TRANSPORTATION POOLED FUND PROGRAM
QUARTERLY PROGRESS REPORT

Lead Agency (FHWA or State DOT): __Iowa DOT_____

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(438)*	**Transportation Pooled Fund Program - Report Period:** X Quarter 1 (January 1 – March 31, 2021) Quarter 2 (April 1 – June 30) Quarter 3 (July 1 – September 30) Quarter 4 (October 1 – December 31)
Project Title: Midwest Smart Work Zone Deployment Initiative	

Name of Project Manager(s): Dan Sprengeler	**Phone Number:** 515-239-1823	**E-Mail** Dan.Sprengeler@dot.iowa.gov
Lead Agency Project ID: Keith Knapp	**Other Project ID (i.e., contract #):** Addendum 733	**Project Start Date:** January 1, 2020
Original Project End Date: December 31, 2020	**Current Project End Date:** December 31, 2021	**Number of Extensions:** None

Project schedule status:

X 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
$500,000	$80,632.09	25%

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
$23,706.73		

Project Description:
The Midwest Smart Work Zone Deployment Initiative (MwSWZDI) was initiated in 1999 as a Federal Highway Administration (FHWA) Pooled Fund Study intended to coordinate and promote research among the participating states related to safety and mobility in highway work zones.

The program is an ongoing cooperative effort between State Departments of Transportation, universities, and industry. The studies completed have consisted of evaluations of various work zone related products, various innovative topics, and several synthesis studies. Completed reports and descriptions of ongoing projects can be obtained at the Iowa State University's Institute for Transportation (InTrans) website (www.intrans.iastate.edu/smartwz/) link to the Smart Work Zone Deployment Initiative. InTrans currently operates as the program manager of the pooled fund efforts and completes administrative tasks related to request for ideas and proposals, meetings, project files, quarterly reports, and recommending reimbursement.

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

Quarter Ending December 31, 2020 (Overall)
During this quarter, the three PY 2020 projects continued and two PY 2021 projects were contracted. The administrative contract for 2021 was initiated to administrate the pooled fund and help the principal investigators of these projects as requested.

The following is a summary of accomplishments from January to March 2021 for the individual research projects underway with fund account TPF-5(438).

2021 Program Projects

- Evaluation of Messaging Techniques to Increase Vehicle Spacing at Work Zones, Iowa State University, Jing Dong as PI

  Review anti-tailgating messaging techniques, including signs and pavement marking
  Held the first TAC meeting to discuss the scope; additional TAC members have be suggested as well

  This project was contracted to start on March 1, 2021 and end on June 30, 2022. The project is 2% complete.

- Work Zone Speed Limits and Motorist Compliance, Michigan State University, Peter Savolainen as PI

  Task 0: Formation of the Technical Advisory Committee - The research team held a kickoff meeting on March 15, 2021.

  Task 1: Synthesis of Existing Practices - No progress to report.

  Task 2: Site Selection and Data Collection - The team has received details of proposed project locations for the 2021 construction season from the Michigan DOT. The research team is working with MDOT to identify candidate projects for field data collection activities.

  Task 3: Data Analysis - No progress to report.

  Task 4: Develop and Submit Deliverables - No progress to report.

This project was contracted to start on March 1, 2021 and end on September 30, 2022. It is 2 percent complete.

2020 Program Projects

- Work Zone Activity Data Logging – Phase II, Iowa State University, John Shaw as PI

  Phase I project completed - no new activities on this Phase II project.

  This project was contracted to start on May 1, 2020 and end on April 30, 2022. This project remains at 1% complete.

- Using Smart Work Zone Trailer Data to Evaluate and Predict Lane Closure Impacts with a Consideration of Work Intensity, The University of Texas-Austin, Natalia Ruiz-Juri as PI

  - Documentation: data cleaning and pre-processing, work zone data preparation, machine learning (ML)-based work zone impact forecasting using data from smart work zone trailers (SWZT), and short term travel time prediction through work zones using INRIX and SWZT data.
  - Implemented data cleaning process and generated typical speed and volumes for archived data: Data cleaning is performed by clusters of days of week and months of year (differences between clusters tested using a T-test approach) using 3-Sigma method. Typical speeds and volumes are provided for weekends and weekdays and updated yearly.
  - Work zone impact forecasting : Tested ML models to predict speed and volumes models (artificial neural network- ANN)
    - For speed prediction, models tend to overestimate speed when the work zone impact is significant. The former is likely a result of most work zones in our training data having little to no impact on speeds, which suggest that additional data or a different method is needed for a successful prediction. This line of work will not be further pursued in this effort.
    - For volume prediction, the ANN model tends to underestimate the volumes on the day of the closure for locations/times with high volumes on typical days, but results are promising and further data cleaning is expected to lead to a better model fit.
  - Short term travel time prediction using INRIX data. We tested models trained without specific indicator of active work zone, which perform very well on average. The performance on closure days worse than on other days, but further research (beyond the scope of this effort) is expected to lead to significant improvements.
  - Met with TAC on 3/24/21 to review project progress, solicit feedback and obtain input.

This project was contracted to start on May 15, 2020 and end on April 14, 2021. A request for extension to June 14, 2021 this quarter. The project is 90% complete.

- Temporary Traffic Control Devices at Driveways within a One-Lane, Two-Way Section, Tim Gates as PI

  Task 1: Review of Literature and Practice - The literature review was completed in Q4.
  Task 2: Expert and Public Survey of DADs Displays - The survey data have been collected, compiled, checked, formatted, and preliminary analysis performed. The full statistical analysis is ongoing through Q1/Q2 of 2021.
  Task 3: Field Evaluation - The field data collected at US31 in Benzonia, Michigan in summer 2020 has been compiled, checked, formatted and preliminary analysis performed. The full statistical analysis is ongoing through Q1/Q2 of 2021.
  Task 4: Simulation Modeling - Simulation modeling of various DADs layout scenarios will occur during Q2 of 2021.

Task 5: Develop Guidelines - Guidelines for use of DADs are being developed and will be completed during Q2 of 2021.
Task 6: Develop and Submit Deliverables. - Deliverables will be fully developed once other tasks are complete during Q2/Q3 of 2021.

The project was contracted to start on May 1, 2020 to October 31, 2021. It is 65% complete.

Anticipated work next quarter:

The projects from PY 2020 continued and projects for PY 2021 were selected and contracted.

Significant Results:

The projects under this administrative contract continue toward completion.

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, with recommended solutions to those problems).

It is not expected that the COVID 19 shut downs will have an impact on the administration of the SWZDI pooled fund but it may impact the progress of the projects above.

Potential Implementation:

Potential implementation includes project report posting when completed.