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:** Quarter 1 (January 1 – March 31) Quarter 2 (April 1 – June 30) X 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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Project Investigator: Chris Day	**Phone:** 515-294-3015	**E-mail:** cmday@iastate.edu
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	$122,133	%12

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
$38,298		%6

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 completed a second working paper (WP2) that provides an in-depth technical review of actuated and adaptive control methods for isolated intersections. The team also continued to work on implementing new trajectory-based actuated control methods in a simulation environment. Preliminary results were written up in a brief paper for the IEEE ITS Conference. These preliminary results are being followed up with a more detailed evaluation for a third working paper (WP3) which is currently in progress.

Anticipated work next quarter: In the third quarter of 2023, the research team will finalize a working paper on green extension methods (WP3), covering control methods 1-4 described below, and a further working paper on 5-6. This should facilitate review and feedback from the project panel on the proposed trajectory-based actuated control methods. In addition, the team will prepare for eventual field testing of the control methods.

Significant Results: At this point we have developed and tested control concepts for green extension that should map to agency objectives. We are currently validating and testing four such actuation methods:

1. Replacement of gap/passage timer with direct measurement of gaps
2. Queue clearance – a new concept tracking queued vehicles and extending green until these vehicles have queued (split failure mitigation)
3. Dilemma zone (DZ) protection, with optional allowance of single DZ vehicles under certain conditions
4. Secondary extension for platoons

These are green extension methods. In addition, we have two other control concepts in the works:

5. Mainline gap identification for side-street service – a concept previously tested in the field by Colorado Springs, which is more complex in that it uses past volume data, so it has required more time to correctly implement.
6. Intelligent adjustment of the desirable gap value based on intersection condition – this idea has proven to be more complex than the above, since it manages the entire intersection. Our preliminary ideas on how this should work had mixed performance, so we are currently refining these.