

TRANSPORTATION POOLED FUND PROGRAM

QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): Indiana Department of Transportation

INSTRUCTIONS:

Lead Agency contacts 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(380)	Transportation Pooled Fund Program - Report Period: ☐ Quarter 1 (January 1 – March 31) ☒ Quarter 2 (April 1 – June 30) ☐ Quarter 3 (July 1 – September 30) ☐ Quarter 4 (October 1 – December 31)	
TPF Study Number and Title: TPF-5 (380): Autonomous Maintenance Technologies - Phase 2		
Lead Agency Contact: Michael Lane	Lead Agency Phone Number: 3174319478	Lead Agency E-Mail mlane1@indot.in.gov
Lead Agency Project ID: TPF-5 (380)	Other Project ID (i.e., contract #): Click or tap here to enter text.	Project Start Date: 7/1/2025
Original Project Start Date: 7/1/2025	Original Project End Date: 6/30/2029	If Extension has been requested, updated project End Date: Click or tap to enter a date.

Project schedule status:

☒ On schedule	☐ On revised schedule	☐ Ahead of schedule	☐ Behind schedule
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Overall Project Statistics:

Total Project Budget	Total Funds Expended This Quarter	Percentage of Work Completed to Date
\$1,252,000	\$0	15%

Project Description:

Background

Road maintenance activities are crucial for ensuring safe and efficient delivery of goods and people. Well-maintained roads not only extend their lifespan but also significantly reduce the risk of accidents and improve fuel efficiency. In recent years, with the development of vehicle automation, wireless communication, and robotic technologies, some road maintenance activities can be partially or fully replaced by machines, which bring significant benefits in improving road maintenance workers' safety and productivity and alleviating the growing workforce shortage in state DOTs.

The existing pooled fund project titled "Autonomous Maintenance Technology (AMT)" started in 2018 and the main focus so far has been the Autonomous Truck Mounted Attenuator (ATMA) technology. Current research in ATMA has led to broader interest in other AMTs such as autonomous cracking sealing, autonomous mowing, and autonomous snow plowing, among others. This motivates us to expand the scope of the current pooled fund project and develop a cooperative agreement to conduct further research on other available AMTs (including the ATMA) and their supported road maintenance activities. The Indiana DOT (INDOT) will serve as the lead state for the execution of the continuing pooled fund project. INDOT, through the Joint Transportation Research Program (JTRP) at Purdue University, will handle all administrative duties associated with the project. Purdue University will also serve as the lead research institution for the project.

Objectives

The overall objective of this study is to support and promote collaborative research efforts in the field of AMTs for road maintenance activities. Specific objectives include 1) Identify needed research priorities from participating state DOTs; 2) Provide a platform for technology, experience, and lessons learned exchange among participants; 3) Fund research related to AMT development, testing, evaluation, and deployment in various DOT maintenance activities; 4) Foster collaboration among state agencies, industry, and academia; and 5) Provide technical leadership in AMT to advance the state-of-the-art road maintenance practices. It is expected that this consortium will become a national leader in AMT-related research and applications.

Scope of Work

- The project will fund research and development efforts to achieve the program goals, with proposed initial research focusing on
- AMT Deployment Requirements: Identify the purpose, features, functionalities, and underlying technologies of each AMT and Investigate how the AMT is intended to be used in what road maintenance activities, and corresponding external conditions (e.g., road, traffic, weather, etc.).
- Human-AMT teaming: explore how the AMT interacts with DOT workers to what extent in road maintenance activities.
- Machine-machine teaming: explore how multiple AMTs can be operated together in terms of interoperability, safety, reliability, scalability, and cybersecurity.
- Cost-benefit analysis: analyze potential benefits and costs and build business cases for each technology.

Progress this Quarter

(includes meetings, work plan status, contract status, significant progress, etc.):

July 1 – Sept 30, 2025

The solicitation was approved by FHWA and the project started from July 1, 2025. Eleven states committed a total amount of \$1.123M, which include CA, CO, IL, IN (lead), KS, MI, MN, MO, MS, PADOT, TX. Projects under this pooled fund study will be funded incrementally by the Joint Transportation Research Program (JTRP) at Purdue University as funds from the participating states are transferred.

The team decided to have monthly meetings on the third Wednesday of each month from 2:30pm – 4:30pm EST. Three monthly meetings (July 16th, August 20th, and Sept 17th) have been conducted during this quarter via MS Teams. Participating state representatives, interested state representatives, and universities researchers attended the meeting. The main agenda discussed in the monthly meetings are:

1. Admin transition from Colorado DOT to Indiana DOT.
2. Year one timeline of call-for-proposal (September 2025: determination of target technologies; November 2025: solicitation release; January 2026: proposal response, discussion, and determination; Spring 2026: subcontracting and new project start)
3. Prioritized AMTs to investigate: A survey has been delivered to all member states to seek input on the agency's prioritized AMTs, and the AMTs that have the highest technology readiness level. Based on the inputs from all states, the team selects autonomous vegetation control (including both autonomous mowing and drone based spraying) and autonomous crack sealing/pothole patching as the AMTs to investigate in year one.

October 1 – December 31, 2025

In this quarter, North Dakota joined the pooled fund which makes the total committed fund of \$1.223M. The group had three monthly meetings (October 15, November 19, and December 17) via MS Teams. The main progress made in this quarter are:

1. The team decided top priority AMTs for the first year's research are: autonomous vegetation control including both drone-based herbicide and autonomous mowing, and autonomous crack sealing and pothole patching.
2. The team decided the call-for-proposal schedule for the first year with a total funding amount of \$200k and an expected start date of June 2026.
3. The 2026 AMT annual meeting will be hosted by INDOT and take place in West Lafayette, Indiana on August 4-5.
4. The solicitation for 2025-2026 CFP is released on December 12th with a deadline response date of January 16th, 2026

January 1 – March 31, 2026

In this quarter, the group had three monthly meetings (January 21, February 18, and March 18) via MS Teams. The main progress made in this quarter are:

1. Nine proposals were received from 5 different universities/companies. The group reviewed, discussed, and ranked all the proposals.
2. Five proposal teams from 4 institutes were invited to give a presentation to the group. The group provided feedback to the proposal teams.
3. A draft agenda of the annual meeting was made. Meeting items include project updates, state DOT experience of AMTs, closed business meeting, and field demos.
4. The group is considering establishing a subcommittee for the ATMA technology.

April 1 – June 30, 2026

In this quarter, the group had three monthly meetings (April 15, May 20, and June 17) via MS Teams. The main progress made in this quarter are:

1. Three projects were selected for the first-year funding. The three funded projects are:

ID	Project Title	Institute	PI	Area	Duration	Cost
1	Technology Integration of Drone-Based Herbicide Spraying for Automatic Roadside Vegetation Control	UIUC	Yanfeng Ouyang	Drone-based herbicide	12 months	\$70,000

2	Autonomous Pothole Patching and Crack Sealing: State-of-Practice Synthesis, DOT Needs Assessment, and Quality Assurance Framework	Purdue, Fort Wayne	Pan Panjehpour	Autonomous Crack Sealing	16 months	\$94,861
3	Decision-Support Synthesis of Autonomous Mowing Technologies for DOT Roadside Operations	Grand Farm	Nathan Marcotte	Autonomous mowing	12 months	\$61,050

Subcontracting of projects 2 and 3 are completed and the projects started from June 1st. Subcontracting of project 2 is still ongoing.

- An ATMA subcommittee was established. The subcommittee mainly has two tasks 1) looking into further funding opportunities for large scale ATMA deployment across states 2) an operator exchange group that ATMA operators from multiple states will discuss experiences of operating ATMA systems and lessons learned.
- The agenda of the annual meeting has been confirmed. The annual meeting will be held on August 4th and 5th in West Lafayette, Indiana. Representatives from member states, faculty members from three universities, and representatives from three AMT vendors will attend the meeting.

Anticipated work next quarter:

- Continue monthly meetings;
- Hold the annual meeting;
- Work on newly funded projects.

Significant Results:

None

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: