

Design/  
Construction

MARCH 2013

**Project Title:**Evaluation of Radar/CMS Trailers to  
Reduce Speeds in Work Zones**Task Number:** 2247**Completion Date:** April 23, 2013

This project investigated whether trailer-based radar and changeable speed signs that display driver speeds are effective in reducing speeds, as compared to positioning a CHP officer on-site or using only cones and lane closures.

**Task Manager:**Hassan Ghotb,  
Transportation Electrical Engineer  
[Hassan.Ghotb@dot.ca.gov](mailto:Hassan.Ghotb@dot.ca.gov)

## Increasing Safety in Work Zones

*Can radar and changeable message signs reduce speeds significantly in work zones without CHP officers?*

### WHAT WAS THE NEED?

Drivers who don't slow down in construction and maintenance zones are one of the biggest dangers that Caltrans road workers face. The agency spends millions of dollars each year employing the California Highway Patrol (CHP) to enforce posted work zone speed limits by sites during work hours with their lights flashing.

Caltrans and CHP wanted to investigate less expensive and more effective options for reducing traffic speeds in work zones. CHP currently owns Radar Detection and Changeable Message Sign (CMS) trailer units that they wanted to evaluate as deterrents to speeders. If proven effective, these devices could allow CHP to return some of the officers dispatched in work zones for other duties. In addition to a radar detection unit and a portable message sign displaying a driver's speed, these trailers have flashing yellow and blue lights that mimic the presence of a CHP vehicle. Having the blue lights on the trailer requires that CHP transport these units and operate them in the field, requiring CHP presence to deploy them.

### WHAT WAS OUR GOAL?

This field pilot evaluated the use of CHP's Radar/CMS trailers to determine whether these stand-alone trailers are as effective as officer-enforced construction or maintenance zones in reducing traffic speed in work areas.



*Overview of the  
oncoming traffic during  
one of the tests*



### WHAT DID WE DO?

Caltrans conducted field experiments to compare the average traffic speeds, volume, and lane distribution at key locations in a work zone with and without the use of the CHP Radar/CMS trailer and a CHP officer parked in a patrol vehicle on-site. Average traffic speeds were collected using iCones—radar speed sensors hidden inconspicuously inside orange traffic barrels—and traffic volume and lane distribution information were captured using video cameras mounted on a mast. This test methodology was based on the use of the iCone system and allowed for rapid deployment and collection of average traffic speed.

Three conditions were evaluated: standard lane closure, lane closure with CMS, and lane closure with CMS plus CHP. Data was gathered during the test and then post-processed by researchers to find correlations between trends in the data and conditions.

### WHAT WAS THE OUTCOME?

Based on experimental data, Caltrans found:

- Lane closure alone, with no additional equipment deployed, resulted in a reduction of the average traffic speed of 5 to 5.5 MPH.
- Total lane closure plus the Radar/CMS trailer resulted in a reduction of the average traffic speed by 8 to 12.5 MPH.
- Lane closure plus the Radar/CMS trailer plus the use of a CHP officer in a police vehicle resulted in a total reduction of the average traffic speed of 10.5 to 14 MPH, a slight improvement over the use of the sign alone in the work zone closure.

These results were obtained from a limited number of field tests, and the implication of these findings should be used cautiously. The test also was limited to short-duration work zones, not semi-permanent construction zones.

### WHAT IS THE BENEFIT?

This research demonstrated that using a CHP-operated Radar/CMS trailer in conjunction with a normal maintenance work zone closure slows traffic more than the work zone closure alone. In some work zones, it may be possible to have the CHP position the sign and turn it on and then become a roving resource in and near the work zone, allowing the CHP unit to be more effective than sitting in the work zone with lights flashing. This would provide a more efficient use of resources.

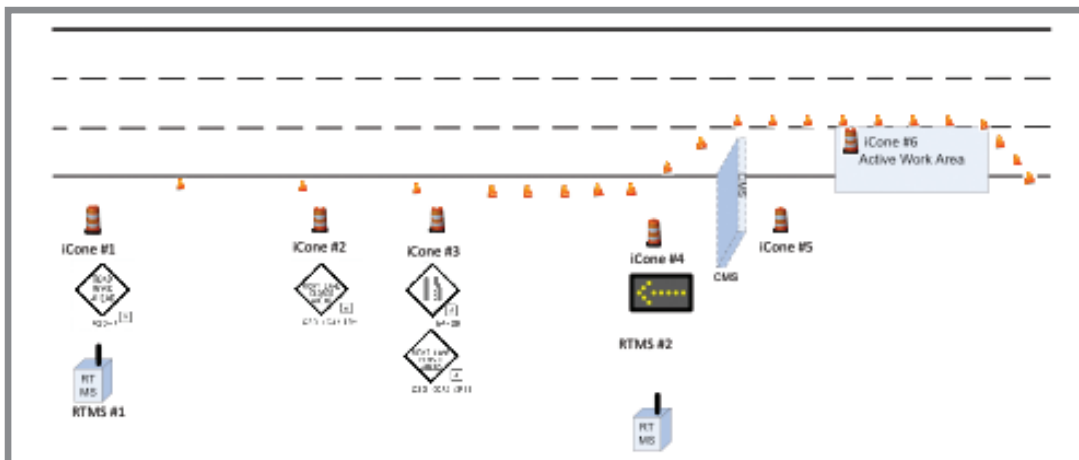
Caltrans is planning to conduct additional research with a similar trailer that uses only yellow flashing lights (no blue light), which could be deployed by Caltrans construction or maintenance personnel without requiring the presence of CHP officers. Future research will also need to determine the criteria to select work zones for yellow-light-only trailers as opposed to using CHP trailers with blue lights.

Based on these results, the use of the CHP Radar/CMS trailer as configured in this study, in combination with an officer, provides for further speed reduction. In the absence of a CHP officer, the CHP Radar/CMS trailer improves the safety in terms of reduced speeds, at least for short duration work zones.

To provide more statistically representative samples, more testing is recommended. Testing in construction work zones is also recommended to see if the results correlate with the data obtained in maintenance work zones. Other factors affecting traffic patterns should be considered in future studies for better understanding of the effectiveness of the CHP Radar/CMS trailer.

### LEARN MORE

The final report will be available on the DRISI website by late spring 2013.



Generic test layout