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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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	$227,202	%40

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
$33,653		%5

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 work on the Phase 1 interim report in Q1 of 2024. While preparing the report, we discovered an error in the implementation of one proposed control method that necessitated repeating some simulation runs. We also explored an additional control concept that we felt would contribute to the operation of the proposed trajectory-based actuated control methods as a combined package and a new mode of operation somewhere between fully-actuated and actuated-coordinated control. For these reasons, we postponed the finalization of the interim report. Some preliminary results were presented at the TRB annual meeting in January 2024.

Anticipated work next quarter: The research team will complete the Phase 1 interim report in the second quarter of 2024. We now are confident that the interim report is ready to be completed, and we are currently working on getting this finished so the report (including an executive summary) can be released to the project panel. It is our intention after this point to hold a panel meeting to present these results and discuss our plans for the second part of this project (Phase 2). We also anticipate presenting our preliminary results in the ITE Annual Meeting in July 2024.

Significant Results: Overall, the results of the study so far find that there is a potential for improvement of signal control with the integration of vehicle trajectory dat into actuated control processes. We believe that this package of control methods can itself serve as a new, standalone form of control, and can also be integrated with both coordinated and real-time adaptive control as a last-second adjustment to scheduled timings that coordinators and real-time adaptive schedulers set for the next cycle length or planning horizon.

Altogether, there are six different actuation methods included in this package:

1. Immediate gap out – use proximity rather than occupancy to terminate phases, eliminating the passage timer.
2. Queue clearance – track vehicles that have stopped during red and extend green until they have been served.
3. Dilemma zone protection – using measured speed and position data instead of point detection.
4. Free optimization – a platoon-accommodation method previously developed by Colorado Springs.
5. Secondary extension – a platoon-accommodation method previously developed at Northeastern University.
6. Adpative gap – determine the value of gap to be used by immediate gap out, similar to gap reduction logic.

Our evaluative process consists of a sweep of a range of volumes from very low to saturated for a simulated three-intersection corridor (US 24 in Colorado Springs). Preliminary results have found that about 10-20% reduction in delay for some volume ranges can be seen with the combined methods compared to conventional fully-actuated control.