Pooled Fund Post

The Newsletter of the Roadside Safety Pooled Fund Program

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The Roadside Safety Pooled Fund Program has officially entered its 10th year of successful research activities devoted to advance roadside safety! Within the years, the group has grown to include participation of 11 States, and has been involved in the investigation of more than 50 research projects. This year, we are happy to announce and welcome the Illinois Department of Transportation to our Group!

"Illinois Department of Transportation is excited to participate in the Roadside Safety Pooled Fund. We are impressed by the previous work accomplished by the pooled fund, and look forward to advancing new safety research projects that are not only beneficial to Illinois, but to other member states."

- Tim J. Sheehan, P.E. (IDOT)

Illinois Department of Transportation

A joint meeting was hosted recently by the West Virginia Department of Transportation in Shepherdstown, WV.

Participants included members of AASHTO Task Force 13.

The following new projects were selected by Pooled Fund Members:

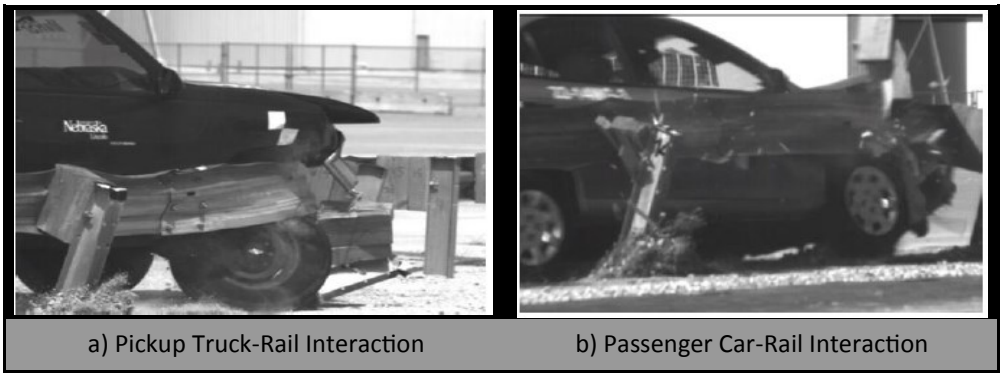
- Guidance for Raising Beam Guardrail Blockout for Rail Height Adjustment
- Guidebook to Assist Implementation of Pinned-Down Barrier
- MASH TL3 T-Intersection (Short Radius) System Design Variations
- MASH Simulations and Full-Scale Crash Testing of Stacked W-Beam Transition for 31" Guardrail
- W-Beam Wood Post Strength Analysis of Preservation Treatment Methods
- Transition Design for Temporary Concrete Barrier Pinned on Asphalt to Rigid Concrete Barrier
- ITS Technology Application for Approaching Vehicle Notification

Next meeting will be hosted by TTI Roadside Safety and Physical Security Division at the Texas A&M University Riverside Campus. in College Station, Texas, in September 2015.

12-inch versus 8-inch Blockout Offset-Similarities and Dissimilarities

TTI Researcher: Chiara Silvestri Dobrovolny (c-silvestri@ttimail.tamu.edu, (979) 845-8971)
Tech Representative: Ali Hangul (Ali. Hangul@tn.gov, (615)-741-0840)

The objective of this research was to compare the system performance of a 31-inch guardrail with a 12-inch blockout depth versus an 8-inch blockout depth. Parameters compared were angular displacements, occupant risks and vehicle interaction with the guardrail system through the impact event. Parameters were studied and compared according to test conditions (NCHRP Report 350, MASH) (Figure 1). Commonly observed vehicle rail interaction is shown in Figure 2 for pickup truck (Figure 2a) and passenger car (Figure 2b)



a) Pickup Truck-Rail Interaction b) Passenger Car-Rail Interaction

Figure 2: Commonly Observed Vehicle-Rail Interactions

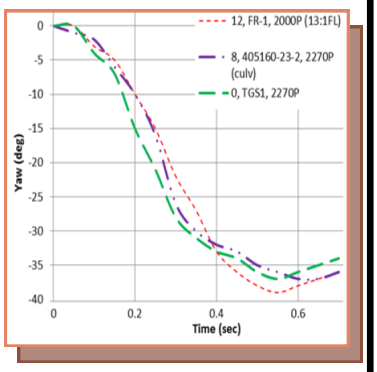


Figure 1: Yaw Angle: Selected tests

Results showed no significant difference between the performance of the 12-inch and 8-inch blockouts when impacted under design impact conditions of NCHRP Report 350 and MASH. The researchers recommended that 8-inch blockouts be considered a crashworthy alternative to the 12-inch ones.

For complete results, visit: http://www.roadsidepooledfund.org/files/2013/03/Report_8vs12_Blockouts_FINAL2.pdf

MASH TL-2 31-inch W-Beam Guardrail with Double Post-Spacing

TTI Researcher: Nauman Sheikh, (Nauman@tamu.edu, (979) 845-8955)
Technical Representative: Michael Elle (Michael.Elle@state.mn.us, (651) 366-4662)

The scope of this project focused on evaluating the performance of a 31-inch tall, strong post W-beam guardrail with 12-feet 6-inch post spacing and 8-inch deep wood blockouts at MASH TL-2 conditions. The intent of the research was to reduce the number of posts installed resulting in significant cost savings for the user agencies. With many user agencies raising the height of the W-beam guardrail to 31-inch from 27 -inch., there is now a potential to use the larger 12-feet 6-inch post spacing for the 31-inch W-beam guardrail for MASH TL-2 conditions.

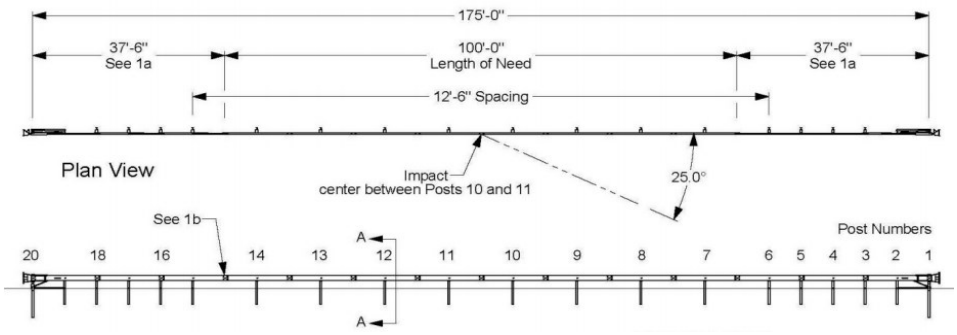


Figure 1: Test Installation: Elevation View with Impact point

The 31-inch W-Beam guardrail with 12-feet 6-inch post spacing contained and redirected the 2270P MASH test vehicle and performed acceptably for MASH Test 2-11.

Results of the crash test show that user agencies can install the 31-inch tall W-beam guardrail with half the number of posts in the length of need by using 12 ft 6 inch post spacing. This is expected to result in nearly 50% reduction in the time and money spent in drilling holes, installing the posts, and backfilling the holes with soil in the length of need.

MASH Test 2-11 Vehicle/Guardrail Vehicle after Crash Test

For complete report , visit: https:// www.roadsidepooledfund.org/files/2014/10/ TRNo602921-1-Final.pdf

MASH Compliant Short Radius Guardrail

TTI Researcher: Akram Y. Abu-Odeh (abu-odeh@tamu.edu, (979) 862-3379)
Research Project Manager: Wade Odell (wodell@dot.state.tx.us, (512) 465-7403)

This research was performed to develop a short radius guardrail (SRG) system for use at intersecting roadways in close proximity to a bridge (Figure 1). AASHTO *MASH* recently updated crash testing criteria for SRGs. The creation of a newly designed SRG involved investigation of different possible designs and components and the use of FE computer simulations to determine the crashworthiness of the various designs. These were tested by taking into account the functional needs of the SRG. Simulations have been heavily involved to evaluate the response of the SRG under identified critical impact points of the final design (Figure 2).

Figure 1: Representation of Roadway intersecting Bridge

Figure 2: FE Simulation of MASH TL 3-32 Small Car Impact

Figure 3: Full-scale Crash Test of MASH TL 3--32 Small Car at Impact

Full-scale crash tests were conducted to verify the strength capacity and crashworthiness of the system according to MASH criteria (Figure 3). Researchers successfully crash tested this system to comply with *MASH* 3-31, 3-32, 3-33, and 3-35 test conditions and criteria (Figure 4). All tests resulted in a controlled stop or containment and redirection of the test vehicle.

Conducted simulations accurately predicted the performance of the subsequent full-scale crash tests. The final optimal design consisted of a thrie beam that is 18 feet 9 inches long with a radius of 8 feet 4 inches. Success of the SRG is attributed to its innovative design which includes the use of BCT and CRT wood posts, a tension cable and sand barrels placed closely behind the rail.

Figure 4: MASH TL-3 Full-scale Crash Test Set-ups

A MASH TL–3 compliant Short Radius Guardrail System was developed and successfully full-scale crash tested. One among the newly populated list of projects for the roadside safety pooled fund is a MASH TL3 T-Intersection (short radius) to investigate system design variations.

Participating Partners

ALASKA DOT and Public Facilities
CALIFORNIA DOT
FLORIDA DOT
ILLINOIS DOT
LOUISIANA DOT and Development
MINNESOTA DOT
PENNSYLVANIA DOT
TENNESSEE DOT
TEXAS DOT
WASHINGTON STATE DOT
WEST VIRGINIA DOT
FEDERAL HIGHWAY ADMINISTRATION
TEXAS A&M TRANSPORTATION INSTITUTE

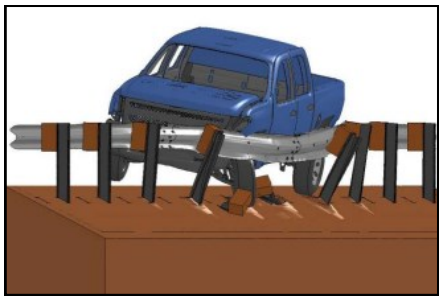
Did you Know...

- TTI has successfully developed implementable solutions through the utilization of non-linear simulations. These solutions are Guardrail on 2H:1V slope, W-Beam median barrier, sign post mounts on barriers and short radius systems. All of them are MASH TL-3 compliant systems.

TTI Proving Grounds Research Facility

Crash Testing

Bogie Test Vehicle



Finite Element Analysis Simulation

The Proving Grounds Research Facility, a 2,000 acre complex, enables researchers to conduct experiments and testing with the ultimate goal of improving transportation safety. This site has large expanses of concrete runways and parking aprons well suited for experimental research and testing in the areas of vehicle performance and handling, vehicle-roadway interaction, durability and efficacy of highway pavements, evaluation of roadside safety hardware, and connected and automated vehicles.

ISO 17025 TTI Proving Ground is an International Standards Organization (ISO) 17025 accredited laboratory with American Association for Laboratory Accreditation (A2LA) Mechanical Testing Certificate 2821.01.

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