# 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 #**<br>*TPF-5(438)* | **Transportation Pooled Fund Program - Report Period:**<br>Quarter 1 (January 1 – March 31, 2025)<br>X Quarter 2 (April 1 – June 30)<br>Quarter 3 (July 1 – September 30)<br>Quarter 4 (October 1 – December 31) |
|---|---|
| **Project Title:** Midwest Smart Work Zone Deployment Initiative | |

| **Name of Project Manager(s):**<br>Dan Sprengeler | **Phone Number:**<br>515-239-1823 | **E-Mail**<br>Dan.Sprengeler@dot.iowa.gov |
|---|---|---|
| **Lead Agency Project ID:**<br>Keith Knapp | **Other Project ID (i.e., contract #):**<br>Addendum 733 | **Project Start Date:**<br>January 1, 2020 |
| **Original Project End Date:**<br>December 31, 2024 | **Current Project End Date:**<br>February, 28, 2026 | **Number of Extensions:**<br>6 |

Project schedule status:

X 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** |
|---|---|---|
| $1,300,000 | $1,027,990 | 91% |
| | | |

***Quarterly*** Project Statistics:

| **Total Project Expenses and Percentage This Quarter** | **Total Amount of Funds Expended This Quarter** | **Total Percentage of Time Used to Date** |
|---|---|---|
| $28,017 | | 2% |

**Project Description**:
The Smart Work Zone Deployment Initiative (SWZDI) 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 June 30, 2025 (Overall)**
During this quarter, work continued on three PY 2024 projects and another additional supplemental project for PY 2024. Other work continued under the new SWZDI funding number is summarized in another quarterly report.

The following is a summary of accomplishments provided by the project principal investigators for the April to June 2025 time period for their individual research projects underway with fund account TPF-5(438).

**2024 Program Year Projects**

- The Effect of Nighttime Lighting Systems on Workers' Visibility and Safety – University of Nebraska – Lincoln, Chun-Hsing Ho as PI.

  The work-zone lighting study has advanced from experimental planning to full data analysis. A complete factorial matrix was implemented, combining three tower orientations with variations in lamp type, mounting height (12-14 ft), aiming angle (10°- 20°), and rotation angle (20°-130°). Field measurements of horizontal illuminance and veiling-luminance ratio were collected at seven 15 ft intervals along a 90 ft transect for each of the 126 lighting configurations, producing 882 paired observations. All photometers were calibrated before deployment, and on-site quality checks verified instrument stability, yielding a validated database for analysis. The dataset was evaluated with a two-axis matrix that applies Federal Highway Administration thresholds for illuminance (< 40 lx under-illumination,> 480 lx over-illumination) and IES RP-8-22 limits for veiling-luminance ratio (< 0.30 acceptable, 0.30-0.40 marginal, > 0.40 unacceptable). Only 14 percent of observations satisfied both criteria, indicating widespread geometric deficiencies in the initial parameter space. Exploratory diagnostics showed that rotation angle and mounting height exert the greatest influence on both illuminance and glare, whereas aiming angle has a limited or inconsistent effect. Lamp substitution from halogen to LED increased mean illuminance by 113 percent and reduced glare by about 20 percent, but these improvements were contingent on appropriate geometry. A supplementary task-performance study, conducted under a representative geometry of 12 ft height, 20° rotation, and 10° aiming, confirmed that photometric gains are reflected in practical readability: LEDs maintained tape-measure visibility at 0.125 ft resolution across the full 300 ft test corridor, while halogen performance declined beyond 200 ft horizontally and 130 ft vertically; conversely, halogen provided longer-range legibility for small-format layout text. Validated data and a glare-illuminance scheme confirm geometry's impact on performance, concluding analysis.

This project has been contracted to start on September 1, 2024 and end on November 30, 2025. The project is 60 percent complete.

- Development of an Analytical Tools for Work Zone Performance – Iowa State University, Guillermo Basulto-Elias as PI.

    - Finalize tables, and plots for INRIX and HERE data on individual projects.
    - Create downloadable reports for individual projects with HERE data and crash data.
    - Produce statewide tables for crashes and HERE data.
    - Associated HERE data to work zone shapefiles and calculate performance metrics
    - Plenty of changes to the Analytical Tool to make it simpler to use.

  This project was contracted to start on March 1, 2024 and end on May 31, 2025. An extension was requested and granted to July 31, 2025. This project is 85% complete.

- Improving Work Zone Management and Safety through AI-Powered Connected Vehicle Data Analysis – Iowa State University, Anuj Sharma as PI (Meenakshi Sumeet Arya was the original PI, but has resigned).

  Algorithm for real-time incident detection using CAV data were developed and fine-tuned.

  This project was contracted to start on March 1, 2024 and end on June 30, 2025. However, an extension has been granted to the project until December 31, 2025. This project is 65 percent complete.

- Accommodation of Vulnerable Road Users – Wayne State University, Steven Lavrenz as PI.

  No quarterly report was submitted for this project by the PI. The PI was contacted three times by the SWZDI coordinator for this document.

  This project was contracted to start on May 1, 2024 and end on April 30, 2025. An extension has been requested to October 31, 2025. This project currently 25% complete.

**Anticipated work next quarter**: Work will continue on the completion of the projects being completed on this SWZDI funding number (other work is starting on the newer SWZDI funding number).

**Significant Results:** All three projects are scheduled to be completed later this year.

**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, with recommended solutions to those problems).**

**Potential Implementation:**