TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): _Federal Highway Administration_(FHWA)_____

INSTRUCTIONS:
Project Managers and/or research project investigators should complete a quarterly progress report for each calendar quarter during which the projects are active. Please provide a project schedule status of the research activities tied to each task that is defined in the proposal; a percentage completion of each task; a concise discussion (2 or 3 sentences) of the current status, including accomplishments and problems encountered, if any. List all tasks, even if no work was done during this period.

Transportation Pooled Fund Program Project #TPF-5(478) **Note:** Obligation transactions must be completed prior to the project end date.	**Transportation Pooled Fund Program - Report Period:** ☐Quarter 1 (January 1 – March 31) ☐Quarter 2 (April 1 – June 30) ☒Quarter 3 (July 1 – September 30) [2023] ☐Quarter 4 (October 1 – December 31)

Project Title:

Accelerated Implementation and Deployment of Pavement Technologies (AIDPT) Pooled Fund

Pooled Fund Study Description:

Background:

Since 2013, FHWA's Accelerated Implementation and Deployment of Pavement Technologies (AIDPT) Program, in partnership with State Departments of Transportation (DOTs), academia and industry, has identified asphalt and concrete paving advancements and seek to implement effective strategies for rapid deployment of new and promising technologies. Through the leveraging of Federal investments with State DOT partnerships, the AIDPT Pooled Fund study aims to advance deployment of engineering design criteria and specifications for new and efficient practices, products, and materials that support processes of importance to FHWA and State DOT partners.

The AIDPT Pooled Fund Study is an opportunity for participating states to advance deployment of the innovative technologies in interest areas including, but not limited to, Balanced Mix Design (BMD) for asphalt, performance engineered mixture (PEM) for concrete, pavement preservation, sustainability, resiliency or any other pavement management strategy that improves decision-making processes, technical frameworks, education efforts, and stakeholder engagement.

As this pooled fund is designed, FHWA collaborates with each DOT to define the parameters of each state pavement technology project. The above-mentioned topics were identified in the initial solicitation; however, as noted, other topics are considered when proposed by participating DOTs. The study provides up to $250,000, up to 100 hours of technical assistance, and resources for developing case study reports and videos for each selected pavement technology project. Additionally, FHWA plans to host a website for publishing case studies and other relevant project documents, as well as peer exchanges for showcasing lessons learned and best practices from the projects. Each state DOT is expected to participate in pooled fund meeting opportunities and actively collaborate with other states and FHWA to advance these initiatives. The state DOT will complete a report documenting the initiative and outcomes of selected state DOT accelerated pavement technologies projects.

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Lead Agency contact: LaToya Johnson & Gina Ahlstrom	**Other Project ID (i.e., contract #** N/A	**Project Start Date:** September 30, 2021
Original Project End Date: October 30, 2026	**Current Project End Date:** October 30, 2026	**Number of Extensions:** N/A

Project schedule status:

☒On schedule ☐ On revised schedule ☐ Ahead of schedule ☐ Behind schedule

Overall Study Funding:

Table 1: Funding Commitments by Agency

Agency	**Commitments**					
	2021	**2022**	**2023**	**2024**	**2025**	**2026**
FHWA	**$1,504,000.00**	**$1,000,000.00**	$_____	$_____	$_____	$_____
AL		$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00
AZ		$10,000.00	$10,000.00	$10,000.00	$10,000.00	
CA				$40,000.00		
CO		$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00
CT			$10,000.00	$10,000.00	$10,000.00	
GA	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	

HI	$10,000.00		$10,000.00	$10,000.00	$10,000.00	$10,000.00
ID	$50,000.00					
IL		$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00
IA		$50,000.00				
LA		$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00
ME				$10,000.00	$10,000.00	$10,000.00
MS	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00
MO	$60,000.00					
NY			$20,000.00	$10,000.00	$10,000.00	$10,000.00
ND		$10,000.00	$10,000.00	$10,000.00	$10,000.00	
OK		$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00
OR				$10,000.00	$20,000.00	$20,000.00
PA	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	
TN				$16,666.00	$16,666.00	$16,666.00
TX	$10,000.00	$10,000.00	$10,000.00	$10,000.00	$10,000.00	
VT			$10,000.00	$10,000.00	$10,000.00	$10,000.00
WI	$10,000.00	$10,000.00	$20,000.00			
Totals:	**$170,000.00**	**$210,000.00**	**$180,000.00**	$150,000.00	$150,000.00	$100,000.00

Table 2: Project Proposals by Agency

Agency		**Project Proposals**	**Project Topics**		**Allocations**		
				2021	**2022**	**2023**	**2024**
1	AL	Finalized – Funding allocated (returned)	Asphalt - Balance Mix Design		$250,000	($250,000)	
2	AZ	Finalized – Funding allocated	Resilience	$200,000	$50,000		
3	CA	Not Submitted yet	To be determined				
4	CO	Finalized – Funding allocated	Sustainability	$250,000			
5	CT	Finalized – Funding allocated	Asphalt - Balance Mix Design			$250,000	
6	GA	Submitted – Not active (to be removed)	Preservation				
7	HI	Finalized – Funding not yet allocated	Asphalt - Balance Mix Design				
8	ID	Not Submitted yet	To be determined				
9	IL	Finalized – Funding not requested	Performance				
10	IA	Finalized – Funding allocated	Foundations		$250,000		
11	LA	Finalized – Funding not yet allocated	Asphalt - Balance Mix Design				
12	ME	Finalized – Funding not yet allocated	Asphalt - Balance Mix Design				
13	MS	Not Submitted yet	To be determined				
14	MO	Finalized – Funding not yet allocated	Asphalt - Balance Mix Design			$250.000	
15	NY	Finalized – Funding allocated	Asphalt – performance tests			$136,000	
16	ND	Finalized – Funding transferred	Asphalt - Balance Mix Design			$350,000	
17	OK	Not Submitted yet	To be determined				
18	OR	Finalized – Funding not yet allocated	Asphalt - Balance Mix Design				
19	PA	Not Submitted yet	To be determined				
20	TX	Finalized – Funding allocated	Asphalt - Balance Mix Design		$250,000		
21	VT	Finalized – Funding not yet allocated	Asphalt - Balance Mix Design				
22	WI	Finalized – Funding not yet allocated	Asphalt - Balance Mix Design				
	Totals:			$450,000	$800,000	$286,000	

Note: Pooled fund study project funding is sent to participating agencies via allocation memos. Allocation memos are sent to the DOT once project proposals have been submitted and finalized. Project proposals are typically in one of the following statuses: Not Submitted yet, Submitted-In review, Finalized – Funding not yet allocated, Finalized – Funding allocated. Additional project information is included in this report for agencies that have finalized project proposals and receive funding allocations, as provided with the project summaries included.

Table 3: Funding Transfers by Agency

Agency		Transfers			
		2021	**2022**	**2023**	**2024**
1	AL		$50,000		
2	AZ		$10,000	$10,000	
3	CA			$10,000	
4	CO		$10,000	$10,000	
5	CT			$10,000	$10,000
6	GA	$10,000	$10,000	$10,000	
7	HI	$10,000		$10,000	
8	ID	$50,000			
9	IL		$10,000	$10,000	
10	IA		$50,000		
11	LA				
12	ME			$10,000	
13	MS	$10,000	$10,000	$10,000	
14	MO	$60,000			
15	NY			$30,000	
16	ND		$10,000	$10,000	$10,000
17	OK		$20,000		
18	OR				
19	PA	$10,000	$10,000	$10,000	
20	TX	$10,000	$10,000	$10,000	
21	VT			$20,000	
22	WI	$10,000	$10,000	$20,000	
	Totals:	**$170,000**	**$210,000**	**$190,000**	**$20,000**

State Project Updates

Alabama: Alabama Department of Transportation (ALDOT)

Title: ***Balanced Mixture Design Pilot and Field Sections, Long term field evaluation of BMD test sections for benchmarking and determination of performance testing variability during production***

Progress this Quarter:

- Mix Designs are completed and approved.
- Construction has begun on the project, but not the test sections.

Project Highlights:

- Constructing the project and testing the mixes is the next step.

Key Project Milestones:

- Completed a revised project proposal based on collaboration with National Center for Asphalt Technology (NCAT) – May 2023
- Project letting – November 2023
- Construction test sections – Mid 2024
- Preliminary field performance measurements – Spring/summer 2025
- Long term field performance measurements – 2026 and beyond

- Constructing the project and testing the mixes is the next step.

Anticipated work next quarter:

- Construction of test section will begin and complete in Q2 2024

Significant Results:

There are no results to report currently.

Potential Implementation:

We do not have sufficient information for this.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project This Quarter**		**Percentage of Work Completed to Date**	
AL:	$250,000.00		Original budget: $250,000.00		(TBD for Q4)	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended**		**Total Percentage of Time Used to Date**	
$0.00			(TBD for Q4)		$0%	
Allocations:	2021	2022	2023	2024	2025	2026

Circumstance affecting project or budget: Weather may delay construction slightly

Arizona: Arizona Department of Transportation (ADOT)

Project #1: Resilience: Pavement Performance and Climate Data Analysis

Project Highlights:

- Resilience: Pavement Performance and Climate Data Analysis
- It is anticipated that the effort would measurably advance FHWA / State DOT state of the practice and tools testing as it relates to linking climate models, climate data, pavement, materials, and sustainability and resilience for weather and natural hazard risk.
- Two of the six case studies have begun. Delay in adding an AZ-located pavement design firm to the contract is still underway so field visits and the final four case studies can be identified and begin early in 2024.

Key Project Milestones:

- The appropriate temporal stretching algorithm for using GCMs in pavement analysis were identified.
- The representative GCMs from both the LOCA and BCCAv2 downscaled ensembles were identified for the State of Arizona.
- Further scoping for final candidate case studies has been done. AZ based engineering firm has begun collecting as-builts.

Progress this Quarter:

- Temporal stretching methods were evaluated for accuracy in matching observed hourly temperature patterns and ultimately the Modified-Imposed Offset Morphing Method (M-IOMM) was chosen as the method to convert GCM data to climate input files for pavement performance modeling.
- Arizona was divided into four climate zones based on effective rutting temperature evaluation using baseline and future climate models. [Zone 1: $T_{eff,rut} \leq 26.6°C$; Zone 2: $26.6°C < T_{eff,rut} \leq 28.6°C$; Zone 3: $28.6°C < T_{eff,rut}$ value $\leq 31.8°C$; Zone 4: $31.8°C < T_{eff,rut}$ value $\leq 36.0°C$]
- Two to three study sites were selected in each of the four climate zones (9 total candidate sites).
- Using Pavement ME, the complete LOCA and BCCAv2 ensembles with temporal stretching algorithm applied to climate input files, the team has identified the represented GCMs for analysis with Pavement ME.
- The team identified a potential issue with the SWCC coefficients from NCHRP 9-23B that manifest in unusual trends in fatigue cracking with thin pavements and is further investigating this topic.

Anticipated work next quarter:

- Developing the Pavement ME File Creator to allow engineers to directly consider climate models in their predictions.
- Sort through pavement corridor case study candidates and acquire historical as-builts for identified pavement sections.
- Finalize analysis to examine the impact of heat waves and wildfires on pavement performance at select sites.

Significant Results:

- The M-IOMM temporal stretching method for both precipitation and temperature have been selected.
- Representative models have been identified from LOCA and BCCA ensembles; LOCA_hot = GFDL-CM3, LOCA_median=HadGEM2-CC, LOCA_cold=MRI-CGCM3, BCCAv2_hot=MIROC-ESM, BCCAv2_median=CNRM-CM5, and BCCAv2_cold=MRI-CGCM3.

Potential Implementation:

- Downscaled data has been sorted and stored in portable hard drives along with state-wide *.hcd (pavement ME climate input files) for the representative models.
- Pavement engineers can use these climate files within Pavement ME currently, but will need to manually replace the climate files in the appropriate folder. The Pavement ME File creator will allow them to do this more easily.
- Final outputs will develop draft design guidance and ‘how to’ videos on linking climate data and pavement design decision making.
- Future heat and precipitation (2100) analysis will contribute to drafting pavement design specifications.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
AZ:	$250,000.00		Original budget: $300,000.00		15% money	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended**		**Total Percentage of Time Used to Date**	
$100,000.00 [40%]			$45,000.00		55%	
Allocations:	2021	2022	2023	2024	2025	2026
	$200,000.00	$50,000.00				

Circumstance affecting project or budget: None reported for Quarter 1.

Project #2: Arizona Roadway Wildfire Management Decision Support

Subject Matter: Vulnerability of Arizona roadways to wildfire and post-fire debris flow

Project Highlights:

Key Project Milestones:

- Task 1A: Fire and post-fire debris flow risk
- Task 1B: Vulnerability Assessment
- Task 2A: Review of existing watershed restoration studies and efforts in the Southwest
- Task 2B: Development of a resilience-based decision support framework

Progress this Quarter:

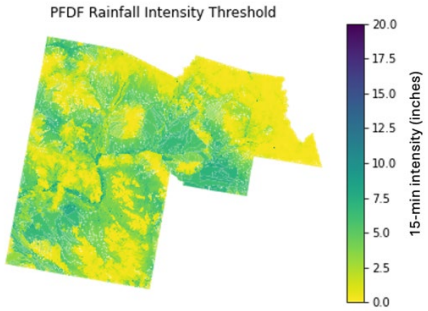
- Task 1A is in progress. We have reviewed the literature and spoken with experts to identify the appropriate post-fire debris flow model to use for our analysis. We plan to use the M3 model from Staley et al 2017. We have also collected data for key parameters, and are in the process of setting up the model and data to run various scenarios.
- Task 1B is also in progress. We have completed betweenness centrality calculations for a subset of the roadways.

Anticipated work next quarter:

- In the next quarter we plan to continue work on Task 1A and Task 1B. As part of Task 1A, We will finalize the post-fire debris flow model development, allowing us to estimate debris flow probabilities on each roadway in the network.
- As part of Task 1B we will calculate betweenness centrality for the entire road network, and process additional data layers to characterize traffic and communities served by roadways.

Significant Results:

- Significant results thus far include a preliminary run of the debris-flow model for a single county to get rainfall thresholds required to cause a debris flow (see figure below).



Potential Implementation:

- Agency and District high priority roadway and pavement locations
- Import decision tool and pavement design decision making

Quarterly Project Statistics:

State	Total Project Budget		Total Cost to Date for Project		Percentage of Work Completed to Date	
AZ:	$200,000.00		$25,000.00			
Total Project Expenses and Percentage This Quarter			Total Amount of Funds Expended		Total Percentage of Time Used to Date	
					15%	
Allocations:	2021	2022	2023	2024	2025	2026
	$200,000.00	$50,000.00				

Circumstance affecting project or budget: None reported for Quarter 1.

Connecticut: Connecticut Department of Transportation (CTDOT)

Project Highlights:

- Performance Test.
- Testing equipment Procurement.
- Training and Round robin testing.
- Shadow projects.
- Specification Development
- Initial Implementation (pilot project)

Anticipated work next quarter:

- MOU CAP Lab in progress

Significant Results:

- In this quarter, only round robing testing. Testing and data collection will continue.

Potential Implementation:

- Shadow projects 2024-2025
- First Pilot project targeted for 2026

Quarterly Project Statistics:

State	Total Project Budget		Total Cost to Date for Project		Percentage of Work Completed to Date	
CT:	$312,500.00		$115,319.00			
Total Project Expenses and Percentage This Quarter			Total Amount of Funds Expended		Total Percentage of Time Used to Date	
					37%	
Allocations:	2021	2022	2023	2024	2025	2026

Colorado: Colorado Department of Transportation (CDOT)

Progress this Quarter:

- Began work on benchmarking analysis of data in an effort to set future GWP thresholds
- Met with NAPA to discuss benchmarking methodology proposed by NAPA for regional/national benchmarks.
- Scheduling meetings with Concrete/Asphalt industry to review proposed benchmarking methodology and draft GWP limits

Project Highlights:

- Benchmarking Transportation Sector Green House Gas (GHG) Emissions, EPDs
- Colorado HB 21-1303 "Buy Clean Colorado Act" directs the Office of State Architecture and Colorado Department of Transportation (CDOT) to establish policies that reduce greenhouse gas emissions over time by accounting for and limiting the global warming potential (GWP) of key construction materials in state-funded building and transportation projects.

- The Office of the State Architect is responsible for Section 117 of the bill, which covers building construction, and CDOT is responsible for Section 118 of the bill, which covers transportation infrastructure that includes road, highway, and bridge construction. The eligible construction materials listed under Section 118 of the bill are asphalt and asphalt mixtures, cement and concrete mixtures, and steel.

- Milestone #1 - Specification in place to require EPD submittals by July 1, 2022 – met.
- Milestone #2 - Year 2 EPD submittal requirements for additional materials – met, incorporated requirements for EPD submittals for structural steel and precast concrete products.
    - Met with local asphalt binder supplier to discuss concerns with generating supply chain specific binder EPDs and how that information may be used/is intended to be used.
- Modified EPD support tool for project/Contractor usage to comply with Year 2 EPD Protocol Document/submittal requirements.
- Coordinated with the American Concrete Pipe Association, National Precast Concrete Association, and Prestress/precast concrete institute on status of EPD development for Colorado materials suppliers.
- Performed review of Steel PCR Committee A5 vs A3 debate/discussion

Anticipated work next quarter:

- Continue outreach to industries targeted for EPD data collection in Year 2/Year 3 of program (pre- cast concrete/steel). Colorado specific ACPA/NCPA Meeting date: December 15, 2022.
- November 14 meeting with UL on CDOT's Steel PCR comments
- Continue planning and discussion on how to address disengaged and unsupportive contractors.
- Prepare CDOT Annual EPD Report

Significant Results:

- Developed methodology for collecting, reviewing and cataloging GHG's emissions through Environmental Product Declarations for various construction materials used on CDOT projects, focusing on Concrete, Asphalt, and Steel materials. Specification approved through CDOT process and incorporated into eligible projects. EPD website developed and maintained at Specification and protocol document approved. https://www.codot.gov/business/designsupport/materials-and-geotechnical/epd.

Potential Implementation:

- Collection of EPDs on eligible construction materials continues. Next phase of the project will shift towards analyzing EPD data received, as well as other national EPD databases to begin developing a GWP threshold methodology and draft GWP limits to be inserted into future CDOT policy as required by Colorado HB 1303.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
CO:	$300,854.00 (Fed.$250,000.00)		$129,794.00		28.7% (money only)	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended**		**Total Percentage of Time Used to Date**	
$40,159.00			(TBD for Q4)		50%	
Allocations:	2021	2022	2023	2024	2025	2026
	$250,000.00					

Georgia: Georgia Department of Transportation (GADOT)

Project Highlights:

- Crack Mitigation/ Pavement Preservation Techniques **[*WITHDRAWN*]**
- The GDOT State Maintenance Office has determined that there is no immediate research needs for pavement preservation. Therefore, GDOT is withdrawing its previous research topic. The GDOT Office of Materials and Testing typically leads materials research. However, there are no immediate research needs and a new topic has not been identified.

Anticipated work next quarter:

- To Be Determined, based on Project Approval.

Significant Results:

N/A.

Potential Implementation:

N/A.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
GA:	N/A		N/A		N/A	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
N/A			N/A		N/A	
Allocations:	2021	2022	2023	2024	2025	2026

Circumstance affecting project or budget: GDOT determined that it would be best to withdraw the initial pavement preservation topic.

Idaho: Idaho Transportation Department (ITD)

Progress this Quarter:

Project Highlights:

- The Idaho Transportation Department (ITD) is still working to finalize a specific project focus. On April 7th, we submitted a proposal titled Integrating Construction and Materials Testing Data with Geospatial Locations for Development of a Construction and Materials Testing Database. ITD is waiting to hear back on the proposal.

Anticipated work next quarter:

- To Be Determined, based on Project Approval.

Significant Results:

N/A.

Potential Implementation:

N/A.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
ID:	TBD		TBD		TBD	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
TBD			TBD		TBD	
Allocations:	2021	2022	2023	2024	2025	2026

Circumstance affecting project or budget: N/A.

Illinois: Illinois Department of Transportation (IDOT)

Progress this Quarter:

Project Highlights:

- Profiler Comparison - Benchmark Profiler vs. the Urban Low Speed Profiler
- Repair/Upgrade profilers, setup track at ICART, complete testing at ICART, Analyze testing results; draft report on results, track setup, and conclusions finalized; create operators manuals for both benchmark and urban low speed profilers.
- IDOT does not report progress on the project scope of work this quarter. The primary progress is related to working final coordination to get the AIDPT project contract in place.
- Federal FY2023 commitment contribution transfer planned (to be sent to FHWA during FY2023 2nd quarter).

Anticipated work next quarter:

- When a contract is in place, work will begin on assessing the two pieces of equipment and beginning the pooled fund scope of work during the 2023 quarter 4.

Significant Results:

- None to date.

Potential Implementation:

- The urban low speed profiler will be utilized as a reference device or potentially a benchmark device at ICART if it is proven to meet the repeatability and accuracy results.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
IL:	$300,000 (Federal: $250,000.00)		$50,842.86		25%	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
$50,842.86 (17%)			$50,842.86		21%	
Allocations:	2021	2022	2023	2024	2025	2026

Circumstance affecting project or budget: The project has been delayed with the state funded work to make the equipment operational. However, the project is progressing towards completion.

Iowa: Iowa Department of Transportation (IowaDOT)

Project Highlights:

- Iowa DOT is in the first year of a 5-year plan to implement the technologies and field training that will allow for rapid measurement, real-time construction compaction monitoring, and modulus-based field control, as implemented on four Spring 2022 pavement construction/grading projects (FY 2022 – 4 to 5 projects). Currently deploying VIC monitoring, e-construction compaction reporting, and APLT modulus

measurement technology on two pilot projects currently under construction. The state supports performance-based specifications.

Anticipated work next quarter:

- Validated Intelligent Compaction (VIC) and Automated Plate Load Testing (APLT): Continue VIC monitoring deployment, e-construction compaction reporting, APLT modulus measurement technology on two pilot projects currently under construction and ten additional projects are anticipated for FY2023.

Significant Results:

- Utilized the Iowa DOT STIC and AID in-situ measurement projects to pilot two innovative technologies that previously were not used in the state of Iowa, which includes modulus-based measurements. Outcomes include model specifications, training materials, and workflow processes to assist agencies in developing a roadmap for modulus-based pavement foundation construction in their state.

Potential Implementation:

- The DOT is committed to moving foundation construction requirements from the current Method specification to performance-based requirements. The objective of this project will be to support the implementation of technologies on additional projects for performance-based specifications.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
IA:	TBD (Federal: $250,000.00)		(TBD for Q4)		(TBD for Q4)	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
(TBD for Q4)			(TBD for Q4)		(TBD for Q4)	
Allocations:	2021	2022	2023	2024	2025	2026
		$250,000.00				

Circumstance affecting project or budget: None reported for Quarter 2

Maine: Maine Department of Transportation (MEDOT)

Balanced Mix Design Implementation - Maine Department of Transportation. Deliver training and develop pilot projects and draft specifications to implement Balanced Mix Design. Submitted March 27, 2023

Progress this Quarter:

- Hosted FHWA BMD workshop Jan. 25&26, 2024 (including approx. 25 industry attendees.
- Worked with FHWA Division and HQ to determine status of funding. Received notification of allocation on 5/02/2024.
- Transferred 2024 DOT commitment of $10,000.00.

Highlights:

- Formed an internal BMD implementation team, a joint administrative task group, and a joint testing working group.
- Joined a northeast BMD working group (9 states).
- FHWA funding allocation completed.

Anticipated work next quarter:

- MaineDOT hosts FHWA BMD training workshop – November/December 2023. **Completed January 2024.**
- Develop draft BMD spec for pilot projects – winter 2023-24. **Delayed due to funding delay.**
- Industry training on BMD test methods – March/April 2024. **Discussed with industry. Delayed until fall 2024.**

Significant Results:

- Funding available so work on tasks can begin.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
ME:	$290,000.00		$20,000.00			
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
					30%	
Allocations:	2021	2022	2023	2024	2025	2026

Circumstance affecting project or budget: Delayed start due to funding allocation..

Missouri: Missouri Department of Transportation (MoDOT)

Title: Developing and Refining QA Testing Protocols for BMD Performance Testing
Subject Matter: Test method procedures for BMD testing
Submittal Date: March 2025

Progress this Quarter:

- 3 of the 7 load frames and water bathes have been purchased.
- BMD equipment training has been conducted for the 3 Districts that have received BMD equipment.

Highlights: Balanced Mixture Design (BMD)

1) Fall 2023/Winter 2024 - Purchase BMD equipment for 3 of the 7 MoDOT Districts and train those districts to use the equipment. Develop a QA testing protocol for sampling, handling, aging, and testing specimens for Ideal CT and Ideal RT.
2) July 1st 2024 - Purchase BMD equipment for the remaining 4 MoDOT Districts and train those districts to use the equipment.
3) Fall 2024 - Compare BMD test results between MoDOT Districts
4) Fall/Winter 2024 Analyze results and final report drafted
5) Winter 2025 – Integrate QA BMD Inspection Training for MoDOT Materials Inspectors

Anticipated work next quarter:

- Spring of 2024 – Develop QA testing protocol for sampling, handling, aging, and testing specimens for Ideal CT and Ideal RT.
- July 1st 2024 - MoDOT will order an additional 4 load frames and water bathes for the remaining Districts.

Significant Results:

- No results yet.

Potential Implementation:

- Districts will immediately start using the equipment for BMD pilot projects.
- A QA testing protocol will be developed for sampling, handling, aging, and testing specimens for Ideal CT and Ideal RT.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
MO:	$250,000		$42,251.10		45%	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
$42,251.10 (45%)			$25,000.00		8.5%	
Allocations:	2021	2022	2023	2024	2025	2026

Circumstance affecting project or budget: Current QA for intelligent compaction is not practical at this tim Therefore, intelligent compaction will not be a part of this project.

North Dakota: North Dakota Department of Transportation (NDDOT)

Project #1: Determining subgrade strength to improve sustainability & resilience in pavements.

Progress this Quarter:

- Hired a consultant and began testing for R-value and used the R-value to correlate to resilient modulus. Completed 9 R-value tests out of 100 budgeted.

Project Highlights:

- Hire a consultant to complete resilient modulus testing and provide training for staff: 2023.
- Sample material from projects and complete testing for resilient modulus: 2023 – 2025.
- Incorporate information into pavement designs starting in 2024.

Anticipated work next quarter:

- Plan to continue completing R-value testing in 2024. Our summer drilling will be starting early May, and we will be sending out R-value samples for testing as the material is processed through our lab.

Significant Results:

- We have found that the current resilient modulus values being used in design is less than the results of the R-value testing.

Potential Implementation:

- The outcome of the project is to obtain an accurate and reliable resilient modulus of the subgrade that will help ensure that future pavements are designed efficiently and sustainably.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
ND:	$400,000-Pooled Fund: $250,000.00		$0		5%	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
NCAT has not submitted 1st Invoice			$0		10%	
Allocations:	2021	2022	2023	2024	2025	2026
		$250,000				

Circumstance affecting project or budget: NCAT has started working on project but not billed to project yet.

Project #2: Benchmarking, Field Validation, Shadow Projects, Pilot Projects, Implementation.

Progress this Quarter:

BMD Validation Project was bid in February 2024 and awarded in March 2024. This project will be constructed in Summer 2024. Practice mix designs were developed and testing in the NDDOT Bituminous lab with favorable results.

Project Highlights:

- Hire a consultant to complete resilient modulus testing and provide training for staff: 2023.
- Sample material from projects and complete testing for resilient modulus: 2023 – 2025.
- Incorporate information into pavement designs starting in 2024.

Anticipated work next quarter:

- Constructing the BMD Validation project in 2024. Developing specifications for shadow projects in 2025.

Significant Results:

- BMD Benchmarking Results.

Potential Implementation:

- Using BMD performance tests in our mix design and construction process through specifications developed through this program.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
ND:	$350,000		$19,327			
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
			$0		35%	
Allocations:	2021	2022	2023	2024	2025	2026

New York: New York State Department of Transportation (NYSDOT)

Progress this Quarter:

- Began testing on PEM Asphalt Mix research samples Began testing on PEM Asphalt Mix research samples

Project Highlights:

- Hamburg and Mixer delivered and installed in lab. Research testing plan developed and started.

Anticipated work next quarter:

- Continued testing of 19 mm asphalt mixes to establish appropriate PEM mix design requirements

Significant Results:

- None – Preliminary testing has just begun.

Potential Implementation:

- Development for statewide PEM mix design requirements to be implemented in new specifications in development.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
NYS:	$170,000.00		$81,855.08			
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
			$0		5%	
Allocations:	2021	2022	2023	2024	2025	2026

Pennsylvania: Pennsylvania Department of Transportation (PennDOT)

Progress this Quarter:

Project Highlights:

- Implementation of Mastics at the Pennsylvania DOT
- The PennDOT determined the best area of pavement management program support to be using mastic materials for preservation activities that would evolve in developing statewide application specific specifications. The PennDOT State Transportation Innovation Council (STIC) was a source for supporting equipment acquisitions during the earlier phases of mastic material application. The AIDPT project component of the ongoing PennDOT efforts will include technical assistance and collaboration to determine the extent of mastic materials use.
- Research applications, new equipment, and specifications used by other states Summer 2023 Develop PennDOT draft specification Fall 2023 Finalize PennDOT specification Summer 2024.

Anticipated work next quarter:

- Continue to research other state Mastic Specifications, and start on a first draft for PA.

Significant Results:

- To date research has been started by PennDOT to look into current specifications for Mastic.

Potential Implementation:

- Research applications, new equipment, and specifications used by other states Summer 2023
- Develop PennDOT draft specification Fall 2023
- Finalize PennDOT specification Summer 2024.

Quarterly Project Statistics:

State	**Total Project Budget**		**Total Cost to Date for Project**		**Percentage of Work Completed to Date**	
PA:	0		0		10%	
Total Project Expenses and Percentage This Quarter			**Total Amount of Funds Expended This Quarter**		**Total Percentage of Time Used to Date**	
(TBD for Q4)			(TBD for Q4)		(TBD for Q4)	
Allocations:	2021	2022	2023	2024	2025	2026
	0	0	0			

Circumstance affecting project or budget: None reported for Quarter 2.

Texas: Texas Department of Transportation (TxDOT)

Documentation of Balanced Mix Design Performance in Texas - Comparison of BMD sections to control sections

2022

Progress this Quarter:

- Validation of Rutting (HWT, IDEAL-RT) and Cracking (OT, IDEAL-CT) tests & thresholds with field performance data from 7 of 9 TxDOT BMD field projects (27 sections) constructed 2019-2022
- Mix Design Support for 6 TxDOT BMD multi-day field projects (approximately 2 sections each)
- Construction and Characterization of 1 TxDOT BMD multi-day field project (2 sections for 3 days each)
- Validation of Rutting (HWT, IDEAL-RT) and Cracking (OT, IDEAL-CT) tests & thresholds with field performance data from WesTrack
- Collaboration with Montana DOT with respect

  to correlation of mixture performance tests

Project Highlights:

- Annual performance test validation through tie to field performance

Anticipated work next quarter:

- Completion of annual performance monitoring of 2 TxDOT BMD field projects (6 sections) constructed 2019-2022
- Construction and Characterization of 4-5 TxDOT BMD multi-day field projects (approximately 2 sections each)

Significant Results:

- Test validation and tie to field performance highlighted in Presentations & Papers
- Presentations completed at:
  - TxAPA Everyday Asphalt Podcast 9/23
  - TxDOT-Industry BMD Working Group 10/3/23
  - TX Transportation Short Course 10/11/23
  - Southeast Asphalt User Producer Group (SEAUPG) 11/16/23
  - FHWA Mega States Peer Exchange 12/7/23
  - TRB Annual Meeting 1/9/24, 1/9/24
  - TxAPA Member Meeting 1/17/24
  - TxDOT Construction, Materials, Alternative Delivery 3/27/24
- Paper published in: Transportation Research Record

Potential Implementation:

- Revision of TxDOT Special Specification 3074 (SS3074) with IDEAL-CT & IDEAL-RT and associated thresholds tied to field performance.

Quarterly Project Statistics:

State	Total Project Budget	Total Cost to Date for Project	Percentage of Work Completed to Date
TX:	$250,000.00	$9,710	(TBD)

Total Project Expenses and Percentage This Quarter			Total Amount of Funds Expended This Quarter		Total Percentage of Time Used to Date	
(TBD)			(TBD)		75%	
Allocations:	2021	2022	2023	2024	2025	2026
		$250,000.00				

Circumstance affecting project or budget: None reported.

NOTE: Other state project progress snapshots expected, as provided by a respective participating state representative for Quarterly reporting. The quarterly reporting time frames are after the defined quarters outlined on page 1.