

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) X 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:

☒ 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	\$248,689	%40

Quarterly Project Statistics:

Total Project Expenses This Quarter	Total Amount of Funds Expended This Quarter	Percentage of Work Completed This Quarter
\$21,487		%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 worked on preparation of the Phase 1 interim report. This is a substantial document containing a very extensive and thorough literature review, a concept of operations for trajectory-based actuation, and simulation analysis with many scenarios representing variations in traffic conditions and control types. The report was about 90% done at the end of the quarter, with some unexpected delays occurring at the end of June 2024. It is anticipated that the interim report will be completed and distributed to the panel in July 2024.

Anticipated work next quarter: The research team will complete the Phase 1 interim report in July 2024. Following the distribution of the interim report, a panel meeting will be scheduled to present the result and discuss plans for the second part of the project. Results will also be presented during the ITE Annual Meeting.

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 data 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. Adaptive 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.