



Project Summary Report 0-4707-S

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Project 0-4707: Development of Measures for Motivating Drivers to Comply with Speed Limits in Work Zones

Authors: Marcus A. Brewer, Geza Pesti, and William Schneider IV

Summary of Treatments to Improve Work Zone Speed Limit Compliance

Motivating drivers to comply with traffic regulations is an extremely important yet challenging task. Further, motivating drivers to comply with regulations within work zones is critical to the safety of both motorists and workers approaching and within the work zones.

According to the Texas Department of Public Safety, more than 9500 crashes occurred in work zones on the state highway system in 2000, and these crashes resulted in 143 fatalities and approximately 9900 injuries. Speed was cited as a contributing factor in approximately 42 percent of these crashes.

Improving compliance with work zone speed limits (WZSL) is a vital step to improving work zone safety and reducing

the number of injuries and fatalities that occur within them. The problem is not new, and many efforts have been made to address the problem. These efforts have had varying degrees of effectiveness; some should be utilized on a more widespread basis, while others should be refined or discontinued. However, identifying the proper treatments to use at a given work zone is sometimes difficult. A project engineer has to know what treatments are available and then determine which ones are appropriate for existing conditions.

To address these concerns, the Texas Department of Transportation (TxDOT) sponsored Project 0-4707: Development of Measures for Motivating Drivers to Comply with Speed Limits in Work Zones. The goal

of Project 0-4707 was to determine effective measures to motivate and encourage drivers to observe posted speed limits in work zones by:

- evaluating traditional measures including speed limit enforcement and traffic control devices,
- identifying new technologies that may be suitable for work zones,
- field-testing two to three promising devices, and
- developing guidelines for recommended work zone designs based on literature review and field testing.

What We Did...

The research team completed three major tasks: an extensive review of previous studies and current practices, a survey of Department of Transportation (DOT) personnel within



Texas and in other states, and the field testing of three devices to determine their effectiveness on WZSL compliance.

The literature review explored research results as well as programs initiated by state DOTs. Common treatments included enforcement, speed display trailers, changeable message signs, signs and markings, flagging, and comprehensive programs that utilize one or more of these treatments in combination.

Survey participants were asked about current practices in setting and posting work zone speed limits, advance warning, enforcement methods, use of signs, innovative messages, and speed display devices, and about the effectiveness of treatments. Two surveys were created, one for TxDOT personnel and one for out-of-state representatives. Both versions of the survey were conducted via the Internet. A request to participate was sent via e-mail to all 25 TxDOT district engineers and 55 representatives in the DOTs of 47 other states. For the TxDOT survey, 18 responses were received from 14 districts, as some district engineers forwarded the survey instructions to their area engineers. For the out-of-state survey, there were 15 responses from 15 states.

Based on findings from the literature review and DOT survey, researchers developed a list of treatments with potential for field testing. After consultation with project advisors, three devices were selected for testing: orange-border speed limit signs (OBSLS), speed display trailer (SDT), and portable changeable message sign with radar (PCMR). Ultimately, two sites were used for field testing: I-20 west of Weatherford and US-59 in Shepherd.

What We Found...

State of the Practice

Review of the literature revealed that there have been numerous methods used to improve WZSL compliance. States' procedures for setting work zone speed limits can vary widely, and different agencies use a variety of methods for installing treatments and arranging for enforcement. The problem of noncompliance is widespread, but methods for addressing the problem can be quite different. Many of these methods had minimal effects, but enforcement, flagging, speed display trailers, and changeable message signs consistently showed measurable positive results.

Survey Results

Based on the responses of survey participants, engineering judgment and a 10 mph reduction are the most common approaches for determining the appropriate value for a work zone speed limit, but the former can be fairly subjective while the latter may be a blanket approach that incorporates little or no consideration of conditions in the work zone. TxDOT engineers preferred to post WZSLs in proximity to actual work being performed, but the preference and the practice may be different when it comes to implementation. Speed display trailers are used much more commonly in Texas than in the rest of the country, while other states use beacons and flags more frequently than Texas. PCMRs are not often used in Texas, though they are increasingly common in other states. Law enforcement was widely considered to be the most effective treatment, but the way it is implemented and funded varies greatly.

Field Testing

Based on the findings from analysis of field data, researchers came to the following conclusions:

- Devices that display an approaching driver's speed



are effective at reducing speeds and improving work zone speed limit compliance.

- Orange borders are a low-cost method of substantially improving the visibility and conspicuity of speed limit signs (see Figure 1). They are well received by workers, but they do not show a consistent measurable effect on improving compliance. They should be used in conjunction with other devices to obtain the greatest benefit.
- Drivers tend to travel as fast as they feel comfortable, absent the threat of enforcement. Even in areas posted as work zones with reduced speed limits, if there are no indications that active work is taking place and the road maintains a normal cross section, drivers will generally maintain the speed they were traveling before entering the work zone, regardless of the posted work zone speed limit.
- To avoid work zone speed limits that are ignored or widely disobeyed, limits should be posted at realistic values and should be confined as much as possible to the specific areas where active work is taking place.

The Researchers Recommend...

The document *Proposed Material for Inclusion in the TxDOT Work Zone Safety and Mobility Manual* serves as the main implementation product from this project and is included in Technical Report 0-4707-1 as Appendix B. It provides descriptions of a variety of work zone conditions that affect drivers' speeds and available treatments to improve WZSL compliance. It also contains a generalized flowchart outlining the decision process a project engineer may take in deciding what treatments are appropriate for a particular work zone.

There are a wide variety of available treatments with varying degrees of effectiveness in improving work zone speed limit compliance (see Figure 2).



Figure 1. Orange-Border Speed Limit Sign.

Implementing these treatments appropriately, along with consistent presentation of realistic work zone speed limits, can help motivate drivers to comply, which will reduce speeds and lead to improved safety for workers and motorists alike.

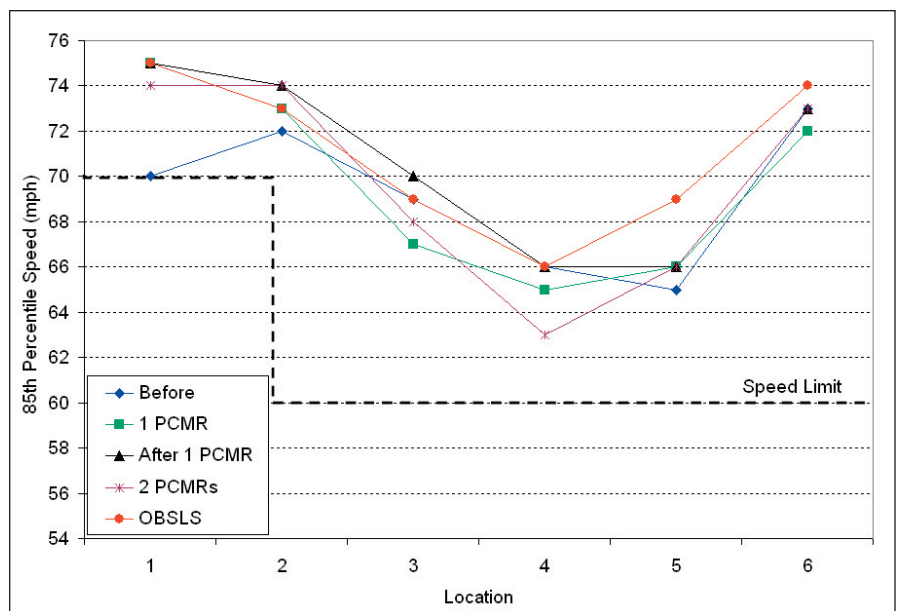


Figure 2. 85th Percentile Speeds at the I-20 Study Site.



For More Details...

Related Reports: The research is documented in Report 0-4707-1, *Identification and Testing of Measures to Improve Work Zone Speed Limit Compliance*.

Research Supervisor: Marcus A. Brewer, P.E., m-brewer@tamu.edu, (979) 845-7321

Researchers: Geza Pesti, Ph.D., P.E., g-pesti@tamu.edu, (979) 845-1728
William Schneider IV, Ph.D., b-schneider@tamu.edu, (979) 845-7321

TxDOT Project Director: Darren McDaniel, Traffic Operations Division,
dmcdanie@dot.state.tx.us, (512) 416-3331

TxDOT Research Engineer: Wade Odell, P.E., Research and Technology Implementation
Office, wodell@dot.state.tx.us, (512) 465-7403

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