Pooled Fund Post

The Newsletter of the Roadside Safety Pooled Fund Program

http://www.roadsidepooledfund.org

DECEMBER 2018 VOLUME 5. NO.I

What's Inside

- ⇒ MASH Coordination Effort... **Page 2**
- ⇒ Professional Opinion Project...**Page 3**
- ⇒ Recent Projects...Page 4 & 5
- ⇒ TTI proving grounds research facility ...

FY 2019 Pooled Fund Project Priorities

A Study of Acceptable Sidewalk Heights and Widths

Review and Investigation of W-Beam Guardrail Terminals with Curbs

MASH TL-4 Investigation and Testing of the Critical Flare Rate for Cast-in-Place Single Slope 42" Concrete Barrier Flaring around a Fixed Object

MASH TL-4 Testing and Evaluation of a Concrete Median Barrier with Fence Mounted on Top

Testing and Evaluation of Large Sign Slipbase Support on Slope at MASH TL-3 Impact Conditions

Determination of Pedestrian Rail Offset Requirements to Eliminate Vehicle Interaction

Shorter TL-3 MASH W-Beam Transition

Guardrail Evaluation on 6:1 Slope

Determination of the Length-of-Need for Guardrail without Anchorage



The objective of the Roadside Safety Pooled Fund Program is to provide a cooperative approach to conducting research on roadside safety hardware. Emphasis will be placed on assisting State DOTs with their implementation of MASH and addressing other roadside safety needs of common interest.

The program provides each participating state an opportunity to send a representative to an annual meeting to collaborate with other state DOT safety engineers to assess best practices, new regulatory issues, risk management strategies, and other matters pertaining to roadside safety.

Participation in this meeting is funded through the state's annual program contribution.



In September 2018, the two-day annual pooled fund meeting was hosted in Denver, CO. The meeting was attended by representatives of DOT members and FHWA. The focus of the meeting covered:

- Latest MASH implementation information
- Further needs for MASH testing
- Prioritization of projects for the fiscal year







MASH Coordination Effort

The objective of the MASH Coordination Effort is to provide support to participant DOTs. during the implementation of MASH standards. The support will include, but is not limited to:



Active and Timely Updating of Information

• Pooled Fund Website • MASH Database



Information Sharing and Coordination **Among Members**

- ListServ
 - A group email service that functions to improve and hasten communication
- Newsletter Publication
- An opportunity to share the latest research information with the RSPF community

Benefiits:

- \Rightarrow Database maintenance of MASH devices
- \Rightarrow Collection of devices prioritized by the DOTs for MASH Testing
- \Rightarrow Identification and comparison of systems used by partner states
- \Rightarrow Identification of opportunities for standardization in roadside safety

According to MASH Implementation dates, all roadside safety features must be successfully tested and evaluated by December 31st, 2019. The MASH Coordination Effort is intended to maximize efficiency to help DOTs meet the implementation deadlines.

Webinar Development

• Designed to provide direct information with respect to ongoing projects and member needs



Hardware Tested

.

Zoneguard[™] -

Mobile Barrier Trailer

Concrete 2

Test Level All FHWA Eligibility Letter All Proprietary/Non-proprietary

All

NEWS

The information provided in this database is for reference only. It is the responsibility of the ser/designer to verify that the selected system meets current Federal eligibility and safety requirements. To filter available hardware devices, select the type of device, test level, eligibility letter, and if the device is proprietary/non-proprietary. If there are options a for the device selected they will appear to the right. Results are displayed below and can be selected for more information

> FHWA Proprietary/ Title Description Eligibility Non proprietary Letter

Zoneguard™ portable longitudinal barrie B176C Proprietary system anchored in concrete.

Extended, mobile longitudinal barrie B178 Proprietary that provides a physical and visual wall

The MASH database is a live document. It undergoes constant updating with funding support through the MASH Coordination Effort.

The MASH Coordination Effort supports coordinated planning of testing and research among pooled fund members.







L

I

L

I

PAGE 3

Professional Assistance Project

The Professional Assistance project provides engineering based support to assess MASH compliance for roadside safety devices of interest to the pooled fund member states.

The Texas A&M Transportation Institute (TTI) plans to fulfill the objectives of this project by

- gathering information pertaining to the prioritized requests
- evaluating the request based on all available, applicable data

EXAMPLE

Member requests assessment of a given system according to MASH standards

Anticipated steps for the successful completion of the project request:

Review of Literature



Similar System Performance





Past Research

Previous Crash History



The results of the performed assessments are used to determine if the system can be considered MASH compliant or if additional testing is required.



Identified Necessary information for TTI Researchers to Complete the Required Assessment:

ENGINEERING SYSTYEM DRAWINGS

SYSTEM TEST REPORT(S)

ENGINEERING ANALYSIS



COMPUTER SIMULATION OUTCOMES





PROJECTS

26-in. Tall Low-Profile T-Shaped Concrete Barrier

TTI Researcher : Chiara Silvestri Dobrovolny, Ph.D.

Technical Representatives: Ken Mora, P.E., Chris Lindsey, P.E., TxDOT, Wade Odell, P.E.

FINAL REPORT

A 26-inch tall low-profile T-shaped concrete barrier system was developed to meet MASH Test Level 3 criteria.

The 26-inch barrier system met all evaluation criteria for MASH test 3-10 and 3-11, with maximum dynamic deflections of 13.2-inches



MASH Test 3-10 Vehicle Post-collision

and 25-inches, respectively.

The height of the barrier was chosen with the intention to ensure view of both headlights. This improves driver visibility and sight distance while providing MASH impact performance.



26" T-Shaped Concrete Barrier System



TTI Researcher : James Kovar

Technical Representative: Ken Mora, P.E., Chris Lindsey, P.E., Wade Odell, P.E., TxDOT

31" Round Timber Post W-Beam Guardrail

The purpose of this test study was to assess the performance of 31-inch tall W-beam guardrail with round timber posts according to MASH test 3-11. The 31-inch guardrail system initially failed to meet MASH standards; however, it was subsequently modified and successfully retested.

The initial system consisted of a W-beam rail mounted 31-inches above grade, on nominal 7.25-inch diameter posts, embedded 40-inches in soil. Multiple posts fractured with little or no lateral displacement. Subsequent rail pock-

The system was modified by decreasing the post embedment depth from 40-inches to 36-inches. The modification was designed to reduce soil resistance and enable the posts to deflect through soil more easily and increase energy dissipation prior to post fracture.

A secondary assessment was performed on the system. When MASH Test 3-11 was performed on the modified guardrail system, the pickup was successfully contained and redirected. The rapid fracture of the posts was at-



Pooled Fund



tributed to an increased flexural demand on the posts associated with increased MASH impact severity and greater moment arm associated with the taller 31-inch guardrail



PAGE 5

Precast Single Slope Concrete Barrier for Bridge and Median Application

The objective of this study was to develop a portable concrete barrier that meets MASH TL-4 criteria that can be used in both temporary and permanent application on bridge decks. Vertical dowel bars are used to restrain the lateral movement of the barrier and enable it s use at the edge of a deck.

Prior to testing, a TL-4 portable concrete barrier had yet to be approved for use. By developing a higher capacity portable barrier, a greater range of vehicle conditions can be accommodated.

Structure and Design

The barrier system is comprised of 42" tall single slope concrete barrier sections that are 30 ft. long. The barrier sections are connected using 7/8 in. diameter threaded rod installed in an X-pattern across the joint. Reinforcing 1 inch diameter bars were embedded 5 1/4 inches into a 7 inch deck to achieve a vertical projection of 12 inches. The bottom of the barrier segments had a 13" tall tapered longitudinal slot into when the anchor dowels were inserted. The restraint system was designed to limit lateral deflection and permit the barrier t o be installed at the edge of the deck.

Test Conditions

The impact performance of the precast single slope concrete barrier system was assessed by performing MASH Test 4-12. The test involved a 22,370 pound single unit truck impacting at a speed of 58.3 mph and an angle of 15.6 degrees, respectively.

Post-Impact

The test vehicle was successfully contained and redirected. The barrier experienced a maximum dynamic deflection of 7.1-inches. The precast single slope concrete barrier acceptably met MASH criteria for test 4-12.

Implementation

The restrained TL-4 precast single slope concrete barrier is considered suitable for use at the edge of a deck or as a median barrier for a deck thickness of at least 7 inches.



PROJECTS

Thorough Diagram of the Tested Simulation



TTI Researcher : Nauman Sheikh, P.E. **Technical Representatives:** Taya Retterer, p.E., Jon Ries, Wade Odell , P.E., TxDot











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.

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

Contact Information

Page 6 D. Lance Bullard, Jr., P.E. Senior Research Engineer Division Head Roadside Safety and Physical Security Division Texas A&M Transportation Institute

Texas A&M University System 3135 TAMU College Station, TX 77843 Phone: 979.845.6153 Fax: 979.845.6107 I-bullard@tamu.edu Roger P. Bligh, Ph.D., P.E. Senior Research Engineer Roadside Safety and Physical Security Division Texas A&M Transportation Institute

Texas A&M University System 3135 TAMU College Station, TX 77843 Phone: 979.845.4377 Fax: 979.845.6107 rbligh@tamu.edu Mustafa Mohamedali Research Manager Research Office Washington State Department of Transportation

P.O. Box 47372 Olympia, WA 98504-7372 Phone: 360.704.6307 Mohamem@wsdot.wa.gov John P. Donahue, P.E. Design Policy and Analysis Manager Development Division Washington State Department of Transportation

P.O. Box 47329 Olympia, WA 98504-7372 Phone: 360.705.7952 DonahJo@wsdot.wa.gov











