



Project Summary

Texas Department of Transportation

0-5772: Developing Comprehensive Roadway Delineation Guidelines

Background

The delineation of horizontal curves on two-lane rural roads is an important component of safety improvements to reduce run-off-road and head-on crashes. This project assessed four types of vertical delineation in conjunction with edgeline markings:

- standard post-mounted delineators with a single reflector at the top (PMD Dot),
- post-mounted delineators with retroreflective material the full length of the post (PMD Full),
- standard chevrons, and
- chevrons with yellow retroreflective material applied the full length of the post (ChevFull).

What the Researchers Did

Researchers assessed the effects of delineation treatments on vehicle performance through:

- a nighttime closed-course study with subject drivers,
- a statewide computer-based survey where participants viewed video clips from the closed-course study, and
- a before-and-after field experiment that evaluated treatments on rural roadways.

The closed-course portion assessed the vehicle performance and curve perception of 20 subject drivers. Subjects negotiated horizontal curves on a test track that had the identified treatments. While driving the course, an instrumented vehicle measured the foot pedal displacement, vehicle speed modifications, and lateral acceleration forces. The computer-based survey was based on the same course layout, filmed from the driver's point of view. A total of 197 participants in four cities in Texas completed the survey.

The field experiment measured free-flow traffic characteristics at four horizontal curves with no existing vertical delineation. The before-and-after study assessed the PMD Dot and PMD Full on just one curve, chevrons and the ChevFull treatments on two curves where each treatment was implemented on each curve over successive time periods. Vehicle speed and lane lateral position data were collected at the point of curvature and at the midpoint of each curve.

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Project Completed: 8-31-08

What They Found

The findings from the closed-course study and survey supported the further exploration of the fully reflectorized posts for PMDs and chevrons in the field study. For all treatment types the results were similar for all vehicle types and during both day and night periods.

The findings concerning the field experiment PMD treatment included the following:

- Both PMD treatments caused vehicles to move away from the centerline by approximately 7 to 20 inches.
- Estimated centerline encroachments decreased by approximately 78 percent.
- The variability in lateral lane position decreased by approximately 38 percent.
- Neither PMD treatment achieved a significant difference in mean vehicle speed.

The findings concerning the field experiment chevron treatment included the following:

- Both chevron treatments caused vehicles to move away from the centerline by approximately 10 to 20 inches.
- Estimated centerline encroachments decreased by approximately 88 to 93 percent.
- The variability in lateral lane position decreased by approximately 40 percent.
- The mean speed was significantly lower, by 1.4 mph for chevrons and 2.2 mph for the ChevFull treatment, when compared to the baseline-markings-only condition.

What This Means

The findings from the field study showed that when curves are marked with just pavement markings and raised pavement markers, many vehicles enter the curve very close to the centerline and often encroach into the other lane or onto the shoulder. The use of any vertical delineation system greatly improved the lane position of vehicles day and night. It is therefore recommended that TxDOT districts increase their use of vertical delineation for horizontal curves on rural two-lane roads.

The fully reflectorized post-mounted delineators did not have a significant effect on vehicle speed in curves, but did improve their lane position both at the entry to the curve and at its midpoint. It is therefore recommended that TxDOT consider changing its specifications for post-mounted delineators to call for a fully reflective post. Chevrons had a large effect on both speed and lateral placement in the curve. Adding reflective sheeting to the post of a chevron did not produce any larger improvements than a standard chevron. It is therefore recommended that TxDOT maintain its current standards for chevron design.

For More Information:

0-5772-1 Driver Response to Delineation Treatments on Horizontal Curves on Two-lane Roads

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