

# IMPROVING MOTORIST UNDERSTANDING OF TRAFFIC CONTROL DEVICES

## PROBLEM STATEMENT

As a vital element of the roadway environment, traffic control devices communicate important information to the driver. Since the beginning of the twentieth century, they have increased in number and complexity. Today, these devices include many signs, markings and signals using different shapes, colors, symbols, and/or words that convey a variety of information, such as applicable traffic laws/regulations, potential hazards, geographic points of reference, and confirmation of intended driving behavior.

Researchers consider a number of criteria when evaluating the overall effectiveness of these devices—understandability, recognition time, conspicuity, legibility distance, glance legibility, and learnability. A noted TRB study has identified “understandability,” or comprehension, as the most important of these evaluation criteria. A driver must know what a traffic control device, or some part of it, means before he or she can respond properly. With this in mind, the next most obvious question becomes—how well *do* motorists understand different devices? How can comprehension of a device be increased? Answers to these questions are important to the continued improvement of our travel environment.

## OBJECTIVES

The Texas Transportation Institute (TTI) conducted study 0-1261, *Assessment and Improvement of Motorist Understanding of Traffic Control Devices*, for the Texas Department of Transportation (TxDOT) and the Federal Highway Administration (FHWA) to improve one of the Department’s primary means of communicating information to drivers. The study assessed driver understanding of selected traffic control devices and then, keeping implementation activities as the key goal, recommended ways to increase understanding of devices that demonstrated a potential for improvement.

With 2,414 drivers taking part, researchers analyzed 52 different traffic control devices through five different evaluation procedures. A statewide survey of 1,745 drivers was given in 12 Texas cities. The results were used to develop a series of follow-up evaluations which included two smaller follow-up surveys of 5 and 10 devices, a Spanish-language survey, and finally, three focus groups of 10 drivers each. From careful analysis of all five

## REVISION 5 TO THE 1980 TEXAS MUTCD



R3-7



W14-4



R10-9a

Fig. 1. Revision 5 deletes 2 signs and adds a supplemental distance plaque to another.

evaluation findings, along with numerous technical panel meetings, the study recommends a detailed implementation plan for improving motorist understanding of selected traffic control devices.

### FINDINGS

The majority of the evaluation effort was devoted to the statewide survey. The survey instrument was a 17-minute videotape which presented in-context and close-up images for each device. The response percentages are described in TTI Research Report 1261-2. Chapter III of TTI Research Report

1261-4 describes the follow-up evaluations, with Chapter IV containing detailed findings and recommendations for each of the 52 traffic control devices. For every device included in the study, researchers placed it in one of four implementation categories: take no action, change TxDOT practices, increase driver awareness/education, or conduct additional research. The following is a list of important points pertaining to those devices which called for a change in TxDOT practice:

- In Revision 5 of the Texas MUTCD, the PROTECTED LEFT ON GREEN sign (R10-9a) and the LIMITED SIGHT DISTANCE sign (W14-4) were deleted. Also, a supplemental distance plaque may now be used below the Mandatory Turn Sign

(R3-7) to indicate the location of a restriction (see fig. 1).

- When the recently revised Part VI of the national MUTCD is adopted by Texas (by January 1996), uneven pavement construction signs (CW8-9a, CW21-13, and CW21-14) will change from symbol signs to word message signs (see fig. 2).

- In July 1994, the Traffic Operations Division distributed a memorandum to each TxDOT district which described changes in the use of several traffic control devices. The devices included in this directive are shown in figure 3, along with a brief description of the change.

### IMPLEMENTATION

Implementation of results and recommendations was a key goal

## PART VI OF THE NATIONAL MUTCD



CW21-14



WB-11



CW21-13



WB-9a



WB-9a



WB-9

Fig. 2. By January 1996, Texas must adopt the recently revised Part VI of the National MUTCD, which calls for the above symbol-to-text changes.

## RECOMMENDED CHANGES IN TxDOT'S USE OF TRAFFIC CONTROL DEVICES



W8-8



W8-12

**ROUGH ROAD** sign should replace the **GROOVED PAVEMENT AHEAD** sign.



R2-5a



R2-5c

**REDUCED SPEED AHEAD** sign will replace the **SPEED ZONE AHEAD** sign.



W1-2



W1-1

**CURVE** and **TURN** symbol signs should have an advisory speed plaque.



W6-3



W6-2

**DIVIDED HIGHWAY ENDS** symbol sign should be used at the end of a divided highway and followed by a **TWO-WAY TRAFFIC** symbol sign.



R4-3b

When double solid lane lines are used, the **DO NOT CROSS DOUBLE WHITE LINE** sign should be used.

in this study's overall research plan. While in several cases researchers found that driver understanding of a device could be improved by a change in TxDOT practice (as highlighted above), for some devices, researchers concluded that many drivers simply do not understand basic fundamentals of traffic control devices, such as the colors and shapes associated with signs and pavement markings. In these cases, researchers recommended the most effective implementation activity as one that will increase awareness of the devices' meaning and uses through some sort of driver education or training program. For example, the study recommendations specify numerous suggestions for different devices to receive increased emphasis in driver education and safety courses. In addition, the Texas Department of Public Safety (DPS) has indicated that they plan to use the study results to revise the Texas Drivers Handbook.

In an effort to reach other portions of the driving population, a framework for an initial public information campaign has been jointly developed by researchers, TTI Communications, and the Technical Panel. The plan is to target such audiences as driving instructors, driver license station patrons, and elderly drivers, focusing on specific devices or situations where education is appropriate, including: distinguishing between 2-way and 4-way stop controlled intersections, left-turn signal indications and signing, color and shapes of signs and markings, two-way left-turn lane signs and markings, school speed

Fig. 3. A July 1994 memo from the Traffic Operations Division describes the above changes in detail.

limit signing, pedestrian/school crossings and advance crossing signs, and speed messages of turn and curve signs.

In the fifth year of this research, researchers will conduct additional evaluations of some devices where an alternative version or modification would possibly make the device more understandable. If alternative designs are found to be more effective, researchers will recommend a change in the national MUTCD. Continued implementation of these recommendations, along with those activities already underway, will ensure that the state's transportation network improves and evolves along with the society it serves.

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*The contents of this summary are reported in detail in the following TTI research reports:*

1261-2, "Motorist Comprehension of Traffic Control Devices: Statewide Survey Results," by Katie N. Womack, H. Gene Hawkins, Jr., Ph.D., P.E., and John M. Mounce, Ph.D., P.E., February 1993.

1261-4, "Motorist Understanding of Traffic Control Devices: Study Results and Recommendations," by H. Gene Hawkins, Jr., Ph.D., P.E., Katie N. Womack, and John M. Mounce, Ph.D., P.E., August 1994.

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