

0-6990: Development of MASH Test Level 3 (TL-3) Compliant Transition between Median Guardrail and Median Concrete Barrier

Background

The Texas Department of Transportation (TxDOT) is in the process of implementing roadside safety hardware on Texas highways in compliance with the American Association of State Highway and Transportation Officials (AASHTO) *Manual for Assessing Safety Hardware (MASH)*. The focus is to further enhance safety on Texas highways. TxDOT currently has a MASH Test Level 3 (TL-3) compliant double-faced guardrail in use. However, this system needs end termination or connectivity adapters to other barriers. The connectivity between the median guardrail and the median concrete barrier is the transition section. There is a safety need to develop a MASH-compliant transition between the double-faced median guardrail and the median concrete barrier.

What the Researchers Did

In this study, the Texas A&M Transportation Institute addressed key performance issues, such as vehicular redirection, vehicular stability, and vehicular pocketing into the transition section, to create a design for a successful *MASH* transition section between a double-faced median guardrail and a median concrete barrier. The purpose was to develop a *MASH* TL-3 compliant transition between the median guardrail and median concrete barrier, and then test the design according to *MASH* crash testing guidelines.

Finite element computer simulations were used to aid in the design of the median transition. Full-scale crash testing was completed to assess the safety performance of the double-faced W-beam median barrier transition to the concrete parapet according to the safety-performance evaluation guidelines included in *MASH* for TL-3. Data obtained from the

crash tests were analyzed, and the results were used to guide the project conclusions and recommendations. Additionally, implementation guidance for the new transition system was created.

Multiple tasks were included in this research project. A literature review, computer simulations, and full-scale crash testing were performed to accomplish the project objectives.

What They Found

After computer simulations showed a reasonable chance of the transition passing *MASH* Test 3-21 with a RAM pickup truck model, full-scale crash testing was initiated to evaluate the transition design experimentally.

Due to rollover of the pickup truck, the initial design failed to redirect the vehicle in a safe and stable manner. To improve the performance of the transition system, the researchers made several modifications. First, the lower W-beam rail was attached to the end face of the concrete parapet with a steel bracket. This was done by moving the lower W-beam rail toward the post line via reducing the side of the wood blocks. Second, an extra post was added upstream of the quarter spacing region to

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smooth the stiffness of the transition between the half-spaced posts and the quarter-spaced posts. Third, a vertical taper was added to the end of the concrete barrier parapet.

Four tests were performed on this modified design, and the transition performed successfully according to *MASH* TL-3 specifications for transitions.

What This Means

The new TxDOT median guardrail transition to a concrete parapet has been evaluated through full-scale crash testing per *MASH* TL-3 conditions. Figures 1 and 2 provide general details of this transition. This system is ready for implementation as a transition between a crashworthy median W-beam guardrail and a *MASH* TL-3 crashworthy median concrete barrier while maintaining the connectivity details tested in this research effort.

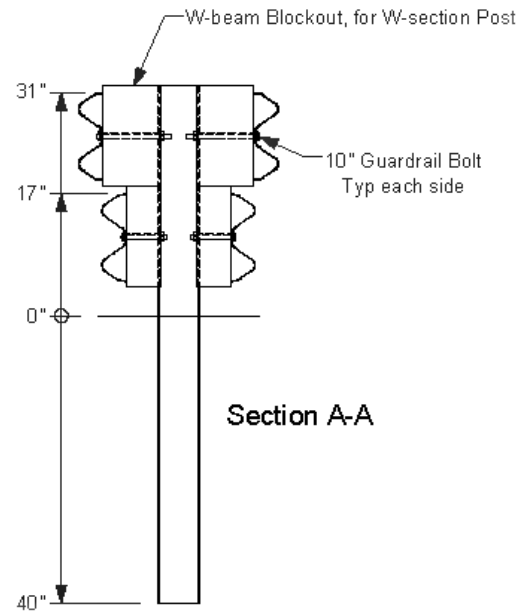


Figure 1. Cross-Section of Modified TxDOT Median Guardrail Transition to Concrete Parapet.



Figure 2. Modified TxDOT Median Guardrail Transition to Concrete Parapet.

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