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(483)*	**Transportation Pooled Fund Program - Report Period:** X Quarter 1 (January 1 – March 31) Quarter 2 (April 1 – June 30) Quarter 3 (July 1 – September 30) Quarter 4 (October 4 – December 31)
Project Title: Implementation of New Traffic Signal Actuation Concepts using Enhanced Detector	

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Lead Agency Project ID:	**Other Project ID (i.e., contract #):** Addendum 791	**Project Start Date:** 02/01/2022
Original Project End Date: 02/28/2026	**Project End Date:**	**Number of Extensions:**

X On schedule ☐ On revised schedule ☐ Ahead of schedule ☐ Behind schedule

Overall Project Statistics:

Total Project Budget	Total Cost to Date for Project	Total Percentage of Work Completed
$595,032	$83,835	%6

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
$32,624		%2

Project Description: The objective of this research is to develop field-tested methods of integrating vehicle trajectory data into actuated signal control that can be directly implemented in traffic signal controllers. This research will identify the practical requirements and limitations of establishing trajectory-assisted actuated signal control, including requirements for acquisition, storage, and communication of vehicle trajectory data. The findings will be developed into a resource toolkit that will permit implementation and further development of the methods conceived during the course of the research.

Progress this Quarter (includes meetings, work plan status, contract status, significant progress, etc.):
The team continued to develop a working paper reviewing control concepts for isolated intersections (WP2). With there being a great deal of relevant previous work, the review has required more time to complete. It is currently about 90% complete and will be finished in the next quarter. We also implemented several control methods in a simulation environment and have begun testing them. This will be documented in a third working paper (WP3), which is currently underway. As part of this effort we developed a controller using VISSIM's external controller API which introduces the trajectories into the control process, and we have begun documenting this for an eventual open-source release later in the project. The team also did worked on detector accuracy concepts, which will be expanded as more field data from different locations and sensor types can be obtained.

Anticipated work next quarter: In the second quarter of 2023, the research team will finalize WP2 and WP3. In addition, the team will prepare for future field testing of the control methods intended to take place in the summer/fall of 2023.

Significant Results: At this point we have a developed control concepts for green extension that should map to agency objectives. The control concepts include the following: (1) confirming queue clearance by monitoring which vehicles have queued and determining whether these were served in the subsequent green interval; (2) intelligent gap selection based on overall intersection condition (similar to the "cars waiting" feature), instead of gap reduction based on arbitrary time intervals; (3) dilemma zone protection; (4) mainline gap identification for side-street service, and (5) platoon-based secondary extension. These have been implemented in the simulation-based controller mentioned above. To facilitate these methods, we introduced controller objects that map the data to a physical representation (digital twin) of the intersection, with each vehicle identified from the trajectory data addressed to an approach, lane, and position in lane.