

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

Lead Agency: Minnesota Department of Transportation

Transportation Pooled Fund Program Project # TPF-5(341) http://www.pooledfund.org/Details/Study/590 TPF-5(466) https://pooledfund.org/Details/Study/693		Report Period: Quarter 1 and 2 (January 1 – June 30,2021)
Project Title: National Road Research Alliance – NRRRA http://www.dot.state.mn.us/mnroad/nrra/index.html NRRRA 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 NRRRA 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.		
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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 NRRRA Executive Committee till 2021)

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
\$4,850,000	SPR Funding Budgeted \$4,823,303 (99%) Funds Remaining = \$26,697	Complete as of Feb 22, 2021 Some contracts continue because they were started near the end of phase-I

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
\$4,788,000	SPR Funding Budgeted \$4,700,000 (98%) Funds Remaining = \$88,000	Feb 22, 2021 Time = 4/60 months (7%) SPR Encumbered = \$987,996 (21%)

Project Description:

This pooled fund 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 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 NRRRA 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 – 50% of the 4/8 projects complete
- 2019 Long Term Research – 8% of the 1/11 projects complete
- 2019 Call for Innovation Research – 0% of the 0/5 projects complete
- 2020 Call for Innovation Research – 0% of the 0/7 projects complete

Phase-2 Projects

- 2021 Long Term Research – 0% of the 0/13 projects complete

General

- NRRRA 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.
- Executive Committee meetings (See team page)
 - Two meeting held this quarter and one expected in the next quarter to help establish Phase-II efforts in February 2021.
 - Call for Construction sent out and ideas are being submitted – one formal idea so far and other potential ideas – Construction in 2022
- Monthly Research pays off webinars have been completed and a plan for end of 2021 topics are developed.
- Budget sheet is attached at the end of this report.
- See the NRRRA website for details on all the teams' activities.

Anticipated work next quarter:

The following is expected to be completed for next quarter.

- RFPs will be finalized and sent out for proposals.
- Technical teams TAPS developing construction designs, layers, sensor requirements, and ICT related construction activities to include in the 2022 MnROAD construction.
- Development of partnerships with FHWA for veta and carboncure related research efforts.
- Development of partnerships with Missouri and the funding received for reflective cracking challenge.
- Contact member states and their pooled fund dollar commitments
- Continued work on Phase-I pooled fund efforts and reporting in the team meetings.
- Executive committee meeting may be planned to review budget and membership roles.

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 and at 65+ 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 \$4 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 - NRRRA Budget Summary (July 20, 2021)

NRRRA Phase-1

TPF-5(341) National Road Research Alliance - NRRRA 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	500,000
IA	Obligation					150,000		150,000
	Payment					150,000		150,000
IL	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
MI	Obligation	150,000	150,000	150,000			300,000	750,000
	Payment	150,000	150,000	150,000			300,000	450,000
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	450,000	4,850,000
	Payment	750,000	900,000	800,000	825,000	1,125,000	450,000	4,850,000

Funding Summary - July 2021

NRRA Phase-2

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

Funding income now active

Current		2021	2022	2023	2024	2025	2026	Total
CA	Obligation							-
	Payment							-
IA	Obligation							-
	Payment							-
IL	Obligation		150,000	150,000	150,000	150,000	150,000	750,000
	Payment							-
MI	Obligation	150,000	150,000	150,000	150,000	150,000		750,000
	Payment	150,000						150,000
MN	Obligation	150,000	150,000	150,000	150,000	150,000		750,000
	Payment	150,000						150,000
MO*	Obligation	550,000	150,000	150,000	150,000	150,000		1,150,000
	Payment	550,000						550,000
MS	Obligation	75,000	75,000	75,000	75,000	75,000		375,000
	Payment							-
ND	Obligation	75,000	75,000	75,000	75,000	75,000		375,000
	Payment	75,000						75,000
WI	Obligation	150,000						150,000
	Payment	150,000						150,000
FHWA**	Obligation	488,000						488,000
	Payment	488,000						488,000
Illinois Tollway	Obligation							-
	Payment							-
Totals	Obligation	1,638,000	750,000	750,000	750,000	750,000	150,000	4,788,000
	Payment	1,563,000	-	-	-	-	-	1,563,000

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

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

Funding Summary - July 2021

Attachment B - NRRRA Budget Summary (October 22, 2020)

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

NRRRA Phase-1

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

For 2020 - quarter 4 report - updated 1/22/2020

Funding Group	Description	Funding Totals	SPR Remaining
States (SPR)	SPR - Pooled Funds (9 agencies) - Pooled Fund + Wisconsin 150K + 150K Tollway	\$ 4,850,000	Percent \$ 26,697
	Total SPR Encumbered =	\$ 4,823,303	99%
	Paid Invoices =	\$ 3,041,151	63%
Additional State Funding (Not NRRRA SPR Dollars)	MnDOT Construction Funding for 2017 MnROAD Construction	\$ 3,132,681	
	Missouri DOT funding of the roller compacted PCC construction and research effort	\$ 275,000	
	NRRRA Associate funding not included in this budget	Not in this report	
Total Spending (SPR and Other)		\$ 8,257,681	

Spending Details SPR Dollars Budget/Spending

NRRRA Focus Areas	Effort Type	Item (Letter.#)	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	150,555	150,555	100%
	Purchase	T1.1	TPF15341	Agency travel / meals / meeting room costs (assume no more travel in 2020)	MNDOT PO	33,108	33,108	100%
Contract	T1.2	Communication (Written, Newsletter, video, Website) - MnDOT will not charge		Not Done				
Tech Transfer (T)	Contract	T1.3.1	TPF15341	Tack Coats	2016 State of Practice (SRF) top two topics from each team established in 2016	95,626	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 - NRRRA 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	R.1.1	TPF15341	2017 MnROAD Construction Sensor Purchases	MnDOT PO	159,130	184,672	100%	
				2018 CCP Missouri Sensor Purchases - broken off the 60K available		25,542			
	Labor	R.1.3	TPF15341C	Inspection (MnDOT) - costs over the initial budget	MnDOT	100,021	100,021	100%	
	MnROAD Labor	R.1.4	TPF15341D		MnROAD Staff - Construction, Sensors and Performance Monitoring	MnDOT	279,318	734,879	100%
					MnDOT approved operating funds for any additional costs - 120K approved by EC - MnDOT fund from Dec 17 budget report				
		R.2.4			Approved \$120K extra funding for monitoring 2018				
		R.3.4			Approved \$200K extra funding for monitoring 2019				
		R.4.4			Approved \$200K extra funding for monitoring 2020				
		R.1.8			Missouri Sensor Labor Costs for 2018 installs - CCP - broken off the 60K available		26,000		
	Contract	R.1.5	TPF15341		PCC Sampling/Testing	AET Consultant	20,000	61,514	100%
		R.2.5			Additional Funding Approved (low initial estimate)				
	Contract	R.1.6			HMA Performance Testing (75K original Estimate - will not use in Phase-I)	Not Done			
	Contract	R.1.7	TPF15341		Partial Depth Repairs Construction (not in construction contract)	Diamond	40,000	78,662	100%
		R.2.7			Additional Funding Approved	Surfacing	38,662		
	MnDOT Agreement	R.1.8			Compacted Concrete Pavement Construction (not in construction) - \$50K original	Missouri DOT Hired University			
	Contract	R.1.9			Diamond Grinding Construction (not in construction contract) - \$50K	Not Done			
	2017 Long Term Projects	R.1.10	TPF15341		HMA Overlay and Rehab of Concrete and Methods of Enhancing Compaction	UNH	169,970	151,424	89%
		R.1.11			Cold Central Plant Recycling	AET Consultant	99,997	99,997	100%
		R.1.12			Fiber Reinforced Concrete Pavements	UMD	149,999	72,680	48%
		R.1.13			Long Term Effects of Diamond Grinding - \$75k	Not Done			
		R.1.14			Concrete Early Opening Strength to Traffic	UofPitt	149,999	34,770	23%
		R.1.15			Optimizing the Concrete Mix Components for Contractors	Iowa State	147,627	147,627	100%
		R.1.16			Compacted Concrete Pavements for Local Streets - \$80K - Did do in Missouri	Not Done			
		R.1.17			Recycled Aggregates in Aggregate Base and Larger Subbase Materials	Iowa State	225,000	212,796	95%
		R.1.18			Maintaining Poor Pavements	SRF	28,725	28,725	100%
		R.1.19			Partial Depth Repair	Braun Inertec	74,978	74,925	100%
	2019 Long Term Research	R.1.21	TPF15341		HMA - Asphalt Mix Rejuvenator Test Sections (added 50K in April 2020)	UNH	148,981	9,030	6%
		R.1.22			PM - Spray on Rejuvenator Test Sections	NCAT	100,000		0%
		R.1.23			ICT - Levels 3-4 Intelligent Compaction Measurement Values (ICMV) for Soils Subgrade/Aggregate Subbase Compaction	Transtec Group	162,024	2,545	2%
		R.1.24			ICT - Support Importing, Viewing and Analysis of Dielectric Constant Data in Veta (paid by Veta pooled fund)	Transtec Group	-	-	
		R.1.25			ICT - HD and VHD Seismic Approaches for Roadway Evaluation	Park Consulting	299,886	228,143	76%
		R.1.26			Geo - Mechanistic Load Restriction Decision Platform for Pavement Systems Prone to Moisture Variations	UNH	90,231	81,031	90%
R.1.27		Geo - Environmental Impacts on the Performance of Pavement Foundation			Michigan State	35,000	15,000	43%	
R.1.28		Geo - Permeability of Base Aggregate and Sand				30,000	24,000	80%	
R.1.29		Geo - Improve material inputs into mechanistic design properties for reclaimed HMA Roadways				30,000	30,000	100%	
R.1.30		PCC - Construction Report for Jointless FRC Roundabout in Minnesota			Iowa State	49,999	30,076	60%	
R.1.31		PCC - Incorporate Joint Faulting Model into BCOA-ME			Contracting Uof Pittsburg	24,999	9,040	36%	
R.1.32	PCC - Engineered Dowel and Tie Bars combined with LTPP SPS-2 Determination of Causes for Cracking Over Dowel Bars	ERES Consulting	101,083	53,510	53%				
2019 Call for Innovation	R.1.33	TPF15341		Blending of Higher Strength Aggregates with Recycled Concrete and Marginal Aggregates to Improve Concrete Properties	Contracting - UofSt Thomas	32,332		0%	
	R.1.34			Performance of Concrete Overlays over Full Depth Reclamation (FDR)	ARM	34,265	1,680	5%	
	R.1.35			Bio-material Maintenance Treatments	Iowa State	50,000	4,000	8%	
	R.1.36			Innovative Practical Approach To Assessing Bitumen Compatibility As A Means Of Material Specification	Cargill	204,119	54,955	27%	
	R.1.37			Cold Asphalt Recycling Technologies using Rejuvenating Asphalt Emulsion: Impact; Implementation; Specification	UNH	141,442	64,316	45%	
Contract	R.1.38			Support Contract for T1.3.1 (SRF) Repair of Joint Associated Distress Pavements	Iowa State	4,972	4,972	100%	
2020 Call for Innovation	R.1.39			Pavement-Specific Structural Synthetic Fibers	UMD	99,792		0%	
	R.1.40			Understanding and Improving Pavement Milling Operations	University of New Hampshire	100,000		0%	
	R.1.41			Novel Methods for Adding Rejuvenators in Asphalt Mixtures with High Recycled Binder Ratios	NCAT	80,000	15,000	19%	
	R.1.42			Impact of Polymer Modification on IDEAL-CT and I-FIT for Balanced Mix Design	NCAT	100,000	15,000	15%	
	R.1.43			Asphalt Real Time Smoothness (ARTS) for Asphalt Paving	Transtec Group	104,021	2,638	3%	
	R.1.44			Enhanced Entrained Air Void System Characterization for Durable Highway Concrete	TSU	100,000	10,349	10%	
	R.1.45			Continuous Moisture Measurement during Pavement Foundation Construction	UTEP	100,000	9,121	9%	
	Totals =						4,823,303	3,041,151	63.1%

NRRRA Phase-2							
TPF-5(466) National Road Research Alliance - NRRRA Pooled fund							
For 2020 - quarter 4 report - updated 7/20/2021							
Funding Group				Funding Totals	Percent off		
States (SPR)	SPR - Pooled Funds with Illinois Tollway (Expected) =			\$ 4,788,000			
	SPR - Pooled Funds with Illinois Tollway (Received) =			\$ 1,563,000	33%	Remaining	
	SPR Budgeted =			\$ 4,700,000	98%	88,000	
	SPR Encombered =			\$ 987,996	21%	3,800,004	
	SPR Invoiced (spent) =			\$ -	0%		
MnDOT	MnDOT Constrction Funding for 2022 MnROAD Construction (budgeted) =			\$ 4,000,000			
State Funds	NRRRA Associate funding (not included in this budget but used for NRRRA needs)						
Grand Total	Total Spending (SPR and Other) =			\$ 8,788,000			
SPR Dollars Budget/Spending							
NRRA Focus	Project# Contract#	General Outcome / Deliverable	Vendors	SPR Budget	SPR Encumbered	Payments Invoiced	Payment Percent
Agency Travel	TPF15466A	Agency travel / meals / meeting room costs	MnDOT	50,000			
Sensors and Purchasing	TPF15466B	MnROAD Sensors and Equipment needed for 2022 studies		350,000			
		FHWA funding for Sensors for Carbon Cure Concrete		0			
MnROAD Labor	TPF15466C	MnROAD Staff - Construction, Sensors and Performance Monitoring (5 years)	MnDOT	800,000			
2021 ICT Funding	BUDGET	2021 Directed ICT funding \$1,375,000 from Executive Team - Remaining to be used		387,004			
	TPF15466D 1047755	Veta Web and Veta MDMS Standardized Platform (FHWA \$188K)	Transtec Group	987,996	987,996	-	0%
2021 General Team Funding	BUDGET	2021 Directed funding \$2,125,000 from Executive Team - Remaining to be used in additiion to Missouri 400K		\$ 75,000			
	TPF15466E 1048189	MnROAD Reflective Cracking Challenge (NRRRA)	RFP	225,000			
	TBD	Reflective Cracking Challenge Corrdination (Missouri - 400K)	TBD	TBD			
	TPF15466F 1048190	Use of Alternative Pozzolanic Materials Towards Reducing Cement Content in Concrete Pavements	RFP	175,000			
	TPF15466G 1048191	Use of Carbon Dioxide for Sustainable and Resilient Concrete Pavements (400K FHWA along with constricton, sensors, monitoring)	RFP	150,000			
	TPF15466H 1048192	The Use of Alternative Cementitious Materials in Concrete Pavements	RFP	150,000			
	TPF15466J 1048193	Performance Evaluation of Wicking Geotextiles for Improving Drainage and Stiffness of Road Foundation	RFP	150,000			
	TBD	Validation of Loose Mix Aging Procedures for Cracking Resistance Evaluation in Balanced Mix Design	RFP	100,000			
	TBD	Perpetual Pavements in Wet Freeze Climate	RFP	200,000			
	TBD	Reclamation and Recycling Techniques to Achieve Perpetual Pavements Characteristics	RFP	150,000			
	TBD	Thinlays as a PM Treatment	Terracon	50,000			
	TBD	Flooded Pavements Assessment App-Phase 2	UNH	200,000			
	TBD	Recycled Binder Availability	RFP (2022)	200,000			
	TBD	InfoPAVE MnROAD Database Support and Development	i-Engineering	300,000			
				Totals =	4,700,000	987,996	- 0.0%
Non-SPR Dollars Budget/Spending (MnDOT 4 million Construction Funding)							
Effort	Project Charge #	General Outcome / Deliverable	Vendors	MnDOT Budget	MnDOT Encumbered	Payments Invoiced	Payment Percent
2022 Construction Effort	TBD	Construction Contract	Feb 22 Letting	3,495,000			
		Construction Technical Expert Guidance on PCC Mixes	NCE	100,000			
		Construction - Sampling and Testing PCC	AET	80,000			
		Construction Environmental Impacts Study (EPD and model verifcaiton)	RFP (2022)	150,000			
		Constricton Geotechnical Investigations	TBD	50,000			
		Consultant Plan Set Development	Bolton M	75,000			
		D3 Construction Inspection costs - Labor	MnDOT	50,000			
				4,000,000	-	-	

Attachment C – NRRRA Project Listing (Part 1 or 2)

- Will attach listing with next quarterly report - BJW