



Office of Engineering
Project Development Division
Bridge Design Section
PO Box 94245 | Baton Rouge,
LA 70804-9245
Phone: 225-379-1302

John Bel Edwards, Governor
Shawn D. Wilson., Ph.D., Secretary

MEMORANDUM

TO: ALL CONSULTANTS
ALL BRIDGE DESIGNERS

FROM: PAUL FOSSIER, P.E. 
BRIDGE DESIGN ENGINEER ADMINISTRATOR

SUBJECT: BRIDGE DESIGN TECHNICAL MEMORANDUM NO. 76, REV. 1 (BDTM.76.1)
PUBLICATION OF NEW (MASH) HIGHWAY GUARD RAIL STANDARD PLANS
(BD.1.1.1.0.01-.11, BD.1.1.2.0.01, BD.1.1.3.0.01) AND NEW (MASH COMPATIBLE)
GUARD RAIL SPECIAL DETAILS (BD.2.6.5.1.01-.19, BD.2.6.5.2.01-.19)

DATE: November 1, 2017

Revision No. 1 Summary:

The (MASH compatible) guard rail special details were developed after the new (MASH) highway guard rail standard plans were issued, in order to provide special rehabilitation projects with details that are compatible with the new MASH guard rail. The section of this BDTM revision pertaining to the new special details was added to provide clarity as to when the new details are applicable, depending on the scope of individual projects, and to highlight the changes from the old guard rail special details. All other content of BDTM.76, as published on Sept. 1, 2017, remains unchanged.

(MASH) Guard Rail Standard Plans:

Effective immediately, use of the new guard rail standard plans for bridge end, non-bridge end, off-system bridge and box culvert applications, with a Chief Engineer signature date of August 21, 2017, shall be implemented for all projects with a letting date after December 31, 2017. All new details have been published in ProjectWise for use.

These new details comprise a major revision to the guard rail standard plans in order to comply with the requirements outlined in AASHTO's Manual for Assessing Safety Hardware (MASH). FHWA has mandated that all new guard rails let after December 31, 2017 be MASH approved as per the attached January 2016 MASH Implementation Agreement from AASHTO and FHWA.

There are several noteworthy changes between the current guard rail standards (GR-200, 202 and 203) and the new MASH standards, such as:

1. The standard top of guard rail height has been raised to 31" (previously 28") as measured from the top of pavement (Note that the overall length of guard rail posts will not need to increase.)
2. Guard rail splices now occur between posts, not at the post.
3. Thrie beam rail is now only used at the bridge rail transition. All other guard rail applications shall use the standard W-beam rail. This change requires that guard rail be placed 5'-0" in front of a hazard as opposed to the 2'-0" allowed under GR-200, which used thrie beam.

4. Under GR-200, the length of the trailing end was 6'-3". The new MASH details require that the trailing end extend 37'-6" (plus the length of the rounded end) beyond the hazard.
5. The design tables and equations have been removed from the standard plans. The general notes now refer designers to the Roadside Design Guide. Guard Rail design tables and equations will also be incorporated into the Bridge Design and Evaluation Manual.
6. The 90 degree "T-Intersection" detail has been removed from the standards as it was not MASH compliant. We intend to turn that sheet into a special detail to be used with the permission of the Bridge Design Engineer Administrator.
7. New guidance on curb applications and median barrier guardrail applications.
8. General clean up and revision of remaining details, including conformance with the 2016 Standard Specifications.
9. A new Approved Materials List (AML) will be published on the DOTD Materials Section website indicating approved 31" MASH guardrail end treatments that shall be used. Currently there are tangent MASH end treatments available, but there are no available flared MASH end treatments. The new MASH flared end treatments are currently being developed and we anticipate approvals to our AML in the next 6 months. If a 31" flared end treatment is needed before the MASH flared end treatment is approved, a 31" flared NCHRP 350 end treatment shall be used from our AML NCHRP 350 list. A separate pay item, 704-10-00310 for this 31" NCHRP 350 end treatment is shown on sheet 1 of 11.
10. New pay items were created as needed for 2016 DOTD Standard Specifications and new MASH details as per sheet 1 of 11.
11. GR-201 will be updated and issued in the near future. Contact Bridge Design when these details are needed for specific projects.

Please note that we will keep existing standard plans GR-200, 201, 202 and 203 only for projects let before December 31, 2017 and for District maintenance purposes for existing guard rail inventory. For this reason, new pay items were developed for any MASH related details or items that did not exactly match those from the GR-200 series. These items are listed on Sheet 1 of 11 of the new standards.

(MASH Compatible) Guard Rail Special Details:

Effective immediately, these retrofit details (with a signature date of September 28, 2017) shall be used and incorporated into projects based on the following guidance:

1. For repair-only projects whose clearly defined scope of work is to restore specific damaged elements of a bridge or structure to a serviceable condition, guidance will be provided in a future update to EDSM II.3.1.3.
2. For rehabilitation projects, where multiple elements of the bridge or structure will be repaired, replaced, or strengthened, upgrading all existing guard rails on the bridge to current MASH standards is preferred. Otherwise, the existing guard rails can remain in service provided they are in good condition with all parts in place, are installed correctly as per GR-200, have a minimum rail height of 28", and have appropriate end treatments from the current Approved Materials List (AML). If these conditions cannot be met, the existing guard rails shall be upgraded to the new MASH standard. Repairing damaged guard rail back to its original condition shall not be allowed.
3. For pavement preservation projects, upgrading all existing guard rails within the project limits to current MASH standards is preferred. Otherwise, the existing guard rails can remain in service provided they are in good condition with all parts in place, are installed correctly as per GR-200, have a minimum rail

height of 28", and have appropriate end treatments from the current Approved Materials List (AML). If these conditions cannot be met, the existing guard rails shall be upgraded to the new MASH standard. Repairing damaged guard rail back to its original condition shall not be allowed.

These new retrofit details comprise a revision to the previous guard rail special details in order to match the newly published standard plans for Highway Guard Rail (MASH). The major changes are as follows:

1. The distance from the top of pavement to the centerline of the rail has been reduced from 1'-10" to 1'-9".
2. Where applicable, the guard rail and end treatment pay items were changed to match the ones shown in the MASH standard plans. Note that the pay items for the retrofit details did not change.
3. All notes now refer to the standard plans for Highway Guard Rail (MASH).
4. The box culvert retrofit details have been removed from these standards. Designers shall use the Highway Guard Rail (MASH) standard plan BD.1.1.3.0.01 for all box culvert applications.

Please contact Ms. Zhengzheng "Jenny" Fu (225-379-1321, zhengzheng.fu@la.gov) if you have questions or comments.

PF/zzf/kb/abl

Attachments

Cc: Christopher Knotts (Chief Engineer)
Edward Wedge (Deputy Engineer Administrator)
Chad Winchester (Chief, Project Development Division)
Vince Latino (Assistant Secretary of Operations)
David Miller (Chief Maintenance Administrator)
Michael Vosburg (Chief Construction Division Engineer)
Brian Kendrick (Project Management Director)
Jeff Lambert (Pavement and Geotechnical Engineer Administrator)
David Smith (Road Design Engineer Administrator)
Art Aguirre (FHWA)
Mary Stringfellow (FHWA)
Patrick Wollerson (DOTD Plans Manager)
District Administrators, ADA Engineering, ADA Operations, and District Bridge Engineers and Area Engineers



U.S. Department
of Transportation
Federal Highway
Administration

Memorandum

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

Date: 11/11/16

From: *Thomas D. Everett*
Thomas Everett
Director, Office of Program
Administration

In Reply Refer To:
HSST

Michael S. Griffith *Michael S. Griffith*
Director, Office of Safety Technologies

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.