

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) X 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 535	Project Start Date: July 1, 2014	
Original Project End Date: June 30, 2020	Current Project End Date: June 30, 2019	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)	\$1,101,467.32	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
\$172,728.96		25

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 September 30, 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). Contracts for Program Year 2019 are in place. The problem statements for Program Year 2020 were reviewed by all the states involved (including IA, NE, KS, MO, WI, MI, TX, and IL) and a meeting was held of the SWZDI Board to select those to be released as part of the RFP. The RFP was created and then held in anticipation of one of the states making their commitment. The Board meeting was held September 4, 2019.

The following is a summary of accomplishments from July to September 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: An initial literature was conducted about the magnitude of back of queue crashes. We are finalizing the literature review. Additionally we began contacting SWZDI states to determine what QWS they utilize. The pros and cons of several commercially available Site-Safe, Wavetronix, and Wanco have been summarized. The configurations for non-commercial QWS are also being investigated.

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. This information was provided to VTTI who are in the process of coding driver glance location, cell phone use, and any accompanying distractions.

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.

Task 5 Progress: We are in the process of reviewing commercially available QWS. Additionally we have contacted SWZDI states to document what QWS they utilize.

Task 6 Progress: No progress was made on Task 6 this quarter

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 75% complete and Tasks 3 and 4 are 25% complete. Task 5 is 15% complete and Task 6 is 0% 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 is 3% complete.

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

Simulator scenarios have been storyboarded, and the TAC recommendations have been included in the scenarios. Scenario development is in progress.

This project is contracted to start on 4/15/2019 and end on 7/31/2020. It is 45 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.

Finalize the list of work zones from 2018 that have reached capacity during work zone periods. Determine prebreakdown capacity and queue discharge rate based on flow and speed data collected at 2018 work zones. Collect data from 2019 work zones.

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 is 70% 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 - Survey distribution began on June 24, 2019 and responses have been received from 20 states. Follow-up interviews are underway and we are exploring a second round of contacts using a fresher mailing list.

Task 5. Analyze Survey Results - Preliminary analysis of survey results completed, will be analyzing final results in fall 2019.

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

Task 7. Develop Prototype and Report - Development of a conceptual work zone data collection and management tool is currently ongoing.

Task 8. Finalize Prototype and Report - Outline for final report has been prepared.

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. The project is 75% 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 will wrap up the project and submit a report for review in a few weeks.

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. This is the same percent complete as last two quarters. A discussion with the SWZDI board will be arranged to determine how this project should proceed.

Anticipated work next quarter:

Work will continue to work to finalize projects and to advance all the contracts in place. The 2020 RFP will be released in the late this year due to some issues with one state. The Chitturi project will be finished and two others will also.

Significant Results:

Project work continued to be completed and the problem statements were reviewed and RFP finalized for release. Additional contacts from the new states were identified.

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).

Currently there are no problems to report with the administrative contract outside of the funding from one state for the upcoming year. Any issues that have come up with the individual projects that may impact schedule or budget are resolved on a case by case basis.

Potential Implementation:

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