Project Summary

Texas Department of Transportation

0-6120: An Evaluation of the Performance of High Impact Signs

Background

There are approximately 15,000 exit gore signs installed on Texas highways. Because of their frequency and exposure to high-speed traffic, they are one of the most commonly struck signs by errant vehicles, and they present a significant maintenance challenge for TxDOT. There is concern regarding the safety of personnel working in gore areas to replace these signs, and the resources necessary for continual maintenance. The objective of this research was to identify and evaluate alternative signing methods that may reduce the number of sign hits as well as the costs and resources required for sign replacement and maintenance.

What the Researchers Did

Researchers visited several sites with problems related to frequent sign hits. They collected data and recorded drive-through videos to determine the factors that most likely contributed to the frequent sign hits. They compiled a list of common problems and recommended countermeasures that could potentially address some of the issues identified. Researchers also evaluated the impact of the absence of exit gore signs at two freeway exits in Corpus Christi, where advance warning with overhead exit signs were provided, and there were no visibility and sight distance issues. Since exit gore signs are required by the *Manual on Uniform Traffic Control Devices* (MUTCD) their removal for the purpose of field evaluations was not possible. Therefore, a different approach was used by taking advantage of events when exit gore signs were knocked down by vehicles. The time window between sign hit and reinstallation provided researchers the opportunity to collect data in the absence of exit gore signs.

What They Found

Table 1 summarizes the most common factors contributing to vehicle crashes with exit gore signs. Table 2 summarizes a list of countermeasures that could potentially address some of the issues identified.

The field evaluations at two freeway exits in Corpus Christi showed that the absence of exit gore signs did not have any negative consequence in terms of vehicle speeds, drivers' deceleration behaviors, and erratic maneuvers.

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Project Completed: 8-31-10

Table 1. Factors Contributing to Frequent Exit Gore Sign Hits.

Category	Factors
Roadway design	• Limited sight distance due to vertical and/or horizontal curve upstream of exit ramp • Significant weaving between closely spaced ramps • Shift in horizontal alignment of main lanes • Constrained right-of-way • Significantly lower advisory speed for ramp and/or frontage road • Drop-lane design coupled with limited sight distance
Driver behavior	• Inattentive driving (e.g., cell phone use, texting) • Late decision-making • Excessive speed
Sign location and/or placement	• Visual clutter with other signs • Exit gore sign located too close to pavement
Pavement markings	• Faded/worn-out • Lane delineators broken or uprooted
Nighttime visibility	• Poor nighttime visibility on inadequately lighted roadways

Table 2. Potential Countermeasures.

Issues	Countermeasures
High operating speeds on approach to exit Relatively large speed difference between main line and exit ramp speed	Pavement markings as passive speed control devices (Converging chevrons, transverse bars, peripheral lines)
	Rumble strips on approach lane to exit
	Ramp speed painted on the pavement in the approach lane to the exit
	Advance ramp advisory speed warning sign with flashers
Vehicle crashes with exit gore sign	Relocation of exit gore sign farther into gore area
Late exiting or merging maneuvers Vehicles crossing gore area	Flexible pylons to delineate gore area
	“Escape” lane (on freeway and/or exit ramp)
Poor nighttime visibility	Retroreflective sheeting on sign posts
	Reflective object markers on sign posts
Poor delineation & visibility of gore area	Impact attenuator with large retroreflective bi-directional arrows

What This Means

The field study results suggest that there are locations where overhead exit signs provide sufficient advance warning and exit gore signs may not be needed. Changes to the MUTCD providing more flexibility in determining the need for these signs could result in many being eliminated at several freeway exits, which could reduce the number of sign hits as well as the costs and resources required for sign replacement and maintenance.

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