	Minnesota State University, Mankato	Allan Hart	Derrick Dasenbrock	Bruce Holdhusen	5/7/13	8/31/13	SP&R, SRP	\$15,000	\$15,000	100%	

# Materials & Construction [cont.]

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
N/A	03598	TRS: Use of Shredded Tires in Roadway Construction	Braun Intertec Corporation	Matthew Oman	Blake Nelson	Shirlee Sherkow	4/17/13	7/31/13	SRP	\$39,913	\$39,913	100%	
N/A	01759	MPR-2(013): Enhancements to Intelligent Construction Data Management (VEDA)	Transtec Group, Inc.	George Chang	Rebecca Embacher	Daniel Warzala	9/25/12	1/31/14	SP&R, SRP	\$74,972	\$74,972	100%	
2013-15	LAB889	INV 889: Recycled Asphalt Pavement: Study of High-RAP Asphalt Mixtures on Minnesota County Roads	MnDOT Materials and Road Research Section	Eddie Johnson	Gregory Johnson	Daniel Warzala	2/22/10	8/31/13	LRRB	\$30,000	\$14,000	47%	
N/A	89261 WO190	INV 896: Quantifying Moisture Effects in DCP and LWD Tests Using Unsaturated Mechanics	University of Minnesota	Kimberly Hill	John Siekmeier	Nelson Cruz	9/24/10	2/28/14	SRP, LRRB, COPTRS	\$109,900	\$99,459	90%	
N/A	99008 W09	Performance-Based Measurement of Optimum Moisture for Soil Compaction	University of Minnesota	John Nieber	John Siekmeier	Nelson Cruz	10/4/11	11/30/13	SRP	\$65,289	\$58,289	89%	
N/A	98109	Use of Recycled Brick in Aggregates	Minnesota State University, Mankato	Farhad Reza	Terrence Beaudry	Nelson Cruz	5/26/11	8/31/13	SRP	\$77,811	\$63,547	82%	
N/A	89264 W05	Cost-Effective Means of Managing Pavements in Poor Condition	University of Wisconsin – Madison	Teresa Adams	Mark Watson	Nelson Cruz	6/7/11	7/31/13	SRP, LRRB	\$139,953	\$111,006	79%	
N/A	94288	INV 645: Integrated Tools for Pavement Design and Management	Minnesota State University, Mankato	W. James Wilde	Rich Sanders	Farideh Amiri	4/21/09	2/28/14	SRP, LRRB	\$86,036	\$54,169	63%	
N/A	92965	TPF-5(165): Development of Design Guide for Thin and Ultrathin Concrete Overlays of Existing Asphalt Pavements, Task 2 Report: Review and Selection of Structural Response Models	University of Pittsburgh	Julie Vandenbossche	Thomas Burnham	Nelson Cruz	9/12/08	9/11/13	SP&R, Partnership Funds	\$504,977	\$318,000	63%	
N/A	00669	INV 921: Frost Video Update and Enhancement	SRF Consulting Group, Inc.	Mike Marti	Benjamin Worel	Shirlee Sherkow	6/14/12	8/31/13	LRRB, Partnership Funds	\$64,986	\$38,281	59%	
N/A	89260 W02	Cost-Effective Base Type and Thickness for Long-Life Concrete Pavements	University of Illinois	Erol Tutumluer	Terrence Beaudry	Nelson Cruz	6/20/11	1/31/14	SRP	\$136,000	\$78,806	58%	
N/A	99008 W044	MPR-2(009): Simplified Design Table for Minnesota Concrete Pavements	University of Minnesota	Lev Khazanovich	Luke Johanneck	Daniel Warzala	6/29/12	8/31/14	SP&R, SRP	\$89,989	\$46,000	51%	
N/A	99008 W06	INV 869: TERRA Board Support, FY2012-2013	University of Minnesota	Stephanie Malinoff	Mark Maloney	Julie Skallman	10/18/11	8/31/14	SP&R, SRP, LRRB, Other Fed. Funds	\$90,000	\$45,000	50%	
N/A	97334	MPR-6(011): Intelligent Compaction	Transtec Group, Inc.	George Chang	Terrence Beaudry	Nicole Peterson	9/13/10	12/31/13	SP&R, Other State Funds, SRP	\$412,332	\$194,453	47%	
N/A	98283	INV 868, MPR-6(029): HMA Surface Characteristics Related to Ride, Texture, Friction, Noise and Durability	Purdue University	Rebecca McDaniel	Bruce Tanquist	Bruce Holdhusen	8/11/11	4/30/14	SP&R, LRRB, Other State Funds	\$50,000	\$21,813	44%	
N/A	98319	INV 918: Implementation of TONN 2010	Minnesota State University, Mankato	W. James Wilde	Rich Sanders	Farideh Amiri	5/4/11	7/31/13	SRP, LRRB	\$35,000	\$15,000	43%	
N/A	99008 W034	TPF-5(215): TERRA Membership Pooled Funds, FY2012-2014	University of Minnesota	Laurie McGinnis	Maureen Jensen	Linda Taylor	1/12/12	9/30/14	SP&R, SRP, LRRB, Other Federal Funds	\$65,000	\$25,004	38%	
N/A	99008 W048	Evaluation of Concrete and Mortars for Partial Depth Repair	University of Minnesota	Eshan Dave	Ronald Mulvaney	Nelson Cruz	8/9/12	7/31/14	SRP	\$74,000	\$27,000	36%	
N/A	99004 W010	INV 942: Aggregate Road Surface Rejuvenate	Iowa State University	Charles Jahren	Bruce Hasbargen	Daniel Warzala	1/30/13	7/31/14	LRRB	\$88,910	\$31,900	36%	

# Materials & Construction [cont.]

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
N/A	01219	INV 929: Petrographic Analysis of Colored Concrete Pavement	American Engineering Testing, Inc.	Gerald Moulzolf	Dallas Larson	Bruce Holdhusen	8/1/12	1/31/14	LRRB	\$40,983	\$13,023	32%	
N/A	99008 W040	Laboratory Performance Test for Asphalt Concrete	University of Minnesota	Eshan Dave	Luke Johanneck	Nelson Cruz	7/10/12	8/31/14	SRP	\$66,816	\$20,172	30%	
N/A	98108	INV 907: Impact of Garbage Haulers on Pavement Performance	Minnesota State University, Mankato	W. James Wilde	Deb Bloom	Daniel Warzala	2/22/11	8/31/13	LRRB	\$54,000	\$15,000	28%	
N/A	99004 W07	INV 939: Lightly Surfaced Roads, Stabilized Aggregate Applications	Iowa State University	Charles Jahren	Gerard Geib	Daniel Warzala	11/15/12	7/31/14	LRRB	\$40,000	\$11,000	28%	
N/A	99004 W04	Carbonate Aggregate in Concrete	Iowa State University	Kejin Wang	Alexandra Akkari	Nelson Cruz	8/9/12	9/30/13	SRP	\$78,498	\$18,600	24%	
N/A	MPR-1(002)	MPR-1(002): Development of a Spatial-Time-Domain Acoustic Device for Rapid Concrete Evaluation	MnDOT Materials and Road Research Section	Bernard Izevbekhai	Maureen Jensen	Daniel Warzala	4/8/11	3/31/14	SP&R, SRP	\$98,000	\$18,000	18%	
N/A	99004 W01	Indefinite Quantity/Indefinite Delivery Contracting	Iowa State University	Douglas Gransberg	Kevin Kosobud	Nelson Cruz	8/9/12	8/31/14	SRP	\$87,390	\$14,470	17%	
N/A	LAB929	INV 929: Investigation and Assessment of Colored Concrete Pavement	MnDOT Materials and Road Research Section	Alexandra Akkari	Dallas Larson	Bruce Holdhusen	4/24/12	4/28/14	LRRB	\$45,000	\$5,000	11%	
N/A	INV 885	INV 885: Research Test Section Tracking—Phase II	MnDOT Materials and Road Research Section	Melissa Cole	Luane Tasa	Farideh Amiri	12/21/09	12/31/17	LRRB	\$55,000	\$5,000	9%	
N/A	02653	INV 941: Online Technician Certification/Recertification Training	Professional Engineering Services, Ltd.	Ann Johnson	John Micheau, Michael Hogan	Daniel Warzala	12/28/12	1/31/14	LRRB	\$12,433	\$1,100	9%	
N/A	98110	Cost-Effective Base Type and Thickness for Long-Life Concrete Pavements	Minnesota State University, Mankato	W. James Wilde	Terrence Beaudry	Nelson Cruz	6/24/11	1/31/14	SRP	\$63,000	\$4,275	7%	
N/A	LAB914	INV 914: Research Using Waste Shingles for Stabilization or Dust Control for Gravel Roads and Shoulders	MnDOT Materials and Road Research Section	Thomas Wood	Tim Stahl	Daniel Warzala	5/11/11	1/31/14	SRP, LRRB	\$77,000	\$5,000	6%	
N/A	99008 W050	INV 935: Design Considerations for Embankment Protection During Road Overtopping Events	University of Minnesota	Craig Taylor	John Anderson	Shirlee Sherkow	9/28/12	3/31/15	SRP, LRRB	\$158,794	\$8,779	6%	
N/A	INV 941	INV 941: Online Technician Certification/Recertification Training	MnDOT Multimedia Development Group	Eugene Olchefske	Michael Hogan, John Micheau	Daniel Warzala	11/21/12	1/31/14	LRRB	\$20,700	\$0	0%	
N/A	99008 W072	MPR-2(012): Disk-Shaped Compact Tension Testing of Asphalt Concrete	University of Minnesota – Duluth	Eshan Dave	Luke Johanneck	Bruce Holdhusen	9/25/12	7/31/14	SP&R, SRP, Other State Funds	\$10,000	\$0	0%	
N/A	MPR-6(031)	MPR-6(031): Concrete Pavement Optimization: Determining the Lower Threshold of Slab Thickness for High-Volume Roadways	MnDOT Materials and Road Research Section	Thomas Burnham	Bernard Izevbekhai	Bruce Holdhusen	1/3/08	7/31/14	SP&R, Other State Funds	\$126,100	\$0	0%	
N/A	LAB949	INV 949: Tack Coat Testing: Measuring Field Bond Strength	MnDOT Materials and Road Research Section	Melissa Cole	Thomas Wood	Nelson Cruz	5/16/13	6/30/15	LRRB	\$68,000	\$0	0%	
N/A	LAB899	INV 899, INV 825: Performance Monitoring of Olmsted CR 117/104 and Aggregate Base Material Update	MnDOT Materials and Road Research Section	Matthew Lebens	Michael Sheehan	Alan Rindels	6/8/10	2/28/15	LRRB	\$36,000	\$0	0%	
N/A	LAB2012	MPR-2(012): DCT Low-Temperature Fracture Testing Pilot Project	Michigan Technological University	Luke Johanneck	John Garrity	Bruce Holdhusen	9/10/12	8/31/14	SP&R, SRP, Other State Funds	\$11,000	\$0	0%	
N/A	99008 W090	INV 948: Flagger Operations: Investigating Their Effectiveness in Capturing Driver Attention	University of Minnesota	Kathleen Harder	Robert Vasek	Daniel Warzala	5/16/13	10/31/15	SP&R, SRP, LRRB	\$270,351	\$0	0%	
N/A	99008 W083	TPF-5(269): Development of an Improved Design Procedure for Unbonded Concrete Overlays	University of Minnesota	Lev Khazanovich	Thomas Burnham	Deb Fick	6/17/13	5/31/16	SP&R	\$407,987	\$0	0%	
N/A	99008 W051	MPR-2(004): Evaluate and Develop Innovative Pavement Repair and Patching: Taconite-Based Repair Options	University of Minnesota – Duluth	Lawrence Zanko	Susan Lodahl, Patrick Huston	Nelson Cruz	8/9/12	7/31/14	SP&R, SRP	\$32,000	\$0	0%	
N/A	99008 W0105	Concrete Strength Required to Open to Traffic	University of Minnesota	Lev Khazanovich	Bernard Izevbekhai	Daniel Warzala	6/21/13	12/31/15	SP&R, SRP	\$109,998	\$0	0%	

## Materials & Construction [cont.]

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
N/A	99008 W0101	INV 947: Investigation of Optimal Mix Design of Full Depth Reclamation Stabilization with Cement and Emulsion	University of Minnesota	Jialiang Le	None	Shirlee Sherkow	6/14/13	9/30/15	SP&R, SRP, LRRB	\$95,823	\$0	0%	
N/A	99008 W0100	Impact of Lower Asphalt Binder for Coarse HMA Mixes	University of Minnesota – Duluth	Eshan Dave	Gerard Geib	Nelson Cruz	6/26/13	9/30/15	SP&R, SRP	\$89,910	\$0	0%	
N/A	03444	MPR-2(013): Enhancements to Intelligent Construction Data Management (ICDM) System for Bituminous Surface Temperature Application	Transtec Group, Inc.	George Chang	Rebecca Embacher	Daniel Warzala	6/27/13	7/31/14	SP&R, SRP	\$166,108	\$0	0%	
N/A	03434	INV 924: YouTube Video: Rural Work Zone Safety	Stonebrooke Engineering Inc.	Tim Arvidson	Sulmaan Khan	Farideh Amiri	3/22/13	11/30/13	LRRB	\$12,801	\$0	0%	
N/A	01583	MPR-2(014): Enhancements to the Sonic Test Rolling (STR) System	Ames Engineering, Inc.	Dustin Reid	Rebecca Embacher	Daniel Warzala	10/11/12	7/31/14	SP&R, SRP	\$40,000	\$0	0%	
N/A	MPR-6(021)	MPR-6(021): Evaluation of Skid Resistance of Turf Drag Textured Concrete Pavements	MnDOT Materials and Road Research Section	Bernard Izevbekhai	Benjamin Worel	Bruce Holdhusen	12/19/08	1/31/16	SP&R, Other State Funds	\$150,000	\$0	0%	

## Materials & Construction Pooled Fund Studies

Study Number	Title	Technical Liaison	Project Coordinator	Lead State or Agency	Number of Participating States	Current MN Commitment End Date	Total Cost	MN 2013 Commitment	Total MN Commitment	TS
TPF-5(129)	Recycled Unbound Pavement Materials (MnROAD Study)	John Siekmeier	Nelson Cruz	MN	6	2011	\$718,120	\$0	\$532,243	
TPF-5(132)	Low-Temperature Cracking in Asphalt Pavements (Phase II, MnROAD Study)	Timothy Clyne	Bruce Holdhusen	MN	7	2011	\$956,357	\$0	\$100,000	
TPF-5(134)	PCC Surface Characteristics—Rehabilitation (MnROAD Study)	Bernard Izevbekhai	Bruce Holdhusen	MN	3	2010	\$275,000	\$0	\$75,000	
TPF-5(149)	Design and Construction Guidelines for Thermally Insulated Concrete Pavements (MnROAD Study)	Timothy Clyne	Nelson Cruz	MN	5	2011	\$455,000	\$0	\$100,000	
TPF-5(165)	Development of Design Guide for Thin and Ultrathin Concrete Overlays of Existing Asphalt Pavements (MnROAD Study)	Thomas Burnham	Nelson Cruz	MN	10	2012	\$515,200	\$0	\$69,200	
TPF-5(215)	TERRA Pooled Fund Support—Transportation Engineering and Road Research Alliance	Maureen Jensen	Deb Fick	MN	7	2014	\$200,000	\$7,500	\$37,500	X
TPF-5(269)	Development of an Improved Design Procedure for Unbonded Concrete Overlays	Thomas Burnham	Deb Fick	MN	7	2014	\$420,000	\$20,000	\$60,000	
SPR-3(074)	State Pavement Technology Consortium	Roger Olson	Deb Fick	WA	4	2012	\$650,000	\$0	\$325,000	
TPF-5(159)	Technology Transfer Concrete Consortium	Maria Masten	Deb Fick	IA	27	2015	\$892,300	\$10,000	\$51,000	
TPF-5(197)	The Impact of Wide-Base Tires on Pavement Damage: A National Study	Shongtao Dai	Deb Fick	FHWA	7	2012	\$775,000	\$0	\$100,000	
TPF-5(224)	Investigation of Jointed Plain Concrete Pavement Deterioration at Joints and the Potential Contribution of Deicing Chemicals	Bernard Izevbekhai	Deb Fick	IA	9	2013	\$540,308	\$15,000	\$60,000	
TPF-5(270)	Recycled Materials Resource Center—Third Generation	Jerry Geib	Deb Fick	WI	6	2014	\$350,000	\$25,000	\$75,000	

## Multimodal

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
2012-14	89261 W0136	Highway Cost Allocation and Determination of Heavy Freight Truck Permit Fees	University of Minnesota	Diwakar Gupta	John Tompkins	Daniel Warzala	3/26/09	9/30/12	SRP, COPTRS	\$179,752	\$179,752	100%	X
2012-19	89261 W0204	Potential Benefits of Mileage-Based User Fees to the Freight Industry and Industry Concerns	University of Minnesota	Ferrol Robnson	Kenneth Buckeye	Shirlee Sherkow	2/8/11	8/31/12	SRP, COPTRS	\$50,000	\$50,000	100%	X
2012-28	89261 W0194	Investigation of Pedestrian/Bicyclist Risk in Minnesota Roundabout Crossings	University of Minnesota	John Hourdos	Peter Buchen	Shirlee Sherkow	6/8/10	9/30/12	SRP, COPTRS	\$65,500	\$65,500	100%	X

# Multimodal [cont.]

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
2012RIC01	98383 Task 1	INV 645: ADA Transition Plan for Public Rights of Way	SRF Consulting Group, Inc.	Mike Marti	Mitch Rasmussen	Farideh Amiri	6/20/11	7/31/14	LRRB	\$29,119	\$29,119	100%	X
2013RIC02	98383 Task 2	INV 645: Complete Streets Implementation Resource Guide for Minnesota Local Agencies	SRF Consulting Group, Inc.	Mike Marti	Jeff Hulsether	Farideh Amiri	6/20/11	7/31/14	LRRB	\$45,725	\$45,725	100%	X
2013-13	99008 W015	Mitigating Highway Construction Impacts Through the Use of Transit	University of Minnesota	Carol Becker	Donald Mohawk	Shirlee Sherkow	10/17/11	5/31/13	SRP	\$39,800	\$39,800	100%	X
2013-19	89261 W0193	Bike, Bus and Beyond: Extending Cyclopath to Enable Multimodal Routing	University of Minnesota	Loren Terveen	Greta Alquist	Shirlee Sherkow	7/6/10	7/31/13	SRP, COPTRS	\$60,627	\$58,000	96%	X
N/A	89261 W0239	Transportation, Environmental and Health Impacts of Transitways: A Case Study of the Hiawatha Line	University of Minnesota	Jason Cao	Aaron Tag	Daniel Warzala	2/15/11	3/31/13	SRP	\$37,500	\$37,500	100%	
N/A	99008 W0116	TRS: Quantifying the Economic Impact of Bicycling: A Literature Review with Implications for Minnesota	University of Minnesota	Neil Linscheid	Fay Simer	Shirlee Sherkow	4/29/13	8/31/13	None	\$9,982	\$9,982	100%	
N/A	89264 W04	INV 911: Best Practices Synthesis and Guidance in At-Grade Trail Crossing Treatments	University of Wisconsin – Madison	David Noyce	Lisa Austin	Bruce Holdhusen	6/14/11	10/31/13	SRP, LRRB	\$96,866	\$92,023	95%	
N/A	99008 W08	The Minnesota Bicycle and Pedestrian Counting Initiative: Methodologies for Non-Motorized Traffic Monitoring	University of Minnesota	Greg Lindsey	Lisa Austin	Daniel Warzala	10/10/11	11/30/13	SRP	\$99,948	\$91,009	91%	
N/A	89264 W07	INV 915: Implications of Modifying State Aid Standards: Urban, New or Reconstruction (Mn Rules 8820.9936) to Accommodate Various Roadway Users (Complete Streets)	University of Wisconsin – Madison	David Noyce	Paul Stine	Bruce Holdhusen	6/28/11	12/31/13	LRRB	\$117,700	\$102,007	87%	
N/A	99008 W059	INV 645: 2012 Truck Weight Enforcement Training Program	University of Minnesota	Jim Grothaus	Richard Kjonaas	Daniel Warzala	4/12/12	8/31/13	SRP, LRRB, Other State Funds	\$30,000	\$24,000	80%	
N/A	99008 W011	INV 909: Planning and Implementation of Complete Streets at Multiple Scales	University of Minnesota	Carissa Schively Slotterback	Scott Bradley	Bruce Holdhusen	10/4/11	1/31/14	SRP, LRRB	\$101,271	\$76,514	76%	
N/A	99008 W014	Evaluating Twin Cities Transitways' Performance and Their Interaction with Traffic and Neighboring Major Roadways	University of Minnesota	John Hourdos	Patricia Bursaw	Daniel Warzala	9/27/11	9/30/14	SRP, ITS Institute	\$100,000	\$55,000	55%	
N/A	99542	MPR-1(007): Commercial Freight Weight Enforcement Innovation	SRF Consulting Group, Inc.	Brian Scott	Benjamin Timerson	Nelson Cruz	9/22/11	11/30/13	SP&R, SRP	\$96,613	\$35,668	37%	
N/A	99008 W038	Multimodalism for Small Cities	University of Minnesota	Carol Becker	Kathryn Caskey	Shirlee Sherkow	9/11/12	5/31/14	SRP	\$30,000	\$11,000	37%	
N/A	99008 W047	MPR-2(007): Using Truck GPS Data for Freight Performance Analysis	University of Minnesota	Chen-Fu Liao	John Tompkins	Bruce Holdhusen	9/28/12	3/31/14	SP&R, SRP	\$96,500	\$30,000	31%	
N/A	99008 W035	MPR-1(012): Statewide Cycloplan: Bicycle Planning Tool and Participatory GIS	University of Minnesota	Loren Terveen	Jasna Hadzic	Shirlee Sherkow	2/6/12	4/30/14	SP&R, SRP	\$130,000	\$6,500	5%	
N/A	99008 W0103	MPR-2(015): Complete Streets Planning and Design Guidance Document	University of Minnesota	Jim Grothaus	Scott Bradley	Bruce Holdhusen	1/14/13	8/31/14	SP&R, SRP	\$200,000	\$4,685	2%	
N/A	99008 W088	Exploring Strategies for Promoting Modal Shifts to Transitways	University of Minnesota	Jason Cao	Lynne Bly	Daniel Warzala	5/23/13	12/31/14	SRP	\$112,066	\$0	0%	

## Multimodal Pooled Fund Study

Study Number	Title	Technical Liaison	Project Coordinator	Lead State or Agency	Number of Participating States	Current MN Commitment End Date	Total Cost	MN 2013 Commitment	Total MN Commitment	TS
TPF-5(156)	Mid America Freight Coalition Pooled Fund	John Tompkins	Deb Fick	WI	10	2013	\$1,475,000	\$25,000	\$175,000	

# Policy & Planning

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
2012-33	95029	TPF-5(192): Loop- and Length-Based Vehicle Classification, Federal Highway Administration Pooled Fund Program	SRF Consulting Group, Inc.	Erik Minge	Gene Hicks	Deb Fick	1/27/10	10/31/12	SP&R, Partnership Funds	\$469,191	\$468,916	100%	X
2012-34	99008 WO20	MPR-1(011): Access To Destinations: Annual Accessibility Measure for the Twin Cities Metropolitan Area	University of Minnesota	David Levinson	Mark Nelson, Jason Junge	Nelson Cruz	9/27/11	11/30/12	SP&R, SRP	\$60,000	\$60,000	100%	X
2012-38	89261 WO114	Development of a Weigh-Pad-Based Portable Weigh-In-Motion System	University of Minnesota – Duluth	Taek Kwon	Benjamin Timerson	Nelson Cruz	12/30/08	12/31/12	SRP, COPTRS	\$160,000	\$160,000	100%	X
2013-03	89261 WO196	Case Studies of Transportation Investment to Identify the Impacts on the Local and State Economy	University of Minnesota	Michael Iacono	Matthew Shands	Bruce Holdhusen	8/27/10	1/31/13	COPTRS, SRP	\$89,378	\$89,378	100%	X
2013-05	89261 WO198	Quality of Life: Assessment for Transportation Performance Measures	University of Minnesota	Ingrid Schneider	Karla Rains	Shirlee Sherkow	7/14/10	4/30/13	COPTRS, SRP	\$262,249	\$262,249	100%	X
2013-07	89261 WO197	Understanding the Economic Effects of Flexibility Through Three Employer Case Studies	University of Minnesota	Adeel Lari	Kenneth Buckeye	Shirlee Sherkow	6/30/10	4/30/13	COPTRS, SRP	\$145,600	\$145,600	100%	X
N/A	89261 WO227	MPR-0(003): Reporting Capabilities for Continuous Vehicle Class and WIM Data	University of Minnesota – Duluth	Taek Kwon	Benjamin Timerson	Nelson Cruz	11/18/10	12/31/12	SP&R, SRP	\$35,268	\$35,268	100%	
N/A	89261 WO251	What is the Risk to the Traveling Public and MnDOT Operations from Transmission Lines Along Our ROW	University of Minnesota – Duluth	Seraphin Chally Abou	Valerie Svensson	Shirlee Sherkow	3/22/11	6/30/13	SRP	\$67,511	\$33,756	50%	
N/A	02242	MPR-2(016): Implementing Bicycle and Pedestrian Traffic Counts and Data Collection	SRF Consulting Group, Inc.	Erik Minge	Lisa Austin	Daniel Warzala	1/8/13	7/31/13	SP&R, SRP	\$5,133	\$5,083	99%	
N/A	03714	TRS: Cost Sharing Policies of State Transportation Agencies	Athey Creek Consultants, LLC	Linda Preisen	Mark Gieseke	Shirlee Sherkow	4/29/13	7/31/13	SRP	\$12,675	\$10,459	83%	
N/A	99008 WO13	INV 912: Improved Approach to Enforcement of Road Weight Restrictions	University of Minnesota	Rajesh Rajamani	Benjamin Timerson	Nelson Cruz	9/21/11	11/30/13	SRP, LRRB	\$65,000	\$50,000	77%	
N/A	99008 WO52	MPR-2(005): Value Increase and Value Capture Study—TH 610 Case Study	University of Minnesota	Zhirong Jerry Zhao	Matthew Shands	Shirlee Sherkow	6/29/12	3/31/14	SP&R, SRP	\$81,000	\$35,585	44%	
N/A	99008 WO55	INV 933: Building Local Agency Capacity for Public Engagement in Local Road Systems Planning and Decision-Making	University of Minnesota	Kathryn Quick	Bruce Hasbargen	Shirlee Sherkow	7/27/12	7/31/14	LRRB	\$140,062	\$55,551	40%	
N/A	99373	INV 922: System Preservation Guide—A Planning Process for Local Government Management of Transportation Networks	SRF Consulting Group, Inc.	Brian Shorten	Susan Miller	Farideh Amiri	1/19/12	11/30/14	LRRB	\$698,876	\$143,972	21%	
N/A	99008 WO104	Transportation Planning to Support Economic Development in Minnesota	University of Minnesota	Lee Munnich	Philip Barnes	Bruce Holdhusen	4/22/13	2/28/15	SRP	\$148,033	\$0	0%	
N/A	99004 WO3	Risk-Based Engineers Estimate	Iowa State University	Jennifer Shane	Mary Lacho	Nelson Cruz	1/11/13	11/30/14	SRP	\$147,797	\$0	0%	

## Policy & Planning Pooled Fund Studies

Study Number	Title	Technical Liaison	Project Coordinator	Lead State or Agency	Number of Participating States	Current MN Commitment End Date	Total Cost	MN 2013 Commitment	Total MN Commitment	TS
TPF-5(192)	Loop and Length Based Classification Pooled Fund	Gene Hicks	Deb Fick	MN	15	2009	\$485,000	\$0	\$40,000	
TPF-5(198)	Urban Mobility Study, 2009 Continuation	Paul Czech	Deb Fick	TX	10	2013	\$1,000,000	\$30,000	\$295,000	
TPF-5(245)	2012 Multi-State Asset Management Implementation Workshop	Cassandra Isaackson	Deb Fick	FHWA	11	2011	\$120,000	\$0	\$10,000	
TPF-5(275)	2014 Asset Management Conference and Training on Implementation Strategies	Mark Nelson	Deb Fick	IA	21	2013	\$265,000	\$10,000	\$10,000	

# Traffic & Safety

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
2012-22	89261 W0240	Investigating the Effectiveness of Intelligent Lane Control Signals on Driver Behavior	University of Minnesota	Kathleen Harder	Jesse Larson	Daniel Warzala	5/12/11	9/30/12	SRP	\$144,500	\$144,500	100%	X
2012-26	89261 W0143	Portable, Non-Intrusive Advance Warning Devices for Work Zones with or without Flag Operators	University of Minnesota	John Hourdos	Randy Reznicek	Daniel Warzala	7/30/09	10/31/12	SRP	\$61,986	\$61,986	100%	X
2012-31	89256 W08	Implementation, Training and Outreach for MnDOT Pavement Marking Tool—Phase II	Iowa State University	Omar Smadi	Mitchell Bartelt	Alan Rindels	5/7/09	10/31/12	SRP	\$86,970	\$86,970	100%	X
2012-32	97078	MPR-9(005): Changeable Message Sign (CMS) Manual of Practice	Iteris, Inc	Lisa Raduenz	Jesse Larson	Alan Rindels	11/3/10	11/30/12	SP&R, SRP	\$91,514	\$91,514	100%	X
2013-04	96737	INV 900: 46th Street Pilot Street Lighting Project	Hennepin County	Robb Luckow	Susan Zarling	Shirlee Sherkow	6/25/10	1/31/13	LRRB	\$50,000	\$50,000	100%	X
2013-06	89261 W0178	MPR-9(006): Research Implementation of the SMART SIGNAL System on Trunk Highway (TH) 13	University of Minnesota	Henry Liu	Steven Misgen	Alan Rindels	12/17/09	2/28/13	SP&R, SRP	\$239,000	\$239,000	100%	X
2013-14	99007 W02	MPR-1(008): Developing Twin Cities Arterial Mobility Performance Measures Using GPS Speed Data	Texas Transportation Institute	Shawn Turner	Paul Czech	Deb Fick	4/9/12	5/31/13	SP&R, SRP	\$125,000	\$125,000	100%	X
2013-17	89261 W0202	Improving Traffic Signal Operations for Integrated Corridor Management	University of Minnesota	Henry Liu	Steven Misgen	Alan Rindels	2/2/11	9/30/13	SRP	\$163,000	\$163,000	100%	
N/A	00714	Power Sources for Automatic Traffic Recorders	Bolton & Menk, Inc., Consulting Engineers & Surveyors	Bryan Nemeth	Chu Wei	Shirlee Sherkow	3/13/12	10/31/12	SRP	\$9,711	\$9,711	100%	
N/A	91150	TPF-5(093): North/West Passage Program Support and Phase II Work Plan Projects	Athey Creek Consultants, LLC	Dean Deeter	Cory Johnson	Deb Fick	9/14/07	8/31/12	SP&R, Partnership Funds	\$487,250	\$475,566	98%	
N/A	98623	TPF-5(190): Use of Mobile Sensors and Maintenance Decision Support for Automated Road Condition Reporting—RFP	Meridian Environmental Technology, Inc.	Ben Hershey	Kenneth Hansen	Deb Fick	11/7/11	4/30/13	SP&R, Partnership Funds	\$49,931	\$47,965	96%	
N/A	01538	INV 924: YouTube Video: Stop Signs/Speed Limits	SRF Consulting Group, Inc.	Mike Marti	Sulmaan Khan	Farideh Amiri	8/15/12	1/31/13	LRRB	\$26,810	\$25,671	96%	
N/A	98039	INV 903: Best Practices for Sign Reduction on the Local System—2009-2011	CH2M Hill	Howard Preston	Mark Vizecky	Farideh Amiri	6/6/11	7/31/12	LRRB	\$26,515	\$23,402	88%	
N/A	99072	INV 917: Two-Lane Roundabout Field Research Regarding Signing and Striping	City of Richfield	Kristin Asher	None	Shirlee Sherkow	9/8/11	8/30/13	LRRB	\$5,000	\$5,000	100%	
N/A	89261 W0271	INV 917: Two-Lane Roundabout Field Research Regarding Signing and Striping	University of Minnesota	John Hourdos	Kristin Asher	Shirlee Sherkow	6/30/11	4/30/14	LRRB	\$105,000	\$95,000	90%	
N/A	01576	TPF-5(190): North/West Passage Program Support Services and Technical Writing	Athey Creek Consultants, LLC	Dean Deeter	Cory Johnson	Deb Fick	7/26/12	8/31/13	SP&R, Partnership Funds	\$99,294	\$89,702	90%	
N/A	89261 W0195	INV 898: Estimating the Crash Reduction and Vehicle Dynamics Effects of Flashing LED Stop Signs	University of Minnesota	Gary Davis	Bradley Estochen	Shirlee Sherkow	6/28/10	2/28/14	LRRB, COPTRS, ITS Institute	\$74,667	\$67,200	90%	
N/A	89261 W0203	Expanding and Streamlining the RTMC Freeway Network Performance Reporting Methodologies and Tools	University of Minnesota	John Hourdos	Jesse Larson	Shirlee Sherkow	10/28/10	1/31/14	SRP	\$89,000	\$79,000	89%	
N/A	01203	Safety Rest Area Advance Signing Enhancements	Jacobs Engineering Group, Inc.	Thomas Parker	Robert Williams	Daniel Warzala	8/15/12	7/31/13	SRP	\$91,746	\$76,252	83%	
N/A	99004 W06	TRS: Evaluation of Low-Cost Treatments—Phase I	Iowa State University	Shauna Hallmark	Bradley Estochen	Shirlee Sherkow	1/28/13	11/30/13	SRP	\$8,000	\$6,400	80%	
N/A	89261 W0247	Evaluation of the Effect MnPASS Lane Design has on Mobility and Safety	University of Minnesota	John Hourdos	Julie Johnson	Daniel Warzala	5/31/11	6/30/14	SRP	\$125,000	\$95,700	77%	
N/A	99008 W025	INV 925: Advanced LED Warning Signs for Rural Intersections Powered By Renewable Energy (ALERT) System—Phase II	University of Minnesota – Duluth	Taek Kwon	Victor Lund	Alan Rindels	12/14/11	6/30/14	LRRB	\$106,192	\$68,012	64%	

# Traffic & Safety [cont.]

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
N/A	00977	TPF-5(190): North/West Passage—Phase III	North Dakota State University	Mohammad Smadi	Cory Johnson	Deb Fick	5/29/12	4/30/14	SP&R, Partnership Funds	\$7,056	\$4,410	63%	
N/A	99007 W01	TPF-5(262): Evaluation of Guide Sign Fonts	Texas Transportation Institute	Bari Kotwal	Cory Johnson	Deb Fick	9/28/12	3/31/14	SP&R, Partnership Funds	\$165,000	\$102,816	62%	
N/A	99008 W0117	INV 955: Enhanced Capabilities for the Portable WIM Systems	University of Minnesota – Duluth	Taek Kwon	Benjamin Timerson	Nelson Cruz	4/22/13	6/30/14	SRP, LRRB	\$33,512	\$18,622	56%	
N/A	99008 W057	MPR-1(016): Field Implementation, Testing and Refinement of Density-Based Coordinated Ramp Control Strategy	University of Minnesota	John Hourdos	Brian Kary	Deb Fick, Alan Rindels	5/3/12	10/31/14	SP&R, SRP	\$144,000	\$78,000	54%	
N/A	99008 W03	Development of Active Traffic Management Strategies for Minnesota Freeway Corridors with Enhanced Variable Speed Limit Control System	University of Minnesota – Duluth	Eil Kwon	Brian Kary	Daniel Warzala	9/23/11	7/31/14	SRP	\$98,700	\$53,200	54%	
N/A	98383 Task 5.1	INV 645: Traffic Monitoring	SRF Consulting Group, Inc.	Mike Marti	Tim Stahl, Darin Mielke	Farideh Amiri	6/20/11	7/31/14	LRRB	\$145,707	\$75,558	52%	
N/A	99008 W043	MPR-2(003): MnPass Modeling and Pricing Algorithm Enhancement	University of Minnesota	John Hourdos	Brian Kary	Farideh Amiri	6/29/12	7/31/14	SP&R, SRP	\$150,000	\$75,000	50%	
N/A	99008 W065	MPR-2(017): Investigation of the Impact the I-94 ATM System has on the Safety of the I-94 Commons High Crash Area	University of Minnesota	John Hourdos	Brian Kary	Daniel Warzala	8/9/12	5/31/14	SP&R, SRP	\$140,000	\$70,000	50%	
N/A	99008 W063	INV 937: Development of Guidelines for Flashing Yellow Arrows for Protected/Permissive Use	University of Minnesota	Gary Davis	Susan Zarling	Alan Rindels	8/9/12	6/30/14	SRP, LRRB	\$85,000	\$36,000	42%	
N/A	99008 W0112	Optimizing Automatic Traffic Recorders (ATR) Network in Minnesota	University of Minnesota	Diwakar Gupta	Mark Flinner	Alan Rindels	4/10/13	3/31/15	SRP	\$94,724	\$32,000	34%	
N/A	03369	Construction Traffic Diversion Data Collection and Traffic Monitoring	Bolton & Menk, Inc., Consulting Engineers & Surveyors	Bryan Nemeth	Tiffany Dagon	Alan Rindels	3/22/13	7/31/13	SRP	\$59,990	\$18,402	31%	
N/A	99006 W01	MPR-2(008): Measuring Minnesota's Traffic Safety Culture	Montana State University, Western Transportation Institute	Nicholas Ward	Katie Fleming	Shirlee Sherkow	6/22/12	8/31/14	SP&R, SRP	\$235,217	\$70,896	30%	
N/A	99008 W039	INV 931, MPR-2(001): Lighting Levels for Isolated Intersections Leading to Safety Improvements	University of Minnesota	Christopher Edwards	Susan Zarling	Daniel Warzala	7/31/12	2/28/15	SP&R, SRP, LRRB	\$94,170	\$27,470	29%	
N/A	99008 W032	MPR-1(010): Vehicle-Mounted Robotic Roadway Message and Symbol Painter (2009-2011 Efforts)	University of Minnesota – Duluth	Ryan Rosandich	Randy Reznicek	Alan Rindels	12/8/11	2/28/14	SP&R, SRP	\$95,000	\$27,500	29%	
N/A	99008 W067	MPR-2(019): Automatic Generation of Traffic Signal Timing Plan	University of Minnesota	Henry Liu	Steven Misgen	Shirlee Sherkow	11/15/12	9/30/14	SP&R, SRP	\$105,000	\$30,000	29%	
N/A	03683	Deployment of Portable WIM Systems at ATR Sites for Data Collection and Comparative Study	SRF Consulting Group, Inc.	Erik Minge	Benjamin Timerson	Nelson Cruz	4/25/13	1/31/15	SRP, LRRB	\$65,904	\$15,311	23%	
N/A	99008 W066	MPR-2(018): Using Smartphone App to Help the Visually Impaired Navigate Work Zones Safely	University of Minnesota	Chen-Fu Liao	Kenneth Johnson	Nelson Cruz	8/9/12	3/31/14	SP&R, SRP	\$89,500	\$20,000	22%	
N/A	99004 W02	Evaluation of Pavement Markings on Challenging Surfaces	Iowa State University	Neal Hawkins	Michelle Moser	Nelson Cruz	6/13/12	10/31/15	SRP	\$130,373	\$22,000	17%	
N/A	98383 Task 5.2	INV 645: Online Sign Management and Maintenance	SRF Consulting Group, Inc.	Mike Marti	Rich Sanders	Farideh Amiri	6/20/11	7/31/14	LRRB	\$218,708	\$21,870	10%	
N/A	89256 W010	Rumble Stripe: Evaluation of Retroreflectivity and Installation Practices	University of Iowa	Neal Hawkins	Kenneth Johnson	Nelson Cruz	5/26/11	2/28/14	SRP	\$65,000	\$5,000	8%	
N/A	98383 Task 4	INV 645: Road Safety—Toward Zero Deaths (TZD)	SRF Consulting Group, Inc.	Mike Marti	Mitch Rasmussen	Farideh Amiri	6/20/11	7/31/14	LRRB	\$94,304	\$3,772	4%	

## Traffic & Safety [cont.]

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
N/A	02889	INV 943: Traffic Sign Life Expectancy	CH2M Hill	Howard Preston	Tim Plath	Shirlee Sherkow	2/7/13	7/31/14	LRRB	\$37,722	\$1,585	4%	
N/A	00755	MPR-1(015): Implementation of LED Roadway Lighting	Short Elliott Hendrickson, Inc. (SEH)	Ken Taillon	Susan Zarling	Deb Fick	5/2/13	6/30/15	SP&R, SRP	\$32,872	\$468	1%	
N/A	03619, 99008 WO126	INV 645: HCM Unsignalized Crosswalk LOS Training	University of Minnesota, Bolton & Menk, Inc., Consulting Engineers & Surveyors	Bryan Nemeth, Jim Grothaus	Tony Winiecki	Shirlee Sherkow	4/26/13	1/31/14	LRRB	\$49,252	\$220	0%	
N/A	LAB943	INV 943: Traffic Sign Life Expectancy	MnDOT Materials and Road Research Section	Matthew Lebens	Tim Plath	Shirlee Sherkow	2/11/13	3/31/14	LRRB	\$37,935	\$0	0%	
N/A	99008 WO124	MPR-4(003): Implementation of a Low-Cost Weigh-In-Motion System	University of Minnesota – Duluth	Taek Kwon	Benjamin Timerson	Nelson Cruz	6/14/13	7/31/15	SP&R, SRP	\$28,054	\$0	0%	
N/A	99008 WO87	Development of a Guideline for Work Zone Diversion Rate and Capacity Reduction	University of Minnesota – Duluth	Eil Kwon	Tiffany Dagon	Nelson Cruz	5/23/13	9/30/15	SP&R, SRP	\$107,000	\$0	0%	
N/A	99008 WO110	INV 928: Human Factors of Vehicle-Based Lane Departure Warning Systems	University of Minnesota	Christopher Edwards	Victor Lund	Shirlee Sherkow	4/16/13	12/31/14	LRRB	\$100,000	\$0	0%	
N/A	00976	TPF-5(190): North/West Passage—Phase 3	University of Wisconsin – Madison	Teresa Adams	Cory Johnson	Deb Fick	5/29/12	7/31/13	SP&R, Partnership Funds	\$25,000	\$0	0%	

## Traffic & Safety Pooled Fund Studies

Study Number	Title	Technical Liaison	Project Coordinator	Lead State or Agency	Number of Participating States	Current MN Commitment End Date	Total Cost	MN 2013 Commitment	Total MN Commitment	TS
TPF-5(093), TPF-5(190)	North/West Passage—Phase 3	Cory Johnson	Deb Fick	MN	16	2014	\$3,739,653	\$25,000	\$175,000	
TPF-5(262)	Evaluation of Guide Sign Fonts	Cory Johnson	Deb Fick	MN	6	2012	\$195,000	\$15,000	\$30,000	
SPR-2(207)	Transportation Management Center Pooled Fund Study	Brian Kary	Deb Fick	FHWA	33	2012	\$6,152,267	\$0	\$450,000	
TPF-5(029)	High Occupancy Vehicle (HOV)/Managed Use Lane (MUL)	Brian Kary	Deb Fick	FHWA	12	2013	\$1,990,000	\$25,000	\$225,000	
TPF-5(114)	Roadside Safety Research Program	Michael Elle	Deb Fick	WA	10	2014	\$1,930,000	\$50,000	\$500,000	
TPF-5(193)	Midwest States Pooled Fund Crash Test Program	Michael Elle	Deb Fick	NE	16	2013	\$3,739,653	\$66,700	\$455,500	
TPF-5(231)	ITS Pooled Fund Program (ENTERPRISE)	Jon Jackels	Deb Fick	MI	12	2012	\$1,645,000	\$30,000	\$60,000	
TPF-5(258)	Traffic Signal Systems Operations and Management	Steve Misgen	Deb Fick	IN	10	2014	\$550,000	\$25,000	\$75,000	

# Administrative

Report Number	Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid	TS
N/A	99008 W018	INV 999: MnDOT RSS Report Publication Services, FY2012	University of Minnesota	Arlene Mathison	Farideh Amiri	Sandra McCully	10/11/11	11/30/12	SRP, LRRB	\$36,861	\$36,861	100%	
N/A	98726	MPR-6(019): Technology Transfer Material Development	CTC & Associates LLC	Patrick Casey	Nick Busse	Sandra McCully	4/29/11	1/31/13	SP&R, SRP	\$99,964	\$99,964	100%	
N/A	93463	INV 645: RIC Implementation of Research Findings (FY2009-FY2011)	SRF Consulting Group, Inc.	Mike Marti	Rich Sanders	Farideh Amiri	4/17/09	6/30/13	LRRB	\$497,697	\$497,697	100%	
N/A	98727	MPR-6(019): Technology Transfer Material Development—2011 Annual Reporting	CTC & Associates LLC	Patrick Casey	Linda Taylor	Sandra McCully	4/28/11	9/30/12	SP&R, SRP	\$35,102	\$35,083	100%	
N/A	01684	MPR-6(019): Technology Transfer Material Development, FY2013	CTC & Associates LLC	Patrick Casey	Nick Busse	Sandra McCully	8/8/12	7/31/13	SP&R, SRP	\$99,987	\$99,987	100%	
N/A	01351	MPR-6(019): Technology Transfer Material Development, FY2012, FY2013 Annual Reporting	CTC & Associates LLC	Patrick Casey	Nick Busse	Sandra McCully	6/13/12	1/31/14	SP&R, SRP	\$88,358	\$88,343	100%	
N/A	95501	INV 999: Local Road Research Board Website Hosting and Maintenance, 2010-2011	MIS Sciences Corp.	Jeff Willis	Farideh Amiri	Sandra McCully	3/17/10	7/31/12	SRP	\$17,200	\$16,450	96%	
N/A	98725	INV 916: LRRB Technical Transfer Materials Development	CTC & Associates LLC	Patrick Casey	Julie Skallman	Sandra McCully	5/20/11	9/30/13	LRRB	\$99,892	\$96,891	97%	
N/A	94376	MPR-6(003): Business Assessment of RSS Processes and Tools	Trissential	Steve Beise	Nicole Peterson	Ann McLellan	11/4/09	12/31/13	SP&R, SRP, Other State Funds	\$172,080	\$159,720	93%	
N/A	00340	INV 927: LRRB Outreach Website	HNTB Corporation	Timm Claudon	Lowell Schafer	Sandra McCully	2/2/12	1/31/14	LRRB	\$99,991	\$86,276	86%	
N/A	94156	MPR-6(005): Next Generation of ARTS Tech Support and Maintenance Services	ArchWing Innovations, LLC	Ryan Anderson	Nelson Cruz	Hafiz Munir	5/13/09	5/12/14	SP&R, SRP, Other State Funds	\$179,400	\$143,850	80%	
N/A	03014	Return on Investment Study for MnDOT Library	Law Library Consultants, Inc.	Kathleen Bedor	Sheila Hatchell	Carole Wiese	2/1/13	1/31/14	SRP	\$44,995	\$32,260	72%	
N/A	00147	MPR-6(019): Technology Transfer Material Development Marketing Plan	Strategic Toolbox, LLC	Janese Evans	Nick Busse	Linda Taylor	3/27/12	1/31/14	SP&R, SRP	\$203,075	\$144,594	71%	
N/A	03569	Orientation Guide for TRIG Members and Best Practice Guide for Assessing the Value of Research	Athey Creek Consultants, LLC	Linda Preisen	Linda Taylor	Carole Wiese	4/11/13	7/31/13	SRP	\$49,963	\$31,557	63%	
N/A	99008 W069	INV 999: RSS Report Publication Services, FY2013	University of Minnesota	Arlene Mathison	Nick Busse	Sandra McCully	7/27/12	8/31/13	SRP, LRRB	\$30,088	\$18,371	61%	
N/A	98383 Task 6	INV 645: LRRB Outreach and Marketing	SRF Consulting Group, Inc.	Mike Marti	TBD	Farideh Amiri	6/20/11	7/31/14	LRRB	\$60,826	\$36,496	60%	
N/A	89261 W0263	Librarian Services, 2011-2016	University of Minnesota	Arlene Mathison	Sheila Hatchell	Carole Wiese	3/21/11	3/20/16	SRP, COPTRS	\$205,041	\$97,297	47%	
N/A	98383	INV 645: RIC Implementation of Research Findings, 2012-2014	SRF Consulting Group, Inc.	Mike Marti	Rich Sanders	Farideh Amiri	6/20/11	7/31/14	LRRB	\$652,762	\$258,201	40%	
N/A	99008 W064	INV 998: Operational Research Program for Local Transportation Groups (OPERA), FY2013-FY2014	University of Minnesota – CTS	Jim Grothaus	Julie Skallman	Farideh Amiri	7/3/12	6/14/14	LRRB	\$135,000	\$45,000	33%	
N/A	99008 W060	INV 936: LRRB Focus Groups	University of Minnesota	Jim Grothaus	Richard West	Linda Taylor	3/30/12	7/31/13	LRRB	\$17,000	\$4,257	25%	
N/A	03541	MnDOT Library Process Improvement	Diane Foote Design Associates	Diane Foote	Sheila Hatchell	Carole Wiese	4/12/13	7/31/13	SRP	\$4,900	\$984	20%	
N/A	99008 W019	INV 998: Operational Research Program for Local Transportation Groups (OPERA), FY2012	University of Minnesota	Jim Grothaus	Julie Skallman	Farideh Amiri	9/23/11	11/30/13	LRRB	\$90,000	\$10,035	11%	
N/A	04015	MPR-3(001): Technology Transfer Material Development RS Outreach	CTC & Associates LLC	Patrick Casey	Nick Busse	Sandra McCully	6/12/13	7/31/14	SP&R, SRP	\$99,919	\$7,645	8%	

## Administrative Pooled Fund Studies

Study Number	Title	Technical Liaison	Project Coordinator	Lead State or Agency	Number of Participating States	Current MN Commitment End Date	Total Cost	MN 2013 Commitment	Total MN Commitment	TS
TPF-5(209)	Transportation Curriculum Coordination Council (TCCC)	Catherine Betts	Deb Fick	FHWA	18	2012	\$1,095,000	\$0	\$75,000	
TPF-5(237)	Transportation Library Connectivity and Development	Sheila Hatchell	Deb Fick	MO	26	2015	\$1,088,028	\$20,000	\$100,000	

## Dedicated Programs

Contract Number	Title	Contractor	Investigator	Technical Liaison	Project Coordinator	Start Date	End Date	Funding Source	Total Cost	Amount Paid	% Paid
99008 W05	INV 668: Local Technical Assistance Program (LTAP), FY2012	University of Minnesota	Jim Grothaus	Julie Skallman	Farideh Amiri	9/23/11	11/30/12	LRRB, Other Federal Funds	\$441,500	\$441,500	100%
99008 W023	FY12-13 CTS Operations	University of Minnesota – CTS	Laurie McGinnis	None	Linda Taylor	12/14/11	9/30/13	SRP, PARI	\$2,400,000	\$2,075,000	86%
99008 W061	INV 668: Local Technical Assistance Program (LTAP), FY2013	University of Minnesota	Jim Grothaus	Julie Skallman	Farideh Amiri	8/1/12	11/30/13	LRRB, Other Federal Funds	\$440,500	\$220,250	50%

## Federal Program Support

Title	MN 2013 Commitment
Core Program Services for a Highway RD&T Program—FFY2013 (TRB FY2014)	\$119,482
National Cooperative Highway Research Program (NCHRP)	\$659,419
Strategic Highway Research Program (SHRP 2)	\$494,781
AASHTO Technical Services Program	\$163,707

## FY2013 RESEARCH SERVICES & LIBRARY KEY STATISTICS

Total active contracts for research and implementation	252
Completed research reports	46
Technical Summaries	45
Transportation Research Syntheses	18
Research Services website visits	37,427
Total active MnDOT-supported pooled fund projects	45
MnDOT-led pooled funds	12
Pooled funds led by other states	33

# Transportation Research Syntheses

Transportation Research Syntheses are short-turnaround research reports that address a specific research topic. They include summaries of completed and in-progress research, or reports about the state of the practice among departments of transportation (DOTs). Transportation Research Syntheses go beyond the scope of literature searches; they can include interviews or surveys, and the resources found are clearly organized and summarized—with contact names, Web links and other specifications.

## Transportation Research Syntheses Completed in FY2013

TRS1309	Quantifying the Economic Impact of Bicycling: A Literature Review with Implications for Minnesota
TRS1308	Bridge Safety Inspection and NBIS Bridge Inspection Program Administration
TRS1307	Cost Sharing Policies of State Transportation Agencies
TRS1306	Pedestrian Snow Removal Best Practices and Lessons Learned
TRS1305	Asset Management for Retaining Walls
TRS1304	The Use of Life-Cycle Cost Analysis to Evaluate Public-Private Partnerships
TRS1303	Mobile Traffic Signals in Lieu of Flaggers for Moving Operations
TRS1302	Culvert Designs for Aquatic Organism Passage: Culvert Design Practices Incorporating Sediment Transport
TRS1301	Performance-Based Specifications for Temporary Erosion and Sediment Control during Construction: A Survey of State Practice
TRS1212	Ultra-Thin Polymer Concrete Overlays for Bridge Decks
TRS1211	State Highway System Classification and Investment: A Survey of State Practice
TRS1210	Integrated Corridor Management: A Review on the Theory and Practice
TRS1209	Culvert Repair Best Practices, Specifications and Special Provisions
TRS1208	Power Sources for Automatic Traffic Recorders
TRS1207	Collecting and Managing Traffic Data on Local Roads
TRS1206	Traffic Forecasting on Trunk Highways in Nonmetropolitan Areas: A Survey of State Practice
TRS1205	Mitigating Highway Construction Impacts with Transit
TRS1204	Methods for Setting Posted Speed Limits

## How can a TRS help me?

- Investigate a problem without starting from scratch.
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Call today and get your report in four to eight weeks!

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**TRS1305, Asset Management for Retaining Walls**, provided valuable information about how DOTs track and maintain the many barriers that keep soil from eroding onto roadways. Information gathered for this TRS included asset data collection techniques, inspection guidelines and schedules, life span estimates for several wall types in various conditions and risk management strategies.

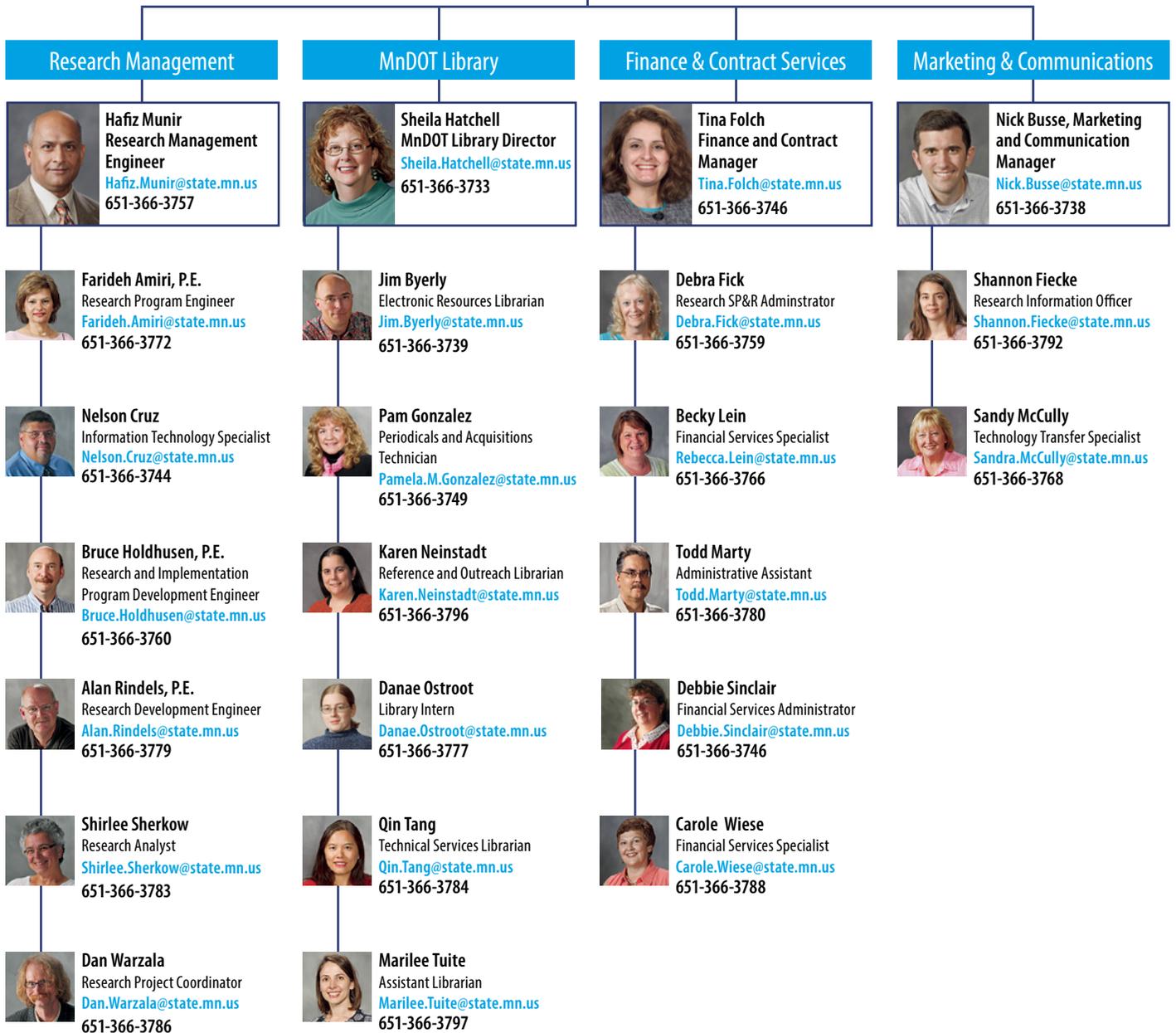
*“The final product was great, with organized and thorough information. I’ve read all the referenced documents and contacted a couple of the experts referenced in the TRS. Having the TRS has saved me days of research and writing.”*

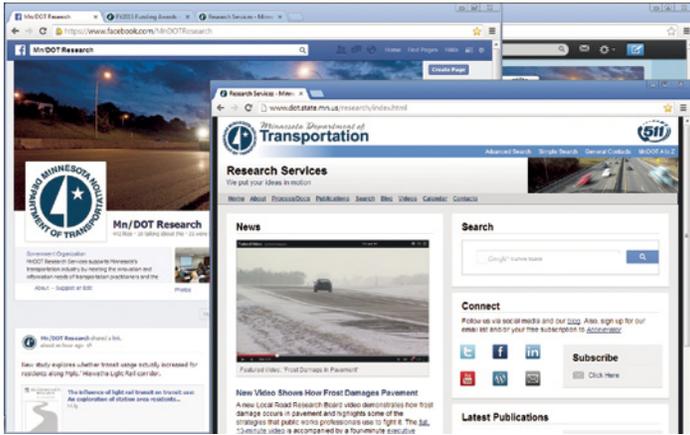
—Trisha Nelson, Infrastructure Asset Management Engineer,  
MnDOT Metro District

# Research Services & Library Staff



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MnDOT's TRIG is the governing board for the State Research Program. TRIG is composed of representatives from each MnDOT office and district, and meets quarterly to recommend research investments.

Name	Represents
<b>Specialty Offices</b>	
Lynn Clarkowski	Environmental Stewardship
Nancy Daubengerger	Bridges & Structures
Glenn Engstrom	Materials & Road Research
Mark Gieseke	Transportation System Management
Chris Roy	Project Management and Technical Support
Susan Groth	Traffic, Safety & Technology
Steven Lund	Maintenance
Mark Nelson	Statewide Multimodal Planning
Michael Schadauer	Transit
Linda Taylor	Research Services & Library

<b>Districts</b>	
Daniel Anderson	District 3
James Kranig	Metro District
Jeffrey Vlamink	District 6
Greg Ous	District 7

<b>Nonvoting Members</b>	
James Close	Information & Technology Services
Bill Lohr	FHWA

**Research Services & Library Support Staff**  
 Hafiz Munir, Farideh Amiri, Bruce Holdhusen, Alan Rindels, Nick Busse, Deb Fick



Produced by CTC & Associates LLC for:

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**Office of Transportation System Management**  
**Research Services & Library**  
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**Website:** [mndot.gov/research](http://mndot.gov/research)  
**Minnesota Department of Transportation:** [mndot.gov](http://mndot.gov)  
**MnDOT Library:** [mndot.gov/library](http://mndot.gov/library)  
**Minnesota Local Road Research Board:** [www.lrrb.org](http://www.lrrb.org)