

I-35 Connected Work Zone

RESEARCH THEME

SYSTEM OPERATIONS

OUTREACH AND
TECHNOLOGY TRANSFER

DATA ANALYTICS

PERFORMANCE MANAGEMENT

SYSTEM MODELING

TECHNOLOGY DEPLOYMENTS

PROJECT DETAILS

Sponsor: Federal Highway Administration

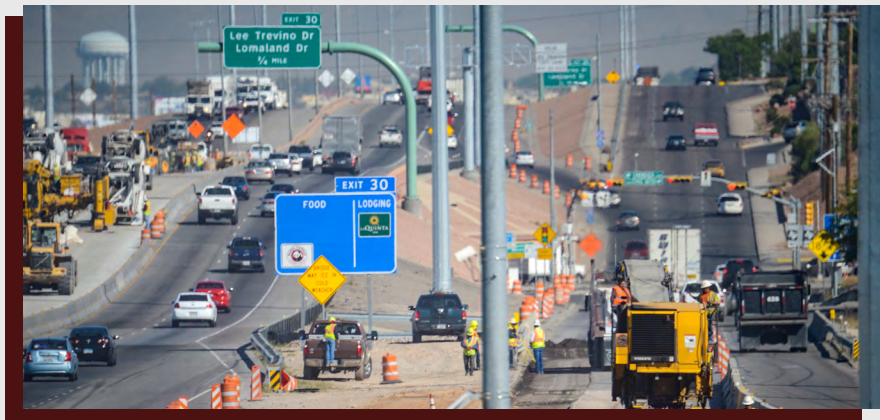
Period: 2014 - 2022

Budget: \$2.5 Million

BENEFITS

Project findings and benefits include:

- Enhanced understanding of how work zone setup differs by state / region
- In-depth real-world testing of mapping process
- In-depth real-world testing of both high-fidelity and low-fidelity application
- Enhanced awareness that hardware suffers from inconsistency, specialized knowledge, and lack of standardization
- Understanding that integration of lane closure information in a systematic fashion is in early stages
- Understanding complex and multi-agency linkages



Summary

In a given year, 94,000 crashes, 37,000 injuries, and more than 750 fatalities occur in work zones at the national scale. This project created and tested technologies for developing connected work zones to enhance driver awareness and information. Using data from a large-scale construction effort on Interstate 35 in Central Texas, the first phase provided advanced freight traveler information for pre-trip and en-route planning to participating freight carriers. The information conveyed included work zone closure locations, capacity reductions, and queue lengths, and delay. The second phase of the project developed and tested connected applications using vehicle V2I infrastructure and DSRC 5.9 GHz communication to warn of work zone locations, delays, traffic queues, and other applicable traveler information.

Background

Under a grant for FHWA, TTI and CAMP (Crash Avoidance Metrics Partnership) partnered on a project to examine next-generation technologies for work-zone awareness.

The impetus for the project was the TTI development of a one-of-a-kind integrated system for I-35 construction efforts that provides TxDOT with unmatched work zone monitoring and traveler information dissemination. The system collects and integrates planned lane closure schedules from the multiple independent contractors working on the 100-mile I-35 corridor, automatically assesses the traffic queuing and delay potential associated with those closures and disseminates advance notification of the closures and potential impacts to various users across multiple outreach channels, including social media. These existing capabilities provided a unique opportunity to examine connected vehicle technologies in real-life work-zone situations to assess capabilities and traveler awareness.

Project Overview

Numerous challenges exist in creating a connected work zone capability, including:

- Mapping a dynamic work zone in high-fidelity.
- Current equipment needs are not standardized and available off the shelf.
- Communication standards and methodologies are still developing.
- Software solutions are developing and are not transferrable across equipment.
- Different information levels (available vs. desired) exist.
- Recognition that not all IOOs can support this level of information need.

The project team established a two-path approach to testing connected work zone solutions. The first path, which was the high-fidelity approach, utilized a detailed lane-level mapping of the roadway and work zone. In this scenario, the reference point which was defined as the beginning of the work zone taper, was accurately defined and a full set of work zone information and driver instructions were available which were specific to each individual lane. For example, if the right lane was being closed, only the right lane drivers would receive information about merging.

The second path was the low-fidelity approach in which less detailed mapping of the roadway and work zone was available and the reference point was estimated. Traveler information in this scenario focused on awareness and did not include lane specific information and directions. In the same right-lane closed scenarios, all drivers in all lanes would receive information about an upcoming closure and merge from the right lane.

Both scenarios were tested utilizing the infrastructure and capabilities established for traveler information in the I-35 corridor. This project enhanced the work-zone capabilities by field deployment and prototype testing of mapping and applications and provided input into final guidelines that CAMP prepared for USDOT.

Applications

- Real-world technology deployments for lane closure awareness.
- High-fidelity lane closure mapping process.
- In-vehicle testing of both high-fidelity and low-fidelity driver communications.
- Support national initiatives.
- Automated processes for Lonestar.
- Export processes and solutions to other Districts.
- National attention.

MISSION of SYSTEM RELIABILITY DIVISION

To transform transportation operations, reliability, mobility, and safety through the application of innovative concepts, tools, and technologies. We will focus on the core programmatic areas of: (1) advanced transportation operations and (2) connected and automated transportation.

TTI's MISSION:

To solve transportation problems through research, to transfer technology and to develop diverse human resources to meet the transportation challenges of tomorrow.

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