Texas A&M Transportation Institute

Texas Department of Transportation

PROJECT SUMMARY REPORT

0-7086: Roadside Safety Device Analysis, Testing, and Evaluation Program

Background

Roadway departure crashes are responsible for more fatalities on Texas roadways each year than any other crash type. Roadside safety devices are a key element of an effective roadway departure safety strategy. These safety devices shield motorists from roadside hazards such as non-traversable terrain and fixed objects, thereby reducing injuries and fatalities associated with roadway departure crashes.

Development of new or improved roadside safety devices that accommodate a variety of site conditions, placement locations, and a changing vehicle fleet can further enhance the safety of the motoring public. Under this project, researchers addressed issues related to roadside safety devices that were a high priority to the Texas Department of Transportation (TxDOT).

What the Researchers Did

Roadside safety issues prioritized by the TxDOT Bridge, Design, Maintenance, and Traffic Safety Divisions were evaluated. Devices of interest included bridge rails, portable concrete barriers, end treatments, sign supports, luminaire poles, barrier-mounted devices (sound walls and luminaire poles), and safety treatments for cross-drainage structures. An appropriate research plan was developed and executed for each prioritized research activity. Depending on the nature of the research task, the evaluation included engineering analyses, computer simulation, and full-scale vehicular crash testing, as appropriate. Crash testing was performed in accordance with the second edition of the American Association of State Highway and Transportation Officials *Manual for Assessing Safety Hardware* (MASH).

What They Found

A TxDOT T2P bridge rail retrofit for thin deck structures was successfully crash tested to MASH Test Level 4 (TL-4). The impact performance of the retrofit system was verified on a 6-inch-thick deck with a 40-inch-wide cantilever. A TxDOT T80SS barrier with concrete soundwall was found to be MASH TL-5 compliant (see Figure 1). The barrier and soundwall system had only minor damage after an impact by an 80,000-lb tractor-van trailer. A portable concrete barrier with modified X-bolt connection was determined to be MASH TL-3 compliant. The modified connection results in substantially reduced fabrication cost, and the system's low deflection (26.6 inches) is significantly lower than the deflection of connection types in TxDOT standards.

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Figure 1. TxDOT T80SS Barrier with Soundwall.

A 42-inch-tall single-slope portable concrete barrier (PCB) installed on a 12:1 flare was found to be MASH TL-3 compliant. This provides a design option for flaring the end of a PCB away from traffic and outside the clear zone, which can reduce the probability of an impact with the barrier end. A luminaire pole anchored to a concrete mounting block cast behind a single slope traffic rail (SSTR) was successfully tested to MASH TL-4 requirements. This design improves access for pole installation, maintenance, and repair, and eliminates the need for deck extensions. MASH compliance of two retrofit bridge rail systems onto existing bridge deck structures was determined through engineering evaluation. A retrofit option for the Type C411 onto an 8-inch deck was found to meet MASH TL-2. Adhesive and bolt-through retrofit anchorage options for the Type T223 were developed to meet MASH TL-3 criteria.

A feasibility study for a narrow end treatment for separator rails on high-speed roadways was performed using finite element simulation. One design concept showed promise and is recommended for further research and development. MASH compliance of TxDOT luminaire pole assemblies was investigated through full-scale crash testing. Full-scale testing was also performed on different slip base sign configurations to evaluate their impact performance at a 90-degree impact angle. MASH recommends testing sign supports 90 degrees if they are intended to be used at or near intersections. Finally, the impact performance of pipe runner safety treatments for cross-drainage structures was evaluated through finite element simulation.

What This Means

This project evaluated prioritized roadside safety issues and resulted in new or improved roadside safety devices. Devices found to be MASH compliant are suitable for implementation. Implementation of these roadside safety devices will improve motorist safety, reduce material and installation costs, and/or improve operations. These devices are being implemented through development of new or revised standard detail sheets. Further research is recommended for devices that did not meet MASH requirements.

For More Information

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