TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT
for
National Road Research Alliance (NRRA)
Phase – 1 (2016-2021)
Phase – 2 (2021-2025)

Lead Agency: Minnesota Department of Transportation

Transportation Pooled Fund Program Project #	**Report Period:**
TPF-5(341) *http://www.pooledfund.org/Details/Study/590* TPF-5(466) *https://pooledfund.org/Details/Study/693*	2022 - Quarter 2 (April 1 – June 30, 2022)

Project Title: National Road Research Alliance – NRRA
http://www.dot.state.mn.us/mnroad/nrra/index.html

NRRA quarterly reports for Phase-I and Phase-II are being combined because of existing projects in phase-I that are still ongoing and still pertain to the NRRA efforts that are being done in phase-II. Both websites will be updated with the same quarterly report. Individual budgets are attached to this quarterly report for both efforts.

Project Manager(s):	**Phone Number:**	**E-Mail**
Glenn Engstrom (MnDOT) Robert Orthmeyer (FHWA)	(651) 366-5531 (708) 283-3533	glenn.engstrom@state.mn.us Robert.orthmeyer@dot.gov
Lead Agency Project ID: None	**Other Project ID (i.e., contract #):** None	**Project Start Date:** Phase 1 - February 22, 2016 Phase 2 – February 22, 2021
Original Project End Date: Phase 1 - September 30, 2018 Phase 2 – February 22, 2025	**Current Project End Date:** Phase 1 – February 22, 2021 Phase 2 – February 22, 2025	**Number of Extensions:** Phase 1 (Approved - Dec 2017 by NRRA Executive Committee till 2021) Phase 2 - NA

Project schedule status → On schedule

Phase – 1 TPF-5(341) Overall Project Statistics:

Total Project Budget	Total Costs obligated to Date for Project	Percentage of Time and Funding Completed to Date
$5,000,000	SPR Funds Budgeted = $4,865,582 (97%) Invoices Paid = $3,762,173 (77%) Funds Remaining = 134,418	Complete as of Feb 22, 2021 Some contracts still continue into Phase-II

Phase – 2 TPF-5(466) Overall Project Statistics:

Total Project Budget	Total Costs obligated to Date for Project	Percentage of Time and Funding Completed to Date
$5,188,000	SPR Funds Budgeted = $4,771,106 (92%) Invoices Paid = $545,866 (11%) Funds Remaining = $416,894	Time = 16/60 months (27%)

Project Description:
This pooled fund phase-II is open for new states and they can join at any time. This pooled fund will help direct and compliment the use of the MnROAD test track for local, regional and national research, tech transfer and implementation. Road owner agencies will provide input and participate in the decision making needed for future MnROAD construction and research scheduled in 2017 (Phase-I) and in 2022 (Phase-2). In Phase-I MnDOT and Missouri have funded construction in both states while Phase-2 MnDOT, Missouri, Wisconsin will fund 2022-2023 construction of test sections. MnROAD will continue to support common goals. Industry and academia will also play an important role to provide critical input on long-term future trends in research and barriers to implementation, including working with their customers and members who play a direct role in implementation.

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):
To date ten (11) government agencies and over fifty-five (65+) industry, associations, consultants, and academic institutions have become NRRA members to share their expertise and are learning about new tools and methods to improve and expand upon transportation systems nationally.

Phase-I Projects

- Tech Transfer - 100% of the 13/13 projects complete.
- 2017 Long Term Research – 100% of the 8/8 projects complete
- 2019 Long Term Research – 63% of the 7/11 projects complete
- 2019 Call for Innovation Research – 17% of the 1/6 projects complete
- 2020 Call for Innovation Research – 14% of the 1/7 projects complete

Phase-2 Projects

- 2021 Long Term Research – 0% of the 0/14 projects complete
- Working on two RFPs this fall/winter of 2022.

General

- NRRA members/Teams have met every monthly again this quarter which also acts as TAP meetings for each team's short and long term research efforts also focusing on development of 2021 projects with inputs on MnROAD 2022 construction / sensors.
- Monthly Research pays off webinars have been completed and a plan for 2022 topics are developed.
- Budget sheet is attached at the end of this report.
- See the NRRA website for details on all the teams' updated activities.
- Technical teams TAPS developing construction designs, layers, sensor requirements, and ICT related construction activities to include in the 2022 MnROAD construction.
- Completed partnerships with FHWA for veta and carboncure related research efforts.
- Finalizing partnerships with a local HMA plant to furnish HMA surface mix for the reflective cracking group study.
- Finalizing partnerships with a local PCC plant to furnish PCC mix need for the 2022 construction.
- Finalized partnerships with Missouri and the funding received for reflective cracking challenge.
- Successful 2022 Minnesota Transportation Conference & Expo in St. Paul, Minnesota, May 17-19 and the NRRA tracks for each technical team. Possible NE and MT members (this is completed)

Anticipated work next quarter:
The following is expected to be completed for next quarter.

- Final contracts for 2 of the RFP will be finalized this fall/winter 2022.
- Contact member states and their pooled fund dollar commitments
- Continued work on Phase-I pooled fund efforts and reporting in the team meetings.
- 2022 TRB NRRA meeting activities
- NE and MT memberships expected

Significant Results:
Currently this pooled fund is working well for all the members. We have shared resources and technology with each other related to intelligent construction and have discuss a number to topics in the technical teams. More formal documentation will start to be developed at the contracts are awarded and this work begins.

NRRA is now up to 11 government members (13 soon) and at 80+ associate members. NRRA Agencies and Associates members make up the now 6 teams that play an important technical role in setting both the technology transfer and long-term research needs. Each team has been active this summer meeting every two weeks to develop and prioritize ideas that fall into each of these categories above to meet both local, state, regional and national research needs. The teams report directly to the NRRA executive committee.

The current push by each of the NRRA technical teams is to develop long term research needs and the MnROAD test sections that will be used to support these initiatives. MnDOT is providing $5 million of construction funding to support NRRA long term research needs to be built at MnROAD in the summer of 2022. Each team is working to get the final designs and special provisions to MnDOT so the plans can be developed, and a formal construction project can be let in February 2022. The long-term research is listed in the phase-2 budget along with the budgets determined by the executive team.

Other important team activities include the formation of technology transfer topics. The NRRA technology transfer team has been approved by the executive committee to fund 2 technology transfer topics from each of the four technical teams. Each topics goal is to pull together the existing state and national state of practice so that a common practice or specification can be developed by the members. Prioritized topics include longitudinal joint construction performance, tack coats, design and performance of concrete unbonded overlays, repair of concrete joint related distress, large unbound subbase materials, subgrade design, surface characteristics of diamond ground PCC, and pavement preservation approaches to lightly surfaced roadways. Currently the teams are updating the problem statements so that a MnDOT hired contractor can be hired to complete the work.

More information on these efforts including the long term research and technology transfer topics can be found under each of the team member's webpage. Summary of the projects are also attached in attachment C at the end of this report.

Circumstance affecting project or budget. (Please describe any challenges encountered or anticipated that might affect the completion of the project within the time, scope and fiscal constraints set forth in the agreement, along with recommended solutions to those problems)

None

Potential Implementation:
See the NRRA team pages for implementation topics that are being developed – TAP members of each of the contracts and teams will be asked to help the development of implementation for the technology transfer team to push with its members. This is a focus area that is probably the hardest part of successful research. The technology transfer team will be focused on this topic in the upcoming months.

Attachment A - NRRA Budget Summary (July 16, 2022)

NRRA Phase-1

TPF-5(341) National Road Research Alliance - NRRA Pooled fund

Funding income complete

Current		2016	2017	2018	2019	2020	2021	Total
CA	Obligation	-	150,000	50,000	150,000	150,000	150,000	650,000
	Payment	-	150,000	50,000	150,000	150,000	150,000	650,000
IA	Obligation					150,000		150,000
	Payment					150,000		150,000
IL	Obligation	150,000	150,000	150,000	150,000	150,000	150,000	900,000
	Payment	150,000	150,000	150,000	150,000	150,000	150,000	900,000
MI	Obligation	150,000	150,000	150,000			300,000	750,000
	Payment	150,000	150,000	150,000			300,000	750,000
MN	Obligation	150,000	150,000	150,000	150,000	150,000		750,000
	Payment	150,000	150,000	150,000	150,000	150,000		750,000
MO	Obligation	150,000	150,000	150,000	150,000	150,000		750,000
	Payment	150,000	150,000	150,000	150,000	150,000		750,000
ND	Obligation	-	-	-	75,000	75,000		150,000
	Payment	-	-	-	75,000	75,000		150,000
WI	Obligation	150,000	150,000	150,000	150,000	150,000		750,000
	Payment	150,000	150,000	150,000	150,000	150,000		750,000
Illinois Tollway	Obligation					150,000		150,000
	Payment					150,000		150,000
Totals	Obligation	750,000	900,000	800,000	825,000	1,125,000	600,000	**5,000,000**
	Payment	750,000	900,000	800,000	825,000	1,125,000	600,000	**5,000,000**

Pooledfund.org does not show 150K Illinois Tollway contribution - $4,850,000 shown on website

NRRA Phase-2

TPF-5(466) National Road Research Alliance – NRRA Pooled fund

		2021	2022	2023	2024	2025	2026	Total
CA	Obligation		150,000					150,000
	Payment		150,000					150,000
IA	Obligation							-
	Payment							-
IL	Obligation		150,000	150,000	150,000	150,000	150,000	750,000
	Payment							-
GA (Veda)	Obligation		25,000.00	25,000.00	25,000.00	25,000.00		100,000
	Payment		25,000.00					25,000
MI	Obligation	150,000	150,000	150,000	150,000	150,000		750,000
	Payment	150,000	150,000					300,000
MN	Obligation	150,000	150,000	150,000	150,000	150,000		750,000
	Payment	150,000.00	150,000	150,000	150,000	38,816		638,816
MO*	Obligation	550,000	150,000	150,000	150,000	150,000		1,150,000
	Payment	550,000	150,000					700,000
MS	Obligation	75,000	75,000	75,000	75,000	75,000		375,000
	Payment	75,000						75,000
ND	Obligation	75,000	75,000	75,000	75,000	75,000		375,000
	Payment	75,000	75,000					150,000
NY (Veda)	Obligation							-
	Payment							-
WI	Obligation	150,000	150,000					300,000
	Payment	150,000	87,286					237,286
FHWA**	Obligation	488,000						488,000
	Payment	488,000						488,000
Illinois Tollway	Obligation							-
	Payment							-
Totals	Obligation	1,638,000	1,075,000	775,000	775,000	775,000	150,000	5,188,000
	Payment	1,638,000	787,286	150,000	150,000	38,816	-	2,764,101

MO* – Missouri added 400K to support the Missouri Reflective Cracking/Additive efforts

FWHA** – FHWA added 300K for Carbon Cure PCC and 188K for ICT related efforts

Funding Summary – July 16, 2022

Attachment B - NRRA Budget Summary (July 16, 2022)

This spreadsheet is approximate summary of income and spending – MnDOT finance has the official dollars.

NRRA Phase-1

TPF-5(341) National Road Research Alliance - NRRA Pooled fund

For 2022 - quarter 2 report - updated 7/16/2020

Funding Group	Description	Funding Totals		SPR Remaining
States (SPR)	- Pooled Funds (9 agencies) - Pooled Fund + Wisconsin 150K + 150K Toll	$ 5,000,000	Percent	$ 134,418
	Total SPR Encumbered =	$ 4,865,582	97%	
	Paid Invoices =	$ 3,762,173	77%	
Additioanl State Funding (Not NRRA SPR Dollars)	MnDOT Constrction Funding for 2017 MnROAD Construction	$ 3,132,681		
	Missouri DOT funding - roller compacted PCC constr and research	$ 275,000		
	Total Spending (SPR and Other)	$ 8,407,681		

Spending Details **SPR Dollars Budget/Spending**

NRRA Focus Areas	Effort Type	Item	Project Charge #	General Outcome / Deliverable	Vendors	Encumbered	Payments Invoiced	Payment Percent
Marketing (M)	Labor	M1.1	TPF15341A	MNDOT Labor - (Website, Monthly Newsletter, Written Documents/Marketing)	MnDOT	152,648	152,648	100%
Tech Transfer (T)	Purchase	T1.1	TPF15341	Agency travel / meals / meeting room costs (assume no more travel in 2020)	MNDOT PO	41,722	41,722	100%
	Contract	T1.2		Communication (Written, Newsletter, video, Website) - MnDOT will not charge	Not Done			
	Contract	T1.3.1	TPF15341	Tack Coats	2016 State of Practice (SRF) top two topics from each team established in 2016	95,565	95,565	100%
				Longitudinal Joint Construction Performance				
				Design and Performance of Concrete Unbonded Overlays				
				Repair of Joint Associated Distress Pavements				
				Larger Subbase Materials - Done by Iowa State				
				Subgrade Design for New and Reconstructed				
				Surface Characteristics of Diamond Ground PCC Surfaces				
				Pavement preservation approaches for lightly surfaced roadways				
				Partial Depth Repairs of Concrete				
				E-Ticketing				
	Labor	T1.3.2	TPF15341B	Tech transfer write-ups (MnDOT Labor) - Topics Below	MnDOT	22,522	22,522	100%
	Contract	T1.5.1	TPF15341	HMA – Asphalt Mixture Rejuvenator Synthesis	2019 State of Practice (WSB)	92,302	92,302	100%
				PM - NRRA Spray on Rejuvenator Synthesis				
				PM - Concrete Pavement Restoration (CPR) for BCOA				
				PM - Service Life Enhancement of Substrates Overlaid with Thin Overlays				

Phase-I Second Page

Research (R)	Purchase	R1.1	TPF15341	2017 MnROAD Constrruction Sensor Purchases	MnDOT PO	159,130	184,672	100%
				2018 CCP Missouri Sensor Purchases - broken off the 60K avalible		25,542		
	Labor	R1.3	TPF15341C	Inspection (MnDOT) - costs over the initial budget	MnDOT	100,021	100,021	100%
	MnROAD Labor	R1.4	TPF15341D	MnROAD Staff - Construction, Sensors and Performance Monitoring MnDOT approved operating funds for any additonal costs - 120K approved by EC - MnDOT fund from Dec 17 budget report	MnDOT	279,318	737,144	100%
		R2.4		Approved $120K extra funding for monitoring 2018		120,000		
		R3.4		Approved $200K extra funding for monitoring 2019		200,000		
		R4.4		Approved $200K extra funding for monitoring 2020		111,826		
		R1.8		Missouri Sensor Labor Costs for 2018 installs		26,000		
	Contract	R1.5	TPF15341	PCC Sampling/Testing	AET Consultant	20,000	61,514	100%
		R2.5		Additional Funding Approved (low initial estimate)		41,514		
	Contract	R1.6		HMA Performance Testing (75K original Estimate - will not use in Phase-I)	Not Done			
	Contract	R1.7		Partial Depth Repairs Construction (not in construction contract)	Diamond Surfacing	40,000	78,662	100%
		R2.7		Additional Funding Approved		38,662		
	MnDOT Agreement	R1.8		Compacted Concrete Pavement Construction	Missouri DOT Hired University			
	Contract	R1.9		Diamond Grinding Construction (not in const	**Not Done**			
	2017 Long Term Projects	R1.10	TPF15341	HMA Overlay and Rehab of Concrete and Methods of Enhancing Compaction	UNH	169,970	169,970	100%
		R1.11		Cold Central Plant Recycling	AET Consultant	99,997	99,997	100%
		R1.12		Fiber Reinforced Concrete Pavements	UMD	145,462	145,462	100%
		R1.13		Long Term Effects of Diamond Grinding - $75	**Not Done**			
		R1.14		Concrete Early Opening Strength to Traffic	UofPitt	149,999	149,999	100%
		R1.15		Optimizing the Concrete Mix Components for Contractors	Iowa State	147,627	147,627	100%
		R1.16		Compacted Concrete Pavements for Local Streets - $80K - Did do in Missouri	**Not Done**			
		R1.17		Recycled Aggregates in Aggregate Base and Larger Subbase Materials	Iowa State	225,000	225,000	100%
		R1.18		Maintaining Poor Pavements	SRF	28,725	28,725	100%
		R1.19		Partial Depth Repair	Braun Inertec	74,925	74,925	100%

Research (R)	2019 Long Term Research	R1.21	TPF15341	HMA – Asphalt Mix Rejuvenator Test Sections (added 50K in April 2020)	UNH	148,981	67,719	45%
		R1.22		PM - Spray on Rejuvenator Test Sections	NCAT - 100k	134,000	18,321	14%
		R1.23		ICT - Levels 3-4 Intelligent Compaction Measurement Values (ICMV) for Soils Subgrade/Aggregate Subbase Compaction	Transtec Group	162,024	26,088	16%
		R1.24		ICT - Support Importing, Viewing and Analysis of Dielectric Constant Data in Veta (paid by Veta pooled fund)	Transtec Group	-	-	
		R1.25		ICT - HD and VHD Seismic Approaches for Roadway Evaluation	Park Consulting	299,886	299,886	100%
		R1.26		Geo - Mechanistic Load Restriction Decision Platform for Pavement Systems Prone to Moisture Variations	UNH	90,231	90,231	100%
		R1.27		Geo - Environmental Impacts on the Performance of Pavement Foundation	Michigan State	35,000	35,000	100%
		R1.28		Geo - Permeability of Base Aggregate and Sand		30,000	30,000	100%
		R1.29		Geo - Improve material inputs into mechanistic design properties for reclaimed HMA Roadways		30,000	30,000	100%
		R1.30		PCC - Construction Report for Jointless FRC Roundabout in Minnesota	Iowa State	49,999	49,999	100%
		R1.31		PCC - Incorporate Joint Faulting Model Into BCOA-ME	Contracting Uof Pittsburg	24,999	24,999	100%
		R1.32		PCC - Engineered Dowel and Tie Bars combined with LTPP SPS-2 Determination of Causes for Cracking Over Dowel Bars	ERES Consulting	101,083	55,087	54%
	2019 Call for Innovation	R1.33	TPF15341	Blending of Higher Strength Aggregates with Recycled Concrete and Marginal Aggregates to Improve Concrete Properties	Contracting - UofSt Thomas	32,332		0%
		R1.34		Performance of Concrete Overlays over Full Depth Reclamation (FDR)	ARM	34,265	1,680	5%
		R1.35		Bio-material Maintenance Treatments	Iowa State	50,000	4,000	8%
		R1.36		Innovative Practical Approach To Assessing Bitumen Compatibility As A Means Of Material Specification	Cargill	204,119	86,358	42%
		R1.37		Cold Asphalt Recycling Technologies using Rejuvenating Asphalt Emulsion: Impact; Implementation; Specification	UNH	141,400	64,316	45%
		R1.38		Support Contract for T1.3.1 (SRF) Repair of Joint Associated Distress Pavements	Iowa State	4,972	4,972	100%
	2020 Call for Innovation	R1.39		Pavement-Specific Structural Synthetic Fibers	UMD	99,792		0%
		R1.40		Understanding and Improving Pavement Milling Operations	University of New Hampshire	100,000	11,651	12%
		R1.41		Novel Methods for Adding Rejuvenators in Asphalt Mixtures with High Recycled Binder Ratios	NCAT	80,000	80,000	100%
		R1.42		Impact of Polymer Modification on IDEAL-CT and I-FIT for Balanced Mix Design	NCAT	100,000	15,000	15%
		R1.43		Asphalt Real Time Smoothness (ARTS) for Asphalt Paving	Transtec Group	104,021	79,923	77%
		R1.44		Enhanced Entrained Air Void System Characterization for Durable Highway Concrete	TSU	100,000	69,344	69%
		R1.45		Continuous Moisture Measurement during Pavement Foundation Construction	UTEP	100,000	9,121	9%
					Totals =	**$ 4,865,582**	**$ 3,762,173**	**77.3%**

NRRA Phase-II

NRRA Phase-2 TPF-5(466) National Road Research Alliance - NRRA Pooled fund For 2022 - quarter 2 report - updated 7/16/2022						
SPR Funding		**SPR Dollars**	**Percent**	**Remaining**	**Comment**	
SPR Funding	SPR - Pooled Funds **(Expected from Agencies)** =	$ 5,188,000	53%		Funding received from the agencies	
	SPR - Pooled Funds **(Received from Agencies)** =	$ 2,764,101				
	(MnDOT Encumbered/EC Approved) for Projects =	$ 4,771,106	92%			
	SPR Invoiced **(Spent)** =	$ 545,866	11%			
	NRRA Executive Team (Budgeted) to Date (1st round 4.7M + 400K Missouri Effort) =	$ 4,771,106	92%	$ 416,894		
MnDOT State Funds	MnDOT Construction Funding for 2022 MnROAD Construction (budgeted) =	$ 5,000,000				
	NRRA Associate funding (not included in this budget but used for NRRA needs)	Used for NRRA efforts --> MnDOT documented dollars				
Partnerships	FHWA Carbon Cure Partnership	$ 400,000				
Grand Total	$10,588,000	SPR + Construction + Carbon Cure				

SPR Dollars Budget/Spending

NRRA Focus	Project# Contract#	General Outcome / Deliverable	Vendors	EC Team Approved	Payments Invoiced	Payment Percent	Money tobe Used
Travel	TPF15466A	Agency travel / meals / meeting room costs	MnDOT	50,000			
Sensors	TPF15466B	MnROAD Sensors and Equipment needed for 2022 studies		350,000	234,739	67%	
MnROAD Labor	TPF15466C	MnROAD Staff - Labor for sensors and monitoring (5 years)	MnDOT	800,000	66,569	8%	
2021 ICT Funding	BUDGET NOTE	2021 Directed ICT funding $1,375,000 from Executive Team - Remaining to be used					263,043
	TPF15466D 1047755	Veta Web and Veta MDMS Standardized Platform (FHWA $188K)	Transtec Group	1,111,957	219,278	20%	
2021 General Team Funding	BUDGET NOTE	2021 Directed funding $2,125,000 from Executive Team - Remaining to be used in addition to Missouri 400K					$ 365,851
	TPF15466E 1048189	MnROAD Reflective Cracking Challenge (NRRA)	UNH Auburn	193,997		0%	
	TBD	Reflective Cracking Challenge Coordination (Missouri - 400K)	University of Missouri-Columbia	400,000		Hold	400,000
	TPF15466F 1048190	Use of Alternative Pozzolanic Materials Towards Reducing Cement Content in Concrete Pavements	Nichols Consulting APT	175,000		0%	
	TPF15466G 1048191	Use of Carbon Dioxide for Sustainable and Resilient Concrete Pavements (400K FHWA along with construction, sensors, monitoring)	Iowa State	150,000		0%	150,000
	TPF15466H 1048192	The Use of Alternative Cementitious Materials in Concrete Pavements	Applied Pavement Technology - NCE	150,000	3,765	3%	
	TPF15466J 1048193	Performance Evaluation of Wicking Geotextiles for Improving Drainage and Stiffness of Road Foundation	Michigan State Michigan Tech Ingios	190,000		0%	
	TPF15466M 1048485	Validation of Loose Mix Aging Procedures for Cracking Resistance Evaluation in Balanced Mix Design	Auburn University UNH - TTI	100,000		0%	
	TPF15466N 1048486	Perpetual Pavements in Wet Freeze Climate	RFP later in Fall 2022	200,000		Hold	200,000
	TPF15466K 1048377	Reclamation and Recycling Techniques to Achieve Perpetual Pavements Characteristics	Braun Intertec	150,000	418	0%	
	TPF15466P 1048487	Thinlays as a PM Treatment	Terracon	49,918	10,329	21%	
	1036343 WO#3 TPF15466L	Flooded Pavements Assessment App–Phase 2	UNH	200,234	10,769	5%	
	TPF15466R 1048488	Recycled Binder Availability	RFP later in Fall 2022	200,000		Hold	200,000
	TPF15466S TBD MnIT	InfoPAVE MnROAD Database Support and Development	i-Engineering	300,000		0%	
			Totals =	**4,771,106**	**545,866**	**11.4%**	**1,578,894**