

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(295)		Transportation Pooled Fund Program - Report Period: Quarter 1 (January 1 – March 31, 2019) Quarter 2 (April 1 – June 30) Quarter 3 (July 1 – September 30) X 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 535	Project Start Date: July 1, 2014	
Original Project End Date: June 30, 2020	Current Project End Date: June 30, 2021	Number of Extensions: None	

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
\$1,425,000 committed	\$1,117,101.15	0

Quarterly Project Statistics:

Total Project Expenses and Percentage This Quarter	Total Amount of Funds Expended This Quarter	Total Percentage of Time Used to Date
\$188,362.79		100

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, 2019 (Overall)**

During this quarter we communicated with a number of principal investigators as needed and resolved progress issues if they occurred. Projects from Program Years 2016, 2018, and 2019 contracts progressed (see below). The project from 2016 was ended early and the PI told to finish this quarter. The proposals for Program Year 2020 were collected and distributed for first round rankings to all the states involved (including IA, NE, KS, MO, WI, MI, TX, and IL). The first round rankings were originally due January 10, 2020 but a request to extend to January 17, 2020 was granted. The selection of proposals for funding is several months later this year due to the addition of more states and commitment timing.

The following is a summary of accomplishments from October to December 2019 for the individual research projects underway with fund account TPF-5(295).

2019 Program Projects

The following projects were selected in September for funding during the 2019 program year.

- An Intelligent Video-Based End of Queue Warning System for Work Zones, Iowa State University, Shauna Hallmark as PI.

Task 1 Progress: A Technical Advisory Committee (TAC) was formed which currently consists of Dan Sprengler, (Dan.Sprengler@iowadot.us) and Willy Sorenson (Willy.Sorenson@iowadot.us).

Task 2 Progress: The literature is complete. We are in the process of finalizing the information as a chapter in the final report. The literature review contains a summary of crashes in work zones, available commercial queue warning systems, and a summary of what SWZDI states are doing for queue warning systems.

Task 3 Progress: Around 300 back of queue work zone events were identified in a related project using the SHRP 2 NDS data. An IRB was completed with Iowa State University and a data sharing agreement was executed with Virginia Tech Transportation Institute (VTTI). The point at which a driver encounters the back of queue was determined and the time stamp noted. VTTI coded driver glance location, cell phone use, and any accompanying distractions. We are in the process of finalizing the data reduction and analysis

Task 4 Progress: The team met with the TAC early in the project and it was decided that it was not efficient or practical for the team to set up video data collection trailers. Instead the TAC suggested we use locations in Iowa where cameras were already in place. A list of work zones was available from the Iowa DOT. Each work zone and camera location within the workzone was reviewed. Locations where cameras were present which could also have some queueing were identified. This resulted in 21 potential work zones. Video data for each camera were further reviewed and feasible sites identified. A total of 16 camera locations are placed in locations where queues are likely to form.

Video data were downloaded for several months for the 16 locations. The team has access to the Iowa DOT work zone camera feed through the InTrans Reactor lab. Code was written to automate download and identify issues.

Code was written which can automatically scroll through each video and will identify locations where vehicles have slowed down. The code was run for all of the 16 locations. The program created a clip of potential slowdowns. We are currently in the process of manually reviewing the clips. Actual queues are identified and characteristics coded.

Task 5 Progress: SWZDI states were contacted and the QWS they utilize was identified. WE are in the process of summarizing the information.

Task 6 Progress: We are in the process of developing the draft final report.

This project has a start date of 1/1/2019 and an end date of 3/31/2020. A quarterly reports was provided that indicates the progress on each tasks and the percentage complete of each task. It appears that Tasks 1 and 2 are 80% and 90% complete, respectively, and Tasks 3 and 4 are 65% and 45% complete, respectively. Task 5 is 45% complete and Task 6 is 15% complete.

- Field Testing of Non-Motorized Road User Accommodations for Work Zones, Iowa State University, John Shaw as PI.

Task 1: TAC, IRB, Qtr Reports: Recruited TAC members. Conducted project kick-off meeting on July 12, 2019.

Participated in webconference to coordinate with other national efforts.

Task 2: Literature Review: Reviewed MnDOT documents related to previous pedestrian safety demonstration.

Task 3: Develop Test Plan: No activities

Task 4: Ped Test Track (PTT): No activities

Task 5: Field Evaluations: No activities

Task 6: Final Report: No activities

This work has a contract of 1/1/2019 and an end date of 3/31/2020. It has been extended to December 31, 2020. It is 4% complete.

- Investigation of Autonomous/Connected Vehicles in Works Zones, University of Missouri-Columbia, Carlos Sun as PI.

The software development is continuing with the coding of the simulator scenarios and the 3D modeling of traffic and other components. The simulator room has been set up to prepare for human subject trials on the driving and trucking simulators.

This project is contracted to start on 4/15/2019 and end on 7/31/2020. It is 50 percent complete.

2018 Program Projects

- Development of Adjustment Factors for HCM Sixth Edition Freeway Work Zone Capacity Methodology, Iowa State University, Jing Dong as PI.

Collect and process data from 2019 work zones.
Visualize the sensor data in Tableau.

This project was contracted to start on April 1, 2018 and was scheduled to finish on July 31, 2019. This end date has been extended to December 31, 2019. It has been extended again to June 30, 2020. It is 80% complete.

- Guidance on Active Work Zone Data Archival, Iowa State University, Anuj Sharma is PI.

Task 1. Develop and Convene TAC - COMPLETED.

Task 2. Conduct Literature Review - COMPLETED. The research team conducted an analysis of existing technical standards and protocols related to work zone traffic data interchange. These included the Traffic Management Data Dictionary (TMDD), SAE standard J2540 / International Traveler Systems Information (ITIS), the European DATEX2 standard, and the draft work zone data exchange protocols currently being proposed by FHWA. Agency work zone data use cases were also compiled and summarized based on the FHWA draft report and other sources. A TAC meeting was held to review the results of this task.

Task 3. Develop Survey - COMPLETED. The first draft of the survey was completed in March 2019 and major revisions were made in May-June 2019 based on TAC recommendations.

Task 4. Conduct Survey - COMPLETED. Survey distribution began on June 24, 2019 and responses were received from 20+ states. Follow-up interviews have been completed.

Task 5. Analyze Survey Results - COMPLETED. Analysis of survey results has been completed.

Task 6. Meet with TAC - A TAC meeting was held Oct 22, 2019 to review the survey results and next steps.

Task 7. Develop Prototype and Report - COMPLETED. A conceptual work zone data collection and management tool has been developed.

Task 8. Finalize Prototype and Report - Final report preparation is underway.

This project started on January 1, 2018 and was expected to finish on December 31, 2018. A no-cost extension has been provided to extend the project to December 31, 2019. An extension to March 31, 2020 have been submitted to finish the project. The project is 90% complete.

2016 Program Projects

- Design Optimal and Effective Queue Detection and Notification: Design of a Low-Cost Work Zone Warning System, University of Wisconsin, Madhav Chitturi as PI.

Project began June 15, 2016. Due to staff turnover, we could not make much progress.

The TAC meeting happened in October, 2016 and we obtained their input on the proposed design. Lot of discussion in the TAC meeting about what sign should be used "Be prepared to stop" or "Slow traffic ahead" or "Watch for stopped traffic". Have been in communication with TAPCO about design of the low-cost system. TAPCO has developed a potential design already. We have gone through multiple iterations to make the design MUTCD compatible. Design changes were required to satisfy crashworthiness requirements of roadside hardware without having to go through crash testing requirements. On February 20, 2018, we presented the design changes to TAC. We communicated with FHWA to ascertain the need for submitting a Request for Experiment to FHWA before proceeding with the field testing. Based on feedback from TAC, we redesigned the sign to avoid the Request to Experiment. Working with TAPCO (private sector partner) on the redesigned sign. Before the fabrication, we reached out to TAC to get their approval for the sign. However, we received comments about crashworthiness/need for crash testing specifically about being MASH compliant. We had to

do further review and in consultation with WisDOT staff and Nebraska staff, we had to do another major revision in the design of the sign. We presented the newest version of the sign to the TAC and have not received any comments. We are moving forward with the latest design.

WisDOT/Counties could not find any sites for field testing in Fall 2018. TAPCO, the private sector partner was not able to fabricate the newest design in time. Therefore, we obtained a No cost time extension till the end of 2019.

WisDOT came back to us in mid-March that they do not have any sites where we can test the QWS. We reached out to multiple Counties. Unfortunately, we did not get any County on-board. We provided two options to re-scope the project to one of the following options:

1. Rescope from the current QWS to a DSRC-based QWS. TAPCO has developed a DSRC-based QWS that we can deploy and test.
2. Wrap up the project with the progress so far and complete the report. Hence we will not use the complete budget.

Based on the feedback from SWZDI Board, research team wrapped up the project and submitted a report for review by the project TAC. Research team addressed TAC comments and submitted the report for SWZDI Board review. The research team is addressing these comments and will submit the revised report and technical brief to SWZDI.

Project started on June 15, 2016 and was expected to finish on December 15, 2017. An extension to December 31, 2018 has been requested and granted. A second extension was also granted for an end date of December 31, 2019. The project is 60% complete (and will advance no further). As noted above a discussion with the SWZDI board indicated to the PI that he should stop the project and summarize what he'd done and finish a report pf what he'd completed. This draft report has been submitted and reviewed. It is currently being finalized for publication.

Anticipated work next quarter:

Work will continue to work to finalize the 2016 report and the other projects listed. The 2020 proposals will be ranked and the winners selected. It is expected that at least one or two of the current project will end in the next two quarters. There is also a need to update the board on the SWZDI website.

Significant Results:

Project work continued to be completed and the proposals from the 2020 PY RFP are being reviewed. The Chitturi project was ended and a report is being finalized.

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).

Currently there are no problems to report with the administrative. An extension has been submitted by request of the Iowa DOT until June 2020.

Potential Implementation:

The website for the SWZDI pooled fund is updated on a regular and as needed basis for finished reports.