**TRANSPORTATION POOLED FUND PROGRAM QUARTERLY PROGRESS REPORT**

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

**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(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) |
| **Project Title:**Autonomous Maintenance Technology (AMT) Pool Fund |
| **Name of Project Manager(s):**David Reeves | **Phone Number:**303-757-9518 | **E-Mail**david.reeves@state.co.us |
| **Lead Agency Project ID:**WBS 22610.06.01 | **Other Project ID (i.e., contract #):** | **Project Start Date:**8/14/2018 |
| **Original Project End Date:**12/31/2024 | **Current Project End Date:**12/31/2024 | **Number of Extensions:**0 |

# Project schedule status:

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

Overall Project Statistics:

|  |  |  |
| --- | --- | --- |
| **Total Project Budget** | **Total Cost to Date for Project** | **Percentage of Work Completed to Date** |
| $441,569 (6 projects encumbered)$925,000 (transferred to CDOT)$483,431 (Available for future projects) |  $114,516 (amount invoiced to date) | 26% |

***Quarterly*** Project Statistics:

|  |  |  |
| --- | --- | --- |
| **Total Project Expenses and Percentage This Quarter** | **Total Amount of Funds Expended This Quarter** | **Total Percentage of Time Used to Date** |
| Ongoing Project (N/A) | Ongoing Project (N/A) | Ongoing Project (N/A) |

**Project Description**:

The Colorado Department of Transportation (CDOT) has helped to develop a first‐of‐its kind work zone vehicle designed to advance safety for roadway maintenance crews. Customarily positioned behind road construction crews in order to protect workers from the traveling public, the Autonomous Impact Protection Vehicle (AIPV) increases work zone safety by removing the driver from a truck that is actually designed to be hit. The objective of the Autonomous Maintenance Technology (AMT) Pool Fund is to develop, demonstrate and refine the AIPV in preparation for its wide‐spread deployment nationwide in DOT maintenance operations.

Currently there are six projects related to this pooled fund:

1. 5380-18-01 AMT Coordination (CSU) $71,700 - Dr. Tom Bradley (PI), Ann Batchelor (PM). Colorado State University (CSU). Provides administrative management and support of the pool fund. This includes travel for annual meetings.
2. 5380-19-02 Human AMV Interaction (CSU) $74,997 - Dr. Erika Miller (PI), CSU. Evaluating the Human‐Automated Maintenance Vehicle (AMV) for Improved Safety and Facilitating Long Term Trust
3. 5380-19-03 ATMA Dev Guide (MST) $92,572 - Dr. Xianbiao (XB) Hu (PI). Missouri University of Science and Technology (MST)
4. 5380-20-04 ATMA Tabletop $22,300 – Will Moorhead (PI), All Clear Emergency Management, Golden, Colorado
5. 5380-20-05 ATMA Cybersecurity Complement $50,000 – Dr. Jeremy Daily (PI), Colorado State University, Fort Collins.
6. 5380-20-06 ATMA Documentation $130,000 – Dr. Xianbiao (XB) Hu (PI), Missouri Tech University.

Each project has a separate quarterly progress report in the lead’s state desired format.

**Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):**

Progress in Q1 2021 includes:

1. 5380-18-01 AMT Coordination (CSU) $71,700 - Dr. Tom Bradley (PI), Ann Batchelor (PM). Colorado State University (CSU). Provides administrative management and support of the pool fund. This includes travel for annual meetings.
	1. **Project Update:** Project remains open – CDOT re-engaged CSU to support various administrative tasks (supporting the monthly meetings, agendas, minutes and general logistics moving forward). CDOT will work with CSU to increase the PO amount for further support this year for the annual meeting and development/refinement of the Toolkit.
2. 5380-19-02 Human AMV Interaction (CSU) $74,997 - Dr. Erika Miller (PI), CSU. Evaluating the Human‐Automated Maintenance Vehicle (AMV) for Improved Safety and Facilitating Long Term Trust
	1. **Project Update:** Dr. Miller sent her final report to CDOT and CDOT accepted the report. The project has been paid in full and is now complete and closed out. Will not appear on future quarterly reports.
3. 5380-19-03 ATMA Dev Guide (MST) $92,572 - Dr. Xianbiao (XB) Hu (PI). Missouri University of Science and Technology (MST)
	1. **Project Update**: Dr. Hu waiting on additional data to validate results – CDOT working on installation of cameras on northern Colorado ATMA.
4. 5380-20-04 ATMA Tabletop $22,300 – Will Moorhead (PI), All Clear Emergency Management, Golden, Colorado
	1. **Project Update:** Planning efforts for the ATMA Tabletop event is well underway. Two meetings have taken place, with the draft plan out to the AMT planning team. Scenario is nearing finalization and group is working on final prep for July tabletop event.
5. 5380-20-05 ATMA Cybersecurity Complement $50,000 – Dr. Jeremy Daily (PI), Colorado State University, Fort Collins.
	1. **Project Update:** Dr. Daily is officially on board as of approximately mid-point in the quarter. Currently working with the ATMA project planning team to define the deliverables that will come after the ATMA tabletop event.
6. 5380-20-06 ATMA Documentation $130,000 – Dr. Xianbiao (XB) Hu (PI), Missouri Tech University.
	1. Project Update: Kickoff occurred during the quarter – project team underway – will present schedule at upcoming AMT meetings to give a head’s up on when project team would like feedback from state DOTs.

**Anticipated work next quarter**:

In the 2nd quarter of 2021, the team plans to accomplish the following:

* Continued refinement of the Toolkit
* Continued monthly meetings
* Quarterly report and project status
* Continued work on revising outwardly facing website
* Continued work on all projects and contract projects 4, 5, and 6
* Beginning planning for a possible meeting the fall

**Significant Results:**

* Indiana DOT joined the AMT pooled fund!
* CDOT working on deployment of their second ATMA with validation occurring in the 2nd quarter. Many member states gearing up for the spring and summer season start up for their ATMA programs.
* New development by VTTI of an ATMA system was presented to the group
* Dr. Erika Miller completed her findings and sent the final report to the AMT members.
* Beginning to compile various lessons learned among the several deployments and seeing patterns and similarities. States that are facing similar challenges and barriers that others have tackled are leveraging those lessons learned.
* Toolkit development illustrating various themes in pre-deployment activities, program setup and procurement challenges that others have faced and new deployers should consider as they begin deployment activities.
* Collaboration and information sharing is one of the most valuable components as states tackle these innovative technology deployments.



**Potential Implementation:**

* Currently five states in some phase of deployment with purchase of a vehicle: California, Colorado, Missouri, Minnesota, and Virginia. This has increased since 2018 when Colorado was the only infrastructure owner operator of an ATMA and who had deployed an ATMA.
* CDOT working through a second ATMA deployment
* Assisting new states with ideation and project discovery