

0-6711: Short Radius *MASH* TL-3 Guardrail Treatment

Background

When a roadway intersects a highway with restrictive features, such as a bridge rail, it becomes difficult to fit a guardrail with the proper length, transitions, and end treatment along the highway. Possible solutions include relocating the constraint blocking the placement of the guardrail or designing a short radius guardrail.

Short radius guardrails typically present the most viable solution. However, no previously designed short radius guardrails meet National Cooperative Highway Research Program (NCHRP) *Report 350* Test Level 3 (TL-3) guidelines. Crash-testing criteria have been updated by the American Association of State Highway and Transportation Officials *Manual for Assessing Safety Hardware (MASH)*. *MASH* uses heavier test vehicles than NCHRP *Report 350*. Therefore, meeting new impact standards for short radius guardrails has become even more challenging.

What the Researchers Did

Several concepts were developed and evaluated to establish a candidate design. High-fidelity simulations were conducted to fine-tune this candidate design. Later, simulations were performed to accurately predict the performance of the system under *MASH* TL-3 conditions. Subsequent full-scale crash tests (Figures 1 and 2) verified the performance of this recommended design. The final short radius system that was simulated and crash-tested consisted of an 18-ft-9-inch-long thrie beam that runs along the secondary roadway. The radius is 8 ft 4 inches and connects to the thrie beam on the primary roadway, which is 27 ft 5 inches long.

What They Found

A *MASH* TL-3 compliant 32-inch-tall short radius system was successfully developed and crash-tested

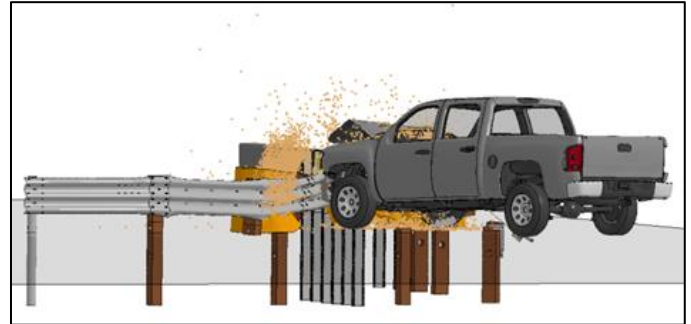


Figure 1. Simulation and Crash-Test Results with a Pickup Truck.

as a result of this project. This innovative design uses an energy dissipation component plus a cable anchor that provides tension capacity to the primary roadway rail section. These ideas made the system effective in capturing the vehicles in the shortest distance without using complicated designs.

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What This Means

The Texas Department of Transportation and other transportation agencies have a *MASH* TL-3 crashworthy short radius system (Figure 3) available for use in constrained intersections found in the highway system. This design demonstrates a significant safety improvement compared to existing short radius designs.



Figure 2. Simulation and Crash-Test Results with a Small Car.



Figure 3. Short Radius Guardrail System.

For More Information

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