

0-6968: Roadside Safety Device Analysis, Testing, and Evaluation Program

Background

Roadway departure crashes represent approximately 50 percent of fatalities on Texas roadways each year. Roadside 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, issues related to roadside safety devices that were a high priority to the Texas Department of Transportation (TxDOT) were addressed.

What the Researchers Did

Roadside safety issues prioritized by the TxDOT Bridge, Design, Maintenance, and Traffic Safety Divisions were evaluated. Devices of interest included guardrail, bridge rails, median barriers, transitions, terminals, breakaway structures (sign supports and mailboxes), portable barriers, and work zone traffic control devices. An appropriate research plan was developed and executed for each prioritized research task. Depending on the nature of the research task, the evaluation included engineering analyses, computer simulation, dynamic impact testing, and full-scale vehicular crash testing (e.g., Figure 1), 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)*.



Figure 1. Concrete Barrier-Mounted Containment System for Motorcycle Riders.

MASH provides comprehensive procedures for the safety performance evaluation of roadside safety hardware. For each device evaluated, factors such as occupant risk, vehicle stability, maintenance, and cost were considered.

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What They Found

Table 1 summarizes the specific devices evaluated and the results of the evaluations. The table indicates the *MASH* test level for which impact performance was assessed and if the device is considered to be *MASH* compliant. Details of the evaluation of each device are addressed in a separate research report or technical memorandum.

What This Means

This project evaluated prioritized roadside safety issues and resulted in numerous 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 failed to meet *MASH* requirements.

Table 1. Summary of Research Results.

Roadside Safety Device	MASH Compliant	Test Level
Bridge Rail		
Shallow Anchorage Options for Single-Slope Concrete Barrier	Yes	TL-4
Retrofit Bridge Rails on Curbs	Yes	TL-4
Load Response of a Cast-in-Place Retaining Wall to a TL-4 Bridge Rail Impact	Yes	TL-4
Performance of Existing TL-4 Bridge Rails under MASH TL-5 Impact Conditions	Not applicable	TL-5
Guardrail		
Modified Round Post Guardrail	Yes	TL-3
Modified Round Post Guardrail in Concrete Mow Strip	Yes	TL-3
Modified Round Wood Post Guardrail in Rocky Terrain	No	TL-3
Portable Concrete Barrier		
TL-3 Low-Profile Barrier	Yes	TL-3
Free-Standing Single-Slope Concrete Barrier with Modified Cross-Bolt Connection	Yes	TL-4
Breakaway Support Structures		
Direct Embedded Wood Sign Supports	No	TL-3
Single and Multiple Extra Large Mailboxes on Different Supports	Yes	TL-3
Work Zone Traffic Control Devices		
Modified Single-Post Skid-Mounted Sign Support	Yes	TL-3
Terminals		
Sloped Concrete End Treatment for TL-3 Low-Profile Barrier	No	TL-3
Miscellaneous		
Structurally Independent Foundation for 36-Inch-Tall Single-Slope Traffic Barrier	Yes	TL-4
Shape Transitions between Different Cast-in-Place Concrete Barriers	Yes	TL-3
Concrete Barrier-Mounted Containment System for Motorcycle Riders	Yes	Not applicable*

*Motorcycle test conditions are not currently included in *MASH*.

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