Texas A&M Transportation Institute

PROJECT SUMMARY

Texas Department of Transportation

0-6946: Establishing Comprehensive *Manual on Assessing Safety Hardware* (*MASH*) Compliance for Roadside Safety Systems in Texas

Background

A *Manual on Assessing Safety Hardware* (*MASH*) implementation agreement was jointly developed and adopted by the Federal Highway Administration and the American Association of State Highway Officials. The agreement establishes various implementation dates for different categories of roadside safety features. On projects let after the specified dates, only *MASH*-compliant hardware is eligible for new installations on the National Highway System (NHS).

In response to these implementation requirements, the Texas Department of Transportation Bridge, Design, Maintenance, and Traffic Safety Divisions reviewed their standards for roadside safety devices and identified those devices that require 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. Figure 1 shows an example of a crash test. Tables 1 through 7 show the devices tested, which include 7 bridge rail systems, 2 transition systems, 4 concrete barrier systems, 4 guardrail systems, 6 sign support systems, 4 work-zone traffic control systems, and 10 mailbox support systems.

What the Researchers Did

The researchers developed a crash test matrix for each device, with consideration given to the various design configurations for which *MASH* compliance was desired. Test installations for the selected configurations were constructed, full-scale crash tests were performed following *MASH* impact conditions, the test results were evaluated in accordance with *MASH* criteria, and implementation recommendations were developed for each device.

Figure 1. *MASH* Test 4-12 on the TxDOT C1W Bridge Rail.

What They Found

The results of the full-scale crash tests were evaluated to assess the *MASH* compliance of each device. These assessments are summarized in Tables 1 through 7 based on device category.

What This Means

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. Further research was recommended for devices that failed to meet *MASH* requirements.

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Table 1. Bridge Rails.

Device	*MASH* Compliant	Test Level
36-inch vertical parapet	Yes	TL-4
C1W	Yes	TL-4
C402	Yes	TL-4
C412	Yes	TL-5
C411	Yes	TL-2
T1W	Yes	TL-3
C66	Yes	TL-3

Table 2. Transitions.

Device	*MASH* Compliant	Test Level
Low-profile barrier to F-shape barrier	Yes	TL-2
Thrie beam to concrete barrier without end shoe block	Yes	TL-3

Table 3. Concrete Barriers.

Device	*MASH* Compliant	Test Level
42-inch single-slope concrete barrier (SSCB) keyed in with 1-inch asphalt concrete pavement	Yes	TL-4
32-inch F-shape portable concrete barrier pinned to concrete	Yes	TL-3
42-inch SSCB with attached light post	Yes	TL-4
Low-profile barrier	Yes	TL-2

Table 4. Guardrails.

Device	*MASH* Compliant	Test Level
Round wood post W-beam guardrail	No	—
Steel post metal beam guard fence (MBGF) in rocky terrain	Yes	TL-3
Round wood post MBGF in rocky terrain	No	—
Round wood post MBGF in concrete mowstrip	No	—

Table 5. Sign Support Structures.

Device	*MASH* Compliant	Test Level
Embedded wood post sign support system	No	—
Embedded perforated square steel tubing (PSST) sign system	No	—
Pedestal pole with flashing beacons	Yes	TL-3
Pedestal pole with flashing beacons with solar assembly	Yes	TL-3
Burn ban sign on slip base support	No	—
Burn ban sign on wedge and socket support	No	—

Table 6. Work-Zone Traffic Control Safety Devices

Device Tested	*MASH* Compliant	Test Level
Skid-mounted single PSST post sign support system	Yes	TL-3
Skid-mounted dual wood post sign support system	Yes	TL-3
Skid-mounted single wood post sign support system	No	—
Type III barricade with PSST frame and wood rails	Yes	TL-3

Table 7. Mailbox Support Structures.

Device	*MASH* Compliant	Test Level
Double mailbox on Type 3 foundation	Yes	TL-3
Double mailbox system on Type 2 foundation	Yes	TL-3
Multiple mailbox system on Type 1 foundation	Yes	TL-3
Single mailbox on Type 4 foundation with rubber support	Yes	TL-3
Double mailbox on Type 4 foundation with thin-walled steel support	Yes	TL-3
Multiple mailbox system on Type 4 foundation	Yes	TL-3
Single mailbox on Type 5 foundation	Yes	TL-3
Single mailbox on Type 6 foundation (plastic drum)	Yes	Tl-3
Single extra-large mailbox on Type 2 foundation	Yes	TL-3
Lockable mailbox on Type 2 foundation	Yes	TL-3

For More Information

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