Evaluation of Work Zone Intrusion Alarms

The research tests and evaluates Work Zone Intrusion Alarm (WZIA) systems with the intention of increasing highway worker safety.

WHAT IS THE NEED?

Maintaining worker safety in work zones remains of paramount concern to California Department of Transportation (Caltrans), as well as other highway agencies throughout the United States. Some ways to ensure highway worker safety in work zones include uses of safe work practices and additional safety measures such as Portable Changeable Message Signs and automated flagging assistance.

Caltrans employees set up highway lane closures to create work zones for workers to conduct highway maintenance activities. Even with proper equipment and standard layouts, unauthorized vehicles still enter these work zones, compromising the safety and well-being of workers and traveling motorists. Minimizing risks associated with vehicles entering work zones motivates the need for the research.

WHAT ARE WE DOING?

This research includes examining, testing, and evaluating Work Zone Intrusion Alarm (WZIA) systems in various work zone conditions. A WZIA system is an impact-activated safety device that warns work crews of errant vehicles to help prevent injuries in work zones. Caltrans completed a Preliminary Investigation (PI) of commercially available WZIA systems. Information from this PI report will be analyzed to assess the need for any augmentation pertaining to literature or available technologies.

Under the Project Panel’s (Panel) direction, this analysis will prompt the selection and procurement of different WZIA systems. With the Panel’s guidance, the researchers will develop a preliminary set of testing protocols to evaluate the performance and implementation of the selected WZIA systems. Next, the research team will conduct initial pilot
tests on the WZIA systems in a controlled environment to gain an understanding of the deployment, practical implementation, system capabilities, and limitations. In addition, the researchers will guide and train Maintenance staff on the usage and deployment of WZIAs as well as collect and analyze data from the pilot tests. Following the pilot tests, the Panel will identify appropriate maintenance projects to test WZIAs in active work zones.

Caltrans maintenance staff and contractors plan to test and deploy the WZIA systems while the researchers collect video, worker crew surveys, and usage data. The researchers will provide a cost-benefit analysis of the tested WZIA systems to help determine the worthiness of implementing these systems.

WHAT IS OUR GOAL?

The goal includes determining if WZIA equipment increases safety in temporary work zones by giving workers advance notice when unauthorized vehicles enter the work area. Contingent on the WZIAs’ effectiveness, Caltrans may utilize WZIA equipment to augment current Caltrans Standard Plans.

WHAT IS THE BENEFIT?

WZIA equipment implementation would support Caltrans to improve business practices towards enhancing worker safety. Although Caltrans is the immediate beneficiary of the proposed research, any organization involved in work zone safety improvements, particularly worker safety improvements, could adopt the developments from the proposed research into their work zone practices.

WHAT IS THE PROGRESS TO DATE?

Following a December 14, 2017 Panel meeting, California State University, Sacramento (CSUS) researchers conducted additional reviews of WZIA systems and related devices / technologies in view of potential applications to specific Caltrans Standard Plans.

Caltrans Division of Research, Innovation and System Information held an interactive Panel Workshop on March 9, 2018 with CSUS researchers and Caltrans panel members. The Panel supported the researchers with expertise on how WZIA devices may or may not apply in Caltrans T10 (Traffic Control System for Lane Closure on Freeways and Expressways) and T13 (Traffic Control System for Lane Closure on Two Lane Conventional Highways) Standard Plans.

From the workshop, the Panel selected five systems for further research and formal testing:

1. Traffic Guard Worker Alert
2. Intellicone
3. SonoBlaster
4. AFAD 76-X (available with Caltrans)
5. Rumble Strip (Astro Optics Portable Speed Bump)

CSUS submitted a WZIA Systems Assessment and Literature Review report on April 17, 2018. The report includes a list of available and emerging WZIA products and related technologies with specifications, system types, and related literature. With Panel collaboration, CSUS completed a detailed assessment to determine the quantities, types, and specifications of each WZIA device selected for procurement. CSUS contacted WZIA vendors and ordered the Intellicone, Traffic Guard Worker Alert, and SonoBlaster systems.

The CSUS researchers developed testing plans, protocols, and a schedule for pilot testing. The research team pilot tested three WZIA systems at the Caltrans Maintenance Equipment Training Academy test site on November 13-16, 2018.

The researchers presented the pilot test results at the December 5, 2018 Panel meeting. Based on the pilot test results, performance of the tested WZIA systems, and Panel input, CSUS contacted the perspective WZIA vendors to discuss related issues to the performance of the WZIA devices.