

# Research Summary

## Mitigating and Preventing MoDOT Safety-Related Incidents through Root-Cause Elimination and Utilization of Leading Safety Indicators

Work zones are crucial for infrastructure maintenance and improvement. However, ongoing projects within work zones can sometimes place workers and drivers in dangerous situations. Despite safety regulations, work zone accidents continue to occur with significant severity and frequency.

This research project focused on evaluating the contributing factors to work zone incidents in Missouri. This project first conducted a systematic literature review (SLR) aimed at synthesizing the existing body of knowledge concerning work zone safety. As a result of the SLR, a comprehensive list of 37 factors was delineated, encompassing design-related, roadway-related, work-related, driver-related, temporal-related, and state-related variables.

Subsequently, this project administered surveys to both Missouri Department of Transportation (MoDOT) employees and contractors. The objective was to ascertain the relative importance of various factors affecting work zone safety,



evaluate their perceptions of MoDOT's performance, and assess compliance with state and federal safety-related policies in the field. A total of 298 work zone professionals from diverse backgrounds participated in the survey, having an average of 17.75 years of construction experience and 13.78 years of work zone experience. Furthermore, clustering analysis was utilized to partition the studied factors into distinct groups with varying levels of importance.

Survey results indicate that driver-related factors, such as the driver's level of attention and unsafe driving, are perceived as most critical to worker safety in work zones. Conversely, factors associated with motorist vehicles, conditions of construction equipment, and technological sophistication are perceived as the least critical.

Findings from the clustering analysis revealed three groups of factors with varying levels of criticality, where the most critical group comprised driver, work, and design-related factors, while other factors and their corresponding groups showed relatively lower criticality.

Survey respondents also evaluated MoDOT's performance across factors influenced by the state. While MoDOT's performance received



substantial ratings across all domains, contractors consistently rated MoDOT lower than employees did, suggesting a disparity between the viewpoints of MoDOT employees and those of on-site contractors. Notably, both stakeholder groups identified law enforcement as the aspect with the least satisfactory performance.

*"This nuanced assessment highlights areas where MoDOT can further fortify its safety culture and enhance employee safety and well-being."*

Additionally, MoDOT employees were tasked with evaluating field compliance with various safety-related policies. While MoDOT employees generally perceive most policies to be strongly complied with or adopted on-site, compliance with the "Backing" policy, which is the leading cause of occupational injuries in work zones, received lower compliance ratings. Additionally, certain aspects of safety incident investigation and improvement processes received lower ratings, signaling opportunities for strengthening MoDOT's safety culture and incident response mechanisms.

By addressing the identified deficiencies, MoDOT can effectively mitigate risks and foster a safer work environment for its employees and all stakeholders engaged in transportation projects.

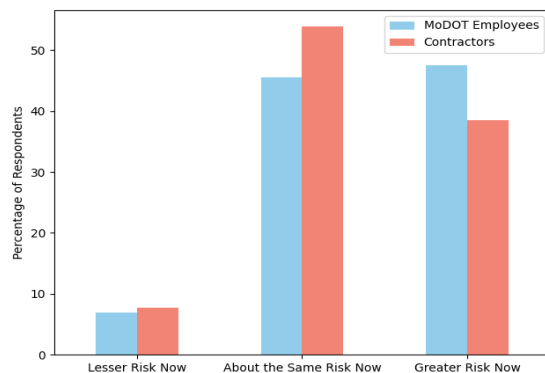


Figure 1. Trajectory of work zone safety risks

## Project Information

**PROJECT NAME:** TR202212—Mitigating and Preventing MoDOT Safety-Related Incidents through Root-Cause Elimination and Utilization of Leading Safety Indicators

**PROJECT START/END DATE:** September 2022-August 2024

**PROJECT COST:** \$249,999

**LEAD CONTRACTOR:** Missouri Center for Transportation Innovation

**PRINCIPAL INVESTIGATOR:** Dr. Islam El-adaway

**REPORT NAME:** Mitigating and Preventing MoDOT Safety-Related Incidents through Root-Cause Elimination and Utilization of Leading Safety Indicators

**REPORT NUMBER:** cmr 24-012

**REPORT DATE:** August 2024

## Project Manager



## CONTACT INFORMATION:

**Scott Breeding**  
Senior Research Analyst  
Missouri Dept. of Transportation  
1617 Missouri Blvd.  
Jefferson City, MO 65109  
(573) 526-4325  
[Scott.Breeding@modot.mo.gov](mailto:Scott.Breeding@modot.mo.gov)

