



Caltrans Division of Research,  
Innovation and System Information

# Research



# Results



Transportation  
Safety and  
Mobility

## October 2013

**Project Title:**

Augmented Speed Enforcement (aSE) Part 1 of 2 WTI- Western Transportation Institutet

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## Augmented Speed Enforcement (aSE) Part 1 of 2 WTI- Western Transportation Institute

The augmented Speed Enforcement project detected and warned speeding vehicles in a work zone and warned workers.

### WHAT IS THE NEED?

A practical method of detecting speeding vehicles and warning them to slow down is needed for use by construction and maintenance workers in rural work zones. Although fewer vehicle miles are traveled in rural areas than urban areas, there are approximately 42 percent more fatal crashes in rural areas compared to urban areas. Aggressive driving behaviors such as speeding are primary factors contributing to major-injury and fatality crashes. Moreover, studies have shown higher crash rates at specific highway locations such as work zones that temporarily set lower speed limits. Work zone crash rates are especially high on rural two-lane two-way highways. Caltrans proposed an innovative safety program consistent with the objectives of the Rural Safety Innovation Administration (RITA) of U.S Department of Transportation to reduce speed related crashes with coordinated speed management systems. This project was a joint effort between the Western Transportation Institute at Montana State University (WTI) and Caltrans.

### WHAT WAS OUR GOAL?

The goal of this project was to reduce vehicle speeds in rural work zones, thereby reducing the number and severity of crashes on rural highways. That will reduce the number of fatalities and injuries to the driving public and workers in these work zones.

### WHAT DID WE DO?

The system developed by WTI consists of 28 orange traffic drums (called smart drums or sDrums- see figure 3) that were positioned adjacent to the orange cones marking the work zone lane closure (see figure 1). When the system detected a speeding vehicle approaching, it synchronously flashed the orange lights



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on top of the drums, warning the driver to slow down. The flashing lights also alerted workers that a vehicle was speeding through the work zone. If the vehicle speed was above a set trigger speed, the system activated a pager system that also warned the workers of the speeding vehicle. The high level system architecture is shown in figure 2.

A separate system was developed by the Partners for Advanced Transportation Technology (PATH) at the University of California, Berkeley, California (UCB). That system was evaluated both separately and in conjunction with the WTI system. The PATH system is fully described in a separate Research Results document.

## WHAT WAS THE OUTCOME?

The result of the project was a prototype system of 30+ smart traffic drums developed and tested by Montana State University. The system was tested for four weeks on SR 152 near Los Banos, CA. The system successfully detected speeding vehicles and synchronously flashed the warning lights (visible in figure 3). The pagers vibrated at the detection of a vehicle traveling 20 mph over the speed limit. Researchers found the daily deployment and retrieval of the system was labor intensive. Evaluation of speed data shows that the system did have an impact resulting in an approximate 5% (1.7 mph) reduction in vehicle speeds compared to the baseline speeds with the lane closure and workers, but no system deployed. When used in conjunction with the PATH system (described in a separate Research Results document), vehicle speeds were reduced by approximately 8% (2.4 mph), again compared to the baseline speeds with the lane closure and workers, but no system deployed. Further work is needed to develop a fully hardened system that will be easily and quickly deployable by workers to slow traffic in work zones.

## WHAT IS THE BENEFIT?

The WTI aSE system influences drivers, causing them to slow down in the work zones when they see the flashing lights. The flashing lights also warn workers to be cautious when speeding vehicles are approaching. The combined effect of slowing traffic and warning workers has the potential to reduce the number and severity of crashes in work zones, resulting in fewer fatalities and fewer and less severe injuries to the traveling public and the workers. The system will give Departments of Transportation one more tool available to reduce vehicle speeds in work zones.

## LEARN MORE

The final report will be available on the DRISI website by early 2020.

## IMAGES

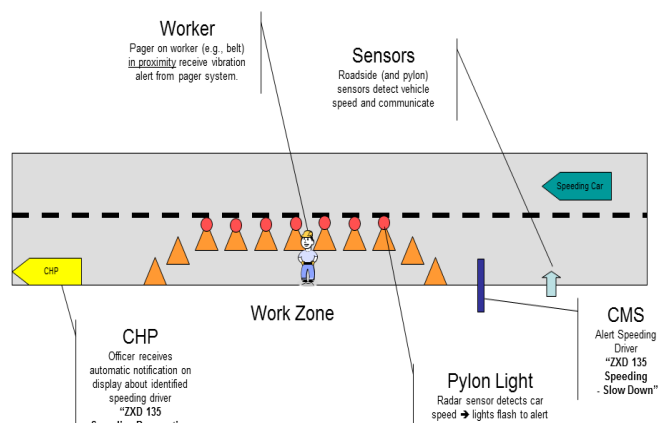


Image 1: Work Zone aSE System Layout

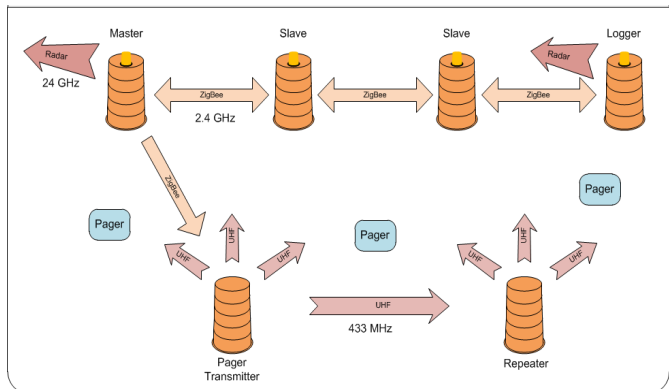


Image 2: sDrum System Architecture



Image 3: Warning Lights on SR52 Los Banos, CA

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