Pooled Fund Post

The Newsletter of the Roadside Safety Pooled Fund Program

http://www.roadsidepooledfund.org

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Participating States

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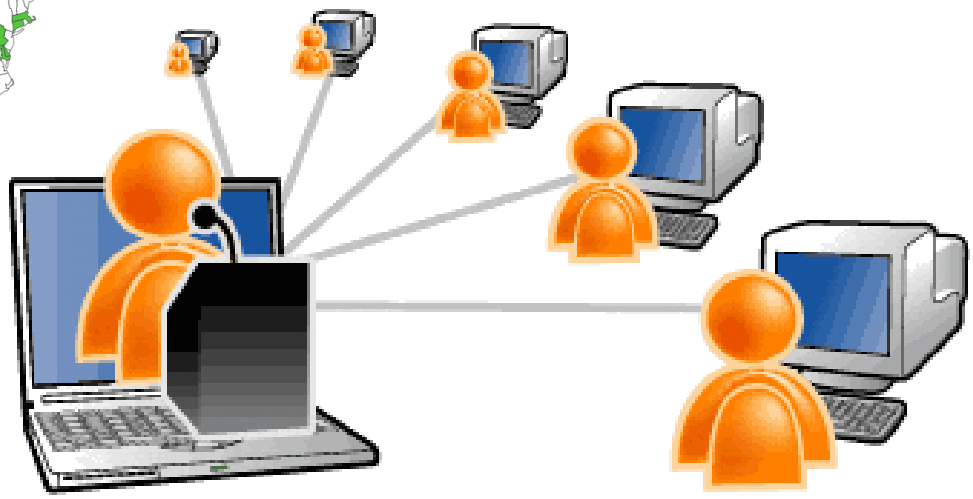


2020 Fall Virtual Meeting

All states participated in a virtual meeting over the course of 2 weeks. This time focused on ongoing projects and current issues faced by various states to diversify and investigate further. *The projects that have been prioritized are*:

- Develop Non-Proprietary MASH-Compliant Three-Pound and Four -Pound Post Systems
- Develop Guidelines for Attaching MASH-Compliant Thrie-Beam Transitions to Rigid Concrete Barriers Other than the Rigid Barrier Tested when Evaluating the Thrie-Beam Transition
- Exploration into Variations in Beam Guard Approach Transitions to Rigid Barrier
- Testing Type III Barricades with Aluminum Panels and Mounted Signs
- Transition Between Guardrail and Tangent Anchored Portable Concrete Barriers
- Multi-Directional Base Design for Steel Beam Non-Proprietary Large Sign Supports: Phase 1

Roadside Safety Pooled Fund

Texas A&M Transportation Institute

FEATURED PROJECTS

Establishing Comprehensive Manual on Assessing Safety Hardware (MASH) Compliance for Roadside Safety Systems in Texas

Crash test of MASH Test 4-12 on the TxDOT C1W Bridge Rail.

TTI Research Supervisor: Roger P. Bligh
Project Manager: Wade Odell, TxDOT
Link to Report

PURPOSE: In response to implementation requirements the AASHTO Manual on Assessing Safe Hardware (MASH), the Texas Department of Transportation Bridge, Design, Maintenance, and Traffic Safety Division reviewed their standards for roadside safety devices and identified those devise that required testing and evaluation to assess MASH compliance. Under this project, 37 roadside safety systems were crash-tested in accordance with MASH criteria in three phases over a three-year period. The devices tested includeds 7 bridge rail systems, 2 transition systems, 4 concrete barrier systems, 4 guardrail systems, 6 sign support systems, 4 work-zone traffic control devices, and 10 mailbox support systems.

RESULTS: Devices found to be MASH compliant are suitable for continued use on the NHS. This includes the configuration that was tested as well as other design configurations that were considered less critical in regard to impact performance as documented in the project reports. Further research was recommended for the devices that did not satisfy MASH evaluation criteria that failed to meet MASH requirements.

MASH Test 3-11 Evaluation of Combination Traffic-Pedestrian-Bicycle Bridge Railing

Image of the tested barrier design with bridge railing from MASH Test 3-11.

TTI Researcher: Chiara Silvestri Dobrovolny

Technical Representative: Derwood Sheppard, FDOT

Link to Report

PURPOSE: Test and evaluate a 42-inch tall combination traffic-pedestrian-bicycle bridge rail system for use at MASH TL-3 conditions. Design of the new barrier considered utilization of a 42-inch single slope concrete barrier with a 6-inch bullet-profile aluminum rail mounted on top.

PROBLEM: As Florida Department of Transportation (FDOT) transitions away from the 32-inch F-shape barrier as the standard shape for permanent concrete barriers to a 36-inch single slope shape, the existing 42-inch combination traffic-pedestrian-bicycle bridge rail system needed to be revised and appropriately modified to be compatible with the new barrier profile and height.

RESULTS: The crash test performed in accordance with MASH Test 3-11. This test evaluated the bridge's ability to successfully contain and redirect the pickup truck and occupant risk.

Development of Structurally Independent Foundations for 36-inch Tall Single Slope Traffic Rail (SSTR) for MASH TL-4

TTI Researchers : Roger Bligh and Nauman Sheikh

Project Manager: Wade Odell, TxDOT

Sponsor: Texas Department of Transportation

Link to Report

OBJECTIVE: The objective was to develop structurally independent foundations for TxDOT's 36-inch tall single slope traffic rail (SSTR) that permits the barrier to meet AASHTO MASH Test Level 4 (TL-4) criteria and require minimal maintenance after a design impact. Foundation designs were developed for two common field installation scenarios: a foundation that requires a shallow depth but can have a wider footprint and a foundation that requires a narrow footprint, but can have greater depth.

DESIGN DEVELOPMENT: Researchers first developed preliminary design concepts for the barrier foundation systems. This was followed by finite element modeling of these designs and full-scale impact simulations following MASH Test 4-12 impact conditions. Results of the simulations were used to modify and improve the foundation designs and select final configurations for which reinforcement details were developed. Two foundation systems were fully developed under the project. One was a shallow moment slab foundation, and the other was a narrower concrete beam foundation.

Image of the Moment Slab Foundation installed at the testing site.

FULL-SCALE CRASH TESTING: The impact performance of the moment slab foundation was further evaluated by performing MASH Test 4-12, which involves a 22,000-lb single unit truck (SUT) impacting the barrier at a target impact speed of 56 mi/h and impact angle of 15 degrees. MASH Tests 4-10 and 4-11 were not performed because the impact performance of a rigid single slope barrier is known to be acceptable for these test conditions based on previous tests. The barrier system with independent foundation is designed to have minor deflection for Test 4-12 and is expected to behave essentially rigidly for the smaller, lighter passenger car (Test 4-10) and pickup truck (Test 4-11).

IMPLEMENTATION: The SSTR on the moment slab foundation performed acceptably for MASH Test 4-12 for longitudinal barriers and is considered MASH compliant Simulation results of the moment slab foundation, while slightly more conservative than the test results, showed a good correlation between simulation and testing. Since similar barrier and soil models were used in the simulation evaluation of the SSTR with beam foundation, it was concluded that the 36-inch tall SSTR with 33 inches wide and 16 inches deep beam foundation is also suitable for implementation as a MASH TL-4 barrier system.

Image of single unit truck at CIP of the Moment Slab Foundation.

The research report provides details of the simulations and crash tests as well as the design details for the two foundation options.

Review and Investigation of W-beam guardrail Terminals with Curbs

TTI Researcher: James C. Kovar

Sponsor: Roadside Safety Research Program Pooled Fund

Link to Report

The results of the survey were compiled and documented in the report with information on specific design configurations and on current trends in the practice. There is a need for research and guidance on installing w-beam guardrail terminals near curbs.

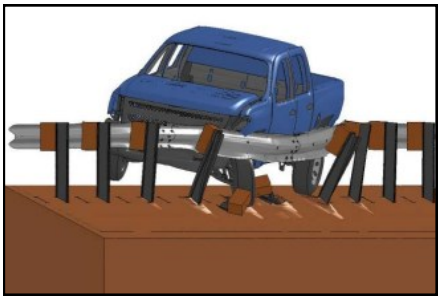
Participating Partners

ALABAMA DOT	IOWA DOT	OHIO DOT
ALASKA DOT	LOUISIANA DOT	OREGON DOT
CALIFORNIA DOT	MARYLAND DOT	ONTARIO Ministry of Transportation
COLORADO DOT	MASSACHUSETTS DOT	PENNSYLVANIA DOT
CONNECTICUT DOT	MICHIGAN DOT	TENNESSEE DOT
DELAWARE DOT	MINNESOTA DOT	TEXAS DOT
FLORIDA DOT	MISSISSIPPI DOT	UTAH DOT
IDAHO DOT	MISSOURI DOT	WASHINGTON STATE DOT
ILLINOIS DOT	NEW MEXICO DOT	WEST VIRGINIA DOT

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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