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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION
TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Effect of Using Standardized Work Zone Data to Improve Work Zone Safety

Standardized work zone data will be utilized to reduce crashes involving human-driven and automated vehicles by sharing information with connected vehicles for improved safety.

Traffic Operations

MAY 2025

Project Title:
Work Zone Research

Task Number: 4340

Start Date: March 4, 2025

Completion Date: June 30, 2026

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WHAT IS THE NEED?

Work zones play a key role in maintaining and upgrading our nation's roadways. Unfortunately, work zone safety continues to be a concern for state transportation agencies across the US, for the safety of motorists who drive through the work zone and for workers who build, repair, and maintain our roadways. According to the national work zone safety data, in 2021, an estimated 106K work zone crash happened across the US, resulting in 42K injuries and 956 fatalities. In California, 113 fatal crashes happened with a total of 120 fatalities in 2021. Between 2020 and 2021, work zone fatalities increased by 10.8 percent. (see Image 1). In specific, work zone intrusions are a growing concern for Caltrans due to their severe impact on the life of workers (see Image 2).

Many transportation agencies face the challenge of how to share work zone activity information with third parties and connected vehicles effectively to improve work zone safety. Since 2019, US Department of Transportation has funded the Work Zone Data Exchange (WZDx) project. The WZDx project focuses on the voluntary adoption of a basic work zone data specification, which enables Infrastructure Owner Operators (IOOs) to make harmonized work zone data available for third party use. Specifically, the WZDx project aims to get data on work zones into vehicles to help both human drivers and automated driving systems (ADSs) to navigate more safely and efficiently.

In May 2023, the SAE (Society of Automotive Engineers) International published a new road safety message (RSM), and the use of infrastructure-to-vehicle (I2V) communications capabilities defined in other standards, including SAE Standards and the National ITS (Intelligent Transportation Systems) Architecture, the purpose of the new RSM is to enable road safety application interoperability using I2V

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communications. The road safety applications include:

- Curve speed warning (CSW)
- Reduced speed zone warning (RSZW)
- Lane closure warning (LCW)
- Dynamic traveler information (DTI)
- Incident information (INC)

WHAT ARE WE DOING?

In this project, we propose using standardized work zone data (i.e., WZDx and RSM) as the countermeasure to reduce work zone intrusion crashes for both human-driven vehicles and automated vehicles (AVs). More specifically, we will generate standardized work zone data feeds of active freeway work zones and lane closures, which represents the common work zone scenarios.

We will make the data available to share with connected vehicles (CVs) through both direct short-range communication (e.g., Cellular Vehicle-to-Everything C-V2X) and long-range cellular network communications (i.e., Infrastructure-to-Network – I2N and Vehicle-to- Network – V2N). The goal is to evaluate the safety effects before and after the adoption of the standardized work zone data.

WHAT IS OUR GOAL?

The goal of this agreement is to produce a report, which include (1) findings of both human driver and automated vehicle performance in and around the work zones before and after adoption of the standardized work zone data, (2) findings of the safety impact on mitigating the work zone intrusion and protecting safety of the work zone workers when the work zone data and information are disseminated to the vehicles, and (3) feedback and specific recommendations for Caltrans regarding critical information of work zone messages that will be accurately and sufficiently interpreted by human drivers and automated vehicles.

WHAT IS THE BENEFIT?

The findings of this project will help Caltrans to enhance work zone safety. It will advance the work zone data adoption for the safe and efficient deployment of AVs. It will enable effective coordination of activities and enhanced mobility and safety in and around work zones for both human drivers and AVs. It will lay the groundwork for the State of California to be a national leader in adopting standardized work zone data.

WHAT IS THE PROGRESS TO DATE?

The kickoff meeting took place on April 11, 2025. Since the contract was executed several months later than the planned start date, we are in the process of submitting a no-cost time extension for this contract.

IMAGES

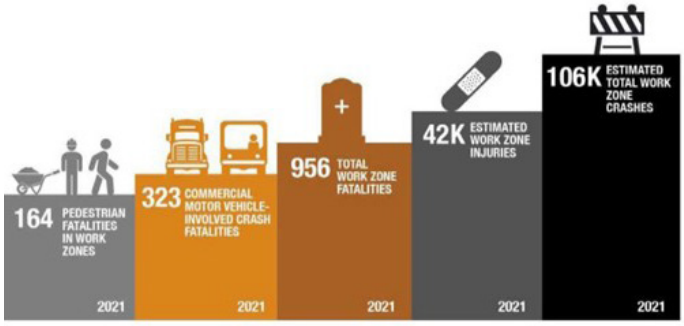

Image 1: Work Zone Crash Data Summary (Source: National Work-Zone Safety Information learinghouse)

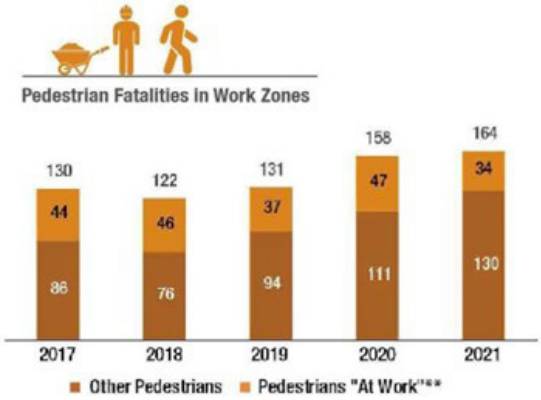

Image 2: Pedestrian Fatalities in Work Zones (Source: National Work-Zone Safety Information Clearinghouse)