LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

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**John Bel Edwards,** Governor
**Shawn D. Wilson, Ph.D.,** Secretary
**Christopher P. Knotts, P.E.,** Chief Engineer

MEMORANDUM

TO: ALL CONSULTANTS
ALL BRIDGE DESIGNERS

FROM: ZHENGZHENG "JENNY" FU, P.E.
BRIDGE DESIGN ENGINEER ADMINISTRATOR

SUBJECT: BRIDGE DESIGN TECHNICAL MEMORANDUM NO. 86 (BDTM.86)
MASH IMPLEMENTATION - UPDATE TO SPECIAL PROVISION FOR PERMANENT IMPACT ATTENUATORS

DATE: FEBRUARY 12, 2019

The Special Provision for permanent impact attenuators has been revised to comply with the AASHTO / FHWA Joint Implementation Agreement for MASH dated January 7, 2016 (see Attachment 1) and FHWA's memo dated December 20, 2018 entitled, "Eligibility of Crash Cushion Devices (Manual for Assessing Safety Hardware (MASH) 16 sunset date)" (see Attachment 2).

As per the updated Special Provision for Impact Attenuators (12/18) (see Attachment 3), all permanent impact attenuators installed on projects letting after January 1, 2019 shall meet the requirements of the AASHTO Manual for Assessing Safety Hardware (MASH). An Approved Materials List (AML) is being developed for permanent MASH impact attenuators. However, until this AML is published, contractors shall submit their proposed impact attenuator to the Project Engineer who will then forward it to the Bridge Design Section (attention: Mr. Kurt Brauner) for review. Installation of the attenuator shall not begin until the submittal has been accepted.

Temporary impact attenuators used in work zones may be NCHRP 350 or MASH devices until directed otherwise.

This technical memorandum is posted on the LA DOTD Website under *Inside La DOTD* > *Divisions - Engineering* > *Bridge Design* > *Technical Memoranda – BDTMs.*

Please contact Kelly Kemp (225-379-1809, kelly.kemp@la.gov) if you have questions or comments.

ZZF/kmb

Attachments

Cc: Chris Knotts (Chief Engineer)

Chad Winchester (Chief, Project Development Division)
Edward Wedge (Deputy Engineer Administrator)
Vince Latino (Assistant Secretary of Operations)
David Miller (Chief Maintenance Administrator)
Nick Fagerburg (Bridge Maintenance Administrator)
Michael Vosburg (Chief Construction Division Engineer)
Brian Kendrick (Project Management Director)
Chris Nickel (Pavement and Geotechnical Engineer Administrator)
David Smith (Road Design Engineer Administrator)
Jacques Deville (Contracts and Specifications)
Art Aguirre (FHWA)
District Administrators, ADA Engineering, ADA Operations, and District Bridge Engineers and Area Engineers

U.S. Department of Transportation
Federal Highway Administration

# Memorandum

BDTM.86
ATTACHMENT 1

Subject: **INFORMATION:** AASHTO/FHWA Joint Implementation Agreement for Manual for Assessing Safety Hardware (MASH)

Date: JAN – 7 2016

From: Thomas Everett
Director, Office of Program Administration

Michael S. Griffith
Director, Office of Safety Technologies

In Reply Refer To:
HSST

To: Division Administrators
Directors of Field Services
Federal Lands Highway Division Directors

**Purpose**

The purpose of this memorandum is to share information regarding the American Association of State Highway and Transportation Officials (AASHTO)/FHWA Joint Implementation Agreement for the AASHTO Manual for Assessing Safety Hardware (MASH). Recently, the agreement was successfully balloted by AASHTO's Standing Committee on Highways and approved by FHWA.

**Information**

On November 12th, 2015, FHWA issued a memorandum (http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/policy_memo/memo111215/) indicating that all modifications to NCHRP 350-tested devices will require testing under MASH in order to receive a Federal-aid eligibility letter from FHWA. In addition, a Federal Register Notice (https://www.federalregister.gov/articles/2015/11/13/2015-28753/manual-for-assessing-safety-hardware-mash-transition) was also issued regarding this action. This action provided a significant step forward to the implementation of MASH.

Through the AASHTO/FHWA partnership, the agreement was executed to define actions needed for full implementation of MASH over the course of several years. Per the agreement, the implementation of the forthcoming edition (anticipated Spring 2016) of the AASHTO Manual for Assessing Safety Hardware (MASH) will be as follows:

- The AASHTO Technical Committee on Roadside Safety will continue to be responsible for developing and maintaining the evaluation criteria as adopted by

AASHTO. FHWA will continue its role in issuing letters of eligibility of roadside safety hardware for federal-aid reimbursement.

- Agencies are urged to establish a process to replace existing highway safety hardware that has not been successfully tested to NCHRP Report 350 or later criteria.
- Agencies are encouraged to upgrade existing highway safety hardware to comply with the 2016 edition of MASH either when it becomes damaged beyond repair, or when an individual agency's policies require an upgrade to the safety hardware.
- For contracts on the National Highway System with a letting date after the dates below, only safety hardware evaluated using the 2016 edition of MASH criteria will be allowed for new permanent installations and full replacements:
    - December 31, 2017: w-beam barriers and cast-in-place concrete barriers
    - June 30, 2018: w-beam terminals
    - December 31, 2018: cable barriers, cable barrier terminals, and crash cushions
    - December 31, 2019: bridge rails, transitions, all other longitudinal barriers (including portable barriers installed permanently), all other terminals, sign supports, and all other breakaway hardware
- Temporary work zone devices, including portable barriers, manufactured after December 31, 2019, must have been successfully tested to the 2016 edition of MASH. Such devices manufactured on or before this date, and successfully tested to NCHRP Report 350 or the 2009 edition of MASH, may continue to be used throughout their normal service lives.
- Regarding the federal-aid eligibility of highway safety hardware, after December 31, 2016:
    - FHWA will no longer issue eligibility letters for highway safety hardware that has not been successfully crash tested to the 2016 edition of MASH.
    - Modifications of eligible highway safety hardware must utilize criteria in the 2016 edition of MASH for re-evaluation and/or retesting.
    - Non-significant modifications of eligible hardware that have a positive or inconsequential effect on safety performance may continue to be evaluated using finite element analysis.

Division Offices should discuss the MASH implementation agreement with state transportation agency partners and monitor the actions taken and progress towards the dates established in the agreement.

If you have any questions or comments, please contact Brian Fouch in the Office of Safety at (202) 366-0744.

U.S. Department of Transportation
Federal Highway Administration

# Memorandum

**BDTM.86 ATTACHMENT 2**

Subject: **ACTION:** Eligibility of Crash Cushion devices (*Manual for Assessing Safety Hardware* (MASH) 16 sunset date)

Date: DEC 20 2018

From: Michael S. Griffith
Director, Office Safety Technologies

In Reply Refer To: HSST-1

To: Division Administrators
Directors of Field Services
Federal Lands Highway Division Directors

**Purpose**

The purpose of this memorandum is to provide guidance to the FHWA Division Offices on the eligibility of National Cooperative Highway Research Program 350 (NCHRP 350) compliant crash cushions on the National Highway System (NHS) in the absence of an acceptable American Association of State Highway Transportation Officials (AASHTO) MASH 16 compliant crash cushion.

**Background**

On January 7, 2016, FHWA issued a memorandum announcing the execution of a Joint Agreement between FHWA and AASHTO to implement the MASH 16 (https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/docs/memo_joint_implementation_agmt.pdf). The agreement established sunset dates for use of roadside hardware on the NHS that has not been tested to MASH 16. In accordance with the agreement, on December 31, 2018, non-MASH compliant crash cushions will no longer be eligible for use on the NHS.

To date, there are nine MASH 16 compliant crash cushions that have received an FHWA eligibility letter and are listed on FHWA's website.

**Action**

For contracts on the NHS with a letting date after December 31, 2018, State Departments of Transportation (DOTs) may request a substitution to specify a NCHRP 350 compliant crash cushion when an equivalent MASH 16 compliant crash cushion doesn't exist. With the crash cushions currently available on the market, certain sizes/configurations have not been crash tested or analyzed according to MASH 16. For example, a 24-inch wide crash cushion could have successfully passed MASH 16 crash testing, but a similar 48-inch wide crash cushion is needed but hasn't been evaluated against MASH 16 yet.

If a State DOT requests federal-aid reimbursement for a NCHRP 350 crash cushion (that has not been evaluated against the MASH 16 crash test criteria) on the NHS, then the

Division Office should have the State provide an explanation. The explanation should provide reason(s) on specifying a NCHRP 350 crash cushion and be included in the DOT project design file. Based on the explanation, the Division Office may determine that the installation of the NCHRP 350 crash cushion on the NHS is acceptable and, therefore, eligible for Federal-aid reimbursement.

For further information, please contact Michael Matzke at (202) 366-1331 or michael.matzke@dot.gov

BDTM.86
ATTACHMENT 3

**NS IMPACT ATTENUATOR (12/18):**

1.0 DESCRIPTION.

Select, furnish, and install a kinetic impact attenuator device in accordance with the manufacturer's recommended procedures, plan details, the 2016 Louisiana Standard Specifications for Roads and Bridges, and these specifications.

2.0 MATERIALS.

Conform to the manufacturer's details for kinetic impact attenuators. Use corrosion resistant fasteners in all assemblies. Use American National Standard bolts, nuts and washers. Fabricate metal work from ASTM A36 steel or approved equal and galvanize after fabrication in accordance with Subsection 811.08. Conform to Section 809 for welding. Furnish hazard marker panels and attach by methods acceptable to the Project Engineer. Construct all required concrete foundations and backups as per the manufacturer's recommendations. If not specified, use Class A1 concrete.

3.0 SUBMITTAL.

Conform to Section 105.02. Submit to the Project Engineer for review information on the type, size, and the manufacturer of the proposed attenuator system. Include information demonstrating that the size (length and width) of the attenuator meets the requirements of the installation site conditions. Provide a certified statement that the impact attenuator and the materials used conform to the plans and specifications. The Project Engineer will forward the submittal to the Bridge Design Section for review.

Do not begin construction until submittal acceptance.

4.0 CONSTRUCTION REQUIREMENTS.

The Contractor shall provide kinetic impact attenuators that are either reusable or low maintenance classification as specified in the plans. The impact attenuator shall be a re-directive, non-gating systems that meets the requirements of AASHTO MASH, Test Level 3 and have an FHWA eligibility letter. When specified in the plans a Test Level 2 system may be used if it is a reusable or low maintenance, re-directive, non-gating system and a design waiver is approved by the Bridge Design Administrator for its use.

Assembly and installation shall be in accordance with the manufacturer's recommendations. The assembly and installation of all impact attenuators shall be supervised at all times by either a manufacturer's representative or an installer who has been trained and certified by the manufacturer of the system. If the supervision is provided by a trained installer, a copy of the installer certification shall be provided to the Engineer prior to installation.

For attenuator installation at an existing site, use the existing backup block, slab or foundation for attachment unless noted otherwise in the plans. Remove any bolts and hardware that are protruding from the concrete surfaces to at least 1 inch below the concrete surface and patch concrete with a concrete patch material from the DOTD Approved Materials List.

When bridge expansion joints conflict with the installation, design the attenuator based on existing site conditions. Do not modify the configuration of the gore area to accommodate the installation of the impact attenuator unless it is substantiated that no other type of attenuator is available on the market that would suit that particular location.

Submit the attenuator design and certification in accordance with Section 3.0.

5.0 MEASUREMENT.

Kinetic impact attenuators will be measured per each, which includes all materials, labor, equipment, tools, and any incidental work necessary to complete this work.

6.0 PAYMENT.

Payment for kinetic impact attenuators will be made at the contract price. Payment will be made under:

| Item No. | Pay Item | Pay Unit |
|---|---|---|
| NS-700-00830 | Impact Attenuator (Reusable, Test Level 2) | Each |
| NS-700-00840 | Impact Attenuator (Reusable, Test Level 3) | Each |
| NS-700-00850 | Impact Attenuator (Low Maintenance, Test Level 2) | Each |
| NS-700-00860 | Impact Attenuator (Low Maintenance, Test Level 3) | Each |