



Caltrans Division of Research,  
Innovation and System Information

# Research



# Results



Maintenance

MAY 2016

**Project Title:**

Evaluate Photo Speed Enforcement in Work Zones

**Task Number:** 2405

**Completion Date:** September, 31, 2015

**Task Manager:**

Sukhdeep Nagra,  
Transportation Engineer  
sukhdeep.nagra@dot.ca.gov

## Evaluation of Photo Speed Enforcement (PSE) in California Work Zones

Evaluate the effectiveness of Photo Speed Enforcement in reducing the speed of vehicles passing through California highway work zones.

### WHAT WAS THE NEED?

Work zone safety is important not only for highway workers but also for the traveling public. Adherence to speed limits in work zones can provide safety benefits by reducing the number and severity of collisions. Some states have enacted laws and have adopted the use of automated Photo Speed Enforcement (PSE) for highway work zones. The operational concepts and the technologies utilized are, however, different among some of the states utilizing PSE. This research was intended to evaluate existing practices, available technologies, and perform testing to establish the guidelines and recommendations of an operational concept for consideration in the deployment of such technology in California highway work zones.

### WHAT WAS OUR GOAL?

The overall goal was to evaluate available PSE technologies, the existing practices for its use, and whether the technology can be configured for implementation in California highway work zones in an effective manner that will result in adherence to the speed limits and improved work zone safety for highway workers and the traveling public.

The particular research objectives were as follows:

1. Develop an understanding of the specific methodologies used by other states (for example, Illinois, Arizona, Oregon, and possibly Washington) and determine what lessons can be learned from these states' experiences.
2. Develop an understanding of the operational conditions that would limit the capability of existing PSE technologies.
3. Develop an understanding of some of the requirements for



DRISI provides solutions and knowledge that improves California's transportation system

- PSE technology in its effectiveness in the field.
4. Develop recommendations for operational concepts for an effective system of automated speed enforcement in highway work zones in California.

## WHAT DID WE DO?

A four-step methodology was used in this research.

The first step involved bringing together, in a workshop, the key personnel involved in PSE implementation from some of the states in which it had been utilized. The workshop provided an opportunity to develop an understanding of the experiences gained by the participating states and their knowledge of what does and does not work in the process of instituting PSE.

The second step involved testing PSE technologies in a controlled environment. A series of controlled tests were performed at California Highway Patrol (CHP) facilities. The tests were designed to determine the operational limitations of existing PSE technologies.

The third step involved the field-testing of PSE technologies in active California work zones. Through coordination with the California Department of Transportation (Caltrans) and the CHP, test sites were identified in both northern and southern California, and some of the available PSE technologies were tested in actual highway work zones. During the controlled as well as the field-testing, three different PSE technology vendors participated and provided their personnel and equipment for data collection.

In the fourth and final step, results from the data collected during field-testing were analyzed to assess the magnitude of the speeding problem in California as well as to understand the limitations and capabilities of PSE technologies.

## WHAT WAS THE OUTCOME?

The results from the field-testing indicated that exceeding the speed limits is a major problem in California highway work zones.

For example, the test results from the Northern California test site (in the Stockton area) indicated that the number of speeding vehicles during the midnight to morning shift was in excess of approximately 500 to 1,000; in the morning and afternoon shifts, the number of speeding vehicles exceeded approximately 1,000 to 1,200. In Southern California (in Los Angeles area), the corresponding numbers ranged from approximately 700 to 2,000 vehicles in the midnight shift, up to 2,000 vehicles in the afternoon shift, and up to 3,500 vehicles in the morning shift.

Considering that the sensors were not able to capture all speeding vehicles in each lane or from multiple unobserved lanes, this data illustrates the numerical magnitude of the speeding problem in the work zones. There was no traffic count data available to evaluate the percentage of speeding vehicles compared with those driving within the speed limit during each shift.

The PSE systems tested did not generate an event for every detected vehicle at or above its trigger speed. If the quality of speed-reading was not good enough, the PSE systems did not take pictures of the vehicle, even if it was traveling at or above the trigger speed. However, approximately 60% of speeding vehicles for targeted lanes were captured by the PSE systems. For a fully citable event involving a speeding vehicle, both the license plate of the vehicle and the driver had to be properly identified. Some images were not very clear and some had obstructions due to the sun visor or drivers wearing sunglasses.

Analysis of the data captured indicated that percentages of citable events were below 50% for all PSE equipment tested. At the test site in Northern California, which evaluated two traffic

lanes, the percentage of citable events was estimated at approximately 30-50%. In the data for the test site in Southern California, which evaluated four traffic lanes, the percentage of citable events dropped to approximately 5-20%.

The CHP, therefore, determined that while the PSE technology showed it had the ability to capture data, the reliability and the effectiveness of the findings did not meet the level considered necessary for its enforcement.

It should also be noted that, although the percentage of citable events was relatively low, the number of events captured in any given period of time far exceeded the numbers that currently can be handled by on-duty police officers pursuing speeding drivers at the locations.

For example, if one considers the morning shift, the number of potentially citable events for Stockton (the Northern California test site) would range from 23-52 per hour. In Los Angeles (the Southern California test site), similar numbers for the morning shift would have a range of 5-13 per hour.

However, other issues were considered in CHP's determination not to implement PSE. These included, for example, problems associated with the judicial handling of citable events based on existing laws, the impact of the potentially much higher volume of citations on the judicial system, and the lack of any data on public acceptability of the use of PSE technology for work zone speed enforcement.

Based on the results of this research study, the recommendations are:

1. Any future implementation of PSE for work zones should start with a pilot study, with a clear review of its impact after the study.
2. Methods of communication with and notification of the public regarding the implementation of this method of speed enforcement need to be evaluated.
3. Any future implementation of this technology

should include periodic reviews of its overall impact. For example, reviews can be conducted on a two-year basis and upon consideration of PSE's continued implementation based on the results of those reviews, especially in terms of its impact on improved safety.

4. Due to the potential sensitivity of the generated revenue, thoughtful governance on income dispersal brought in by fines should be addressed up front.
5. The relevant courts involved in the judicial handling of the citations generated need to be fully communicated with and provided the resources needed to manage the potential increase in the number of citations.
6. Automated Speed Enforcement Systems should be designed such that it should aid the officer on duty to identify the violating party in near real time. The officer on duty may issue a warning to the violating party based on the data provided to the officer

## WHAT IS THE BENEFIT?

By carrying out this study we have learned that speeding at California highway work zones is a major issue. We have also identified photo speed identification technologies as well as the capabilities, configurations, advantages and disadvantages of the technologies. As part of this study we also learned what other states have done to implement photo speed enforcement.

## LEARN MORE

### View the Final Report

<https://dot.ca.gov/-/media/dot-media/programs/research-innovation-system-information/documents/final-reports/ca15-2405-finalreport-ally.pdf>