

# DRISI

CALTRANS DIVISION OF RESEARCH,  
INNOVATION AND SYSTEM INFORMATION

# Research Notes

Traffic  
Operations

MAY 2024

Project Title:  
Work Zone Speed Limit Reduction  
Research

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## Enhancing Work Zone Safety Through Work Zone Speed Limit Reduction

Test and evaluation of the most effective Work Zone Speed Limit Reduction (WZSLR) Strategies

### WHAT IS THE NEED?

The work zone (WZ) is a complex driving environment for drivers due to elevated cognitive load, safety risk, and enforced speed management. Despite various efforts to improve worker and motorist safety in work zones, work zone-related fatal crashes have increased by 53% in California since 2010. Moreover, California also ranked in the top 10 states with the highest number of fatal work zone crashes and fatalities involving commercial motor vehicles from 2012 to 2017, imposing approximately \$1.2 billion in societal costs.

In recent years, the California Department of Transportation (Caltrans) has marked safety as the primary goal in their 2020-2024 Strategic Plan and designed several educational programs, including (a) the California move-over law, (b) work zone alert, and (c) slow for the cone zone. Following the recommendations from the annual safety summit, Caltrans has spearheaded Work Zone Speed Limit Reduction (WZSLR) strategies and technologies in the field to improve safety. However, the effectiveness of these strategies in improving work zone safety has not been studied under variations of work zone type, traffic mix, traffic volume, time, and location of construction with extensive field data.

### WHAT ARE WE DOING?

From meetings with Caltrans personnel, the researchers learned that for work zone projects that implement WZSLR, Caltrans has a general work zone management plan that documents the work zone speed reduction request from the local districts and requires contractors to collect traffic speed and other related traffic data during construction. However, the traffic data collected is not centralized, categorized, and evaluated over the entire California highway network based on the work zone type and location.



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Thus, a rigorous evaluation of any WZSLR strategy requires the assimilation of data from different Caltrans districts. The proposed study will address the needs and proceed in two phases.

The first phase will gather and centralize the traffic data from the previous work zone projects throughout California in the last five years (which will need close collaboration with various Caltrans districts), assess data quality, and perform a preliminary analysis of the effectiveness of WZSLR based on this assembled data set.

This preliminary analysis will help guide the Phase 2 project, where the most used WZSLR strategies identified by Caltrans will be tested in the field with thoughtful experimental design and data collection that can help the researchers draw convincing conclusions about the effectiveness of the tested WZSLR strategies. The execution of Phase 2 needs close cooperation from the Caltrans districts where the field tests are carried out.

## WHAT IS OUR GOAL?

The project aims to assess the effectiveness of WZSLR strategies across California based on work zone location and type, traffic volume, and classification. To achieve this, the project is divided into two phases with Phase 1 focusing on existing literature, data, and work zone safety practices in and outside of California. Phase 2 uses controlled experiments to dig deeper into the safety impact of selected WZSLR strategies through field studies in California.

## WHAT IS THE BENEFIT?

The research will assess the effectiveness of WZSLR strategies across California based on work zone location and type, traffic volume, and classification. In addition, the WZSLR strategies identified by Caltrans will be tested in the field with thoughtful experimental design and data. This research will provide impacts of selected WZSLR strategies and results in a recommendation for Caltrans to use.

## WHAT IS THE PROGRESS TO DATE?

Researchers completed an in-depth review of the state-of-the-art literature on work zone safety. They obtained access to the Highway Safety Information System (HSIS) for crash injury records and roadway characteristics data. Gathered data from the publicly available traffic volume datasets through the California Traffic Census program (Caltrans, 2019). Last, Caltrans supplied researchers with the lane closure system (LCS) reports, which include records of submitted lane closure requests for maintenance and construction activities across the state, containing some characteristics of work zones in California. The researchers combined all data to attempt to link safety and work zone data for further analysis. The matching process resulted in 3327 crash records referred to as crashes in work zones with lane closures. From the comprehensive data set the researchers constructed a multinomial logit (MNL) model which elucidates the effects of different features on the likelihood of injury severity outcomes in all work zones across California. The detail analysis and completion of phase 1 is expected in Summer 2024.

## IMAGES

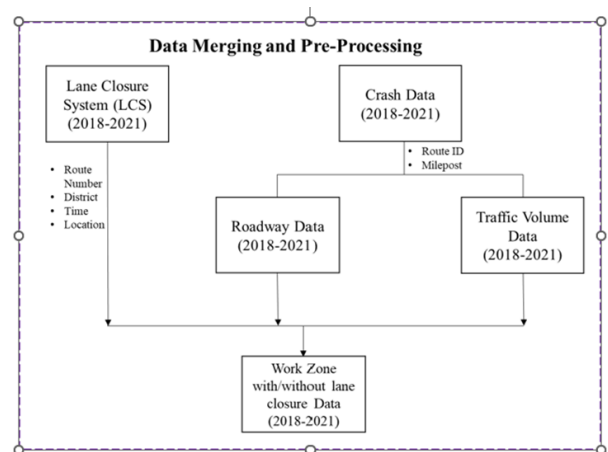


Image 1: Data Merging and Pre-processing

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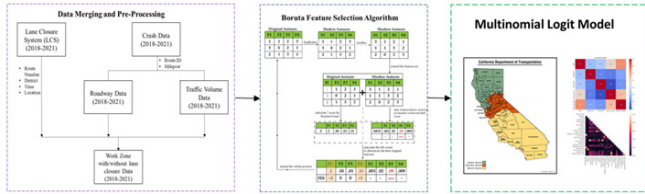


Image 2: Research Framework

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