




U.S. Department
of Transportation
**Federal Highway
Administration**

Memorandum

Subject: **ACTION:** Evaluating a State DOT's
Process to Determine Roadside Safety
Hardware Crashworthiness on the
National Highway System (NHS)

Date: April 9, 2018

From: Michael S. Griffith 
Director, Office of Safety Technologies

In Reply Refer To:
HSA

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

PURPOSE

The purpose of this memorandum is to provide guidance to the FHWA Division Offices to assist in their evaluation that a State DOT has an acceptable process for determining the crashworthiness of roadside safety hardware used on the National Highway System (NHS).

BACKGROUND

The FHWA's longstanding policy is that all roadside safety hardware installed on the NHS be crashworthy. To support this policy, the [joint implementation agreement](#) for the American Association of State Highway Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH) was adopted by AASHTO and FHWA. This agreement established dates for implementing AASHTO MASH as the criteria for determining crashworthiness of roadside safety hardware.

The FHWA continues to provide a voluntary service of reviewing crash test results and issues eligibility letters for *new* roadside safety hardware only. The FHWA no longer provides Federal-aid eligibility letters for modifications made to an AASHTO MASH-crash tested device. An eligibility letter is not a requirement for roadside safety hardware to be determined eligible for Federal funding. Roadside safety hardware is eligible for Federal funding if it has been determined to be crashworthy by the user agency (i.e., State DOT).

An FHWA eligibility letter should not be the sole basis for a State's determination of crashworthiness. It is each State's responsibility to determine crashworthiness and to approve new or modified roadside safety hardware meeting the State's specific needs. Each State should consider its own operational issues such as installation and

maintenance requirements, climate considerations (e.g., use of wood vs. steel posts), and in-service performance data in determining what roadside safety hardware to use on highway projects. The determination of crashworthiness of roadside safety hardware, acceptance for use on highway projects, and installation and maintenance are responsibilities handled at the State and local level.

GUIDANCE

Each FHWA Division Office should work with its respective State DOT to ensure that the State has an acceptable process for determining the crashworthiness of roadside safety hardware. Please note that there is no single recognized procedure or standard for how State DOTs determine crashworthiness, and existing processes may vary from State to State. However, an acceptable process for a State's determination of crashworthiness should be fully documented and may include:

- For new roadside safety hardware:
 - A physical crash test report documenting successful crash testing (relative to the AASHTO MASH test criteria) conducted by an ISO 17025 accredited laboratory.
- For modifications to existing successfully tested roadside safety hardware:
 - Proprietary devices: an engineering analysis conducted by an ISO 17025 accredited crash testing laboratory that determines the modification does not affect the crashworthiness of the roadside safety hardware based on previous crash testing (relative to the AASHTO MASH test criteria). If necessary, crash testing may be warranted based on the results of an engineering analysis.
 - Generic devices: an engineering analysis as described above can be conducted by the State DOT or an ISO 17025 laboratory. If necessary, crash testing may be warranted based on the results of an engineering analysis.

The initial determination of the crashworthiness of roadside safety hardware begins with laboratory testing and engineering analysis as defined by the AASHTO MASH. Once roadside safety hardware is identified as crashworthy and properly installed, States are encouraged to collect and assess in-service performance data on how the device performs in the vast array of real-world collisions. As selectors of hardware, the States are in the best position with complete access to crash data, maintenance information, and other critical elements to perform in-service performance evaluations and to use that data to make improvements to crash testing criteria and to installation and maintenance procedures. States should use all information available to determine the continued crashworthiness of roadside safety hardware.

Chapter 6 in the AASHTO MASH provides guidance on crash testing documentation and Chapter 7 provides guidance on in-service performance evaluations. A list of Q&As and a guidance document are attached for further clarification.

ACTION

Each FHWA Division Office should ensure that the State DOT has an acceptable process in place for determining the crashworthiness of all roadside safety hardware installed on the NHS.

Please report to Will Longstreet, Office of Safety, by June 30, 2018, on the existence of an acceptable State DOT process and, if necessary, a timeline for addressing any needed improvements. If you have questions or comments, please contact Will at will.longstreet@dot.gov or 202-366-0087.

Enclosures

CC: Safety field

Division Office Guidelines for Reviewing State Processes for Determining Crashworthiness of Roadside Safety Hardware

This guidance is provided to assist the FHWA Division Offices in reviewing a State DOT process for determining the crashworthiness of roadside safety hardware used on the National Highway System (NHS).

A State DOT's initial determination of crashworthiness of roadside safety hardware should begin with how the device meets current national testing criteria (i.e. AASHTO Manual on Assessing Safety Hardware (MASH)). This initial step often may include full-scale crash testing for new devices and/or an engineering analysis (for modifications of crashworthy devices). Below are some examples of how devices may be determined and documented as crashworthy that State DOTs may implement in their processes.

1. Research (NCHRP or pooled fund studies) conducted through ISO 17025 accredited crash test laboratories (accredited laboratories) showing a device meets AASHTO MASH.
2. Crash test results, videos, and test summary sheets that are completed and reported by accredited laboratories and in accordance with AASHTO MASH.
3. Evaluation of modifications to devices in accordance with AASHTO MASH to determine if additional testing is necessary for a device. At the State's discretion, this may be done through a State DOT's analysis for generic products or requiring manufacturers to have modifications of proprietary products reviewed by an accredited crash testing lab.
4. State requirements for manufacturers to have products tested to AASHTO MASH at accredited laboratories and to provide a manufacturer's certification that the device meets AASHTO MASH criteria supported by concurrence from the accredited crash testing lab.
5. Consultant review of a device's crashworthiness for States that may not have the expertise to review roadside safety hardware.

Once roadside safety hardware is identified as crashworthy and properly installed, States are encouraged to collect and assess in-service performance data on how the device performs in the vast array of real-world collisions. As selectors of hardware, the States are in the best position with complete access to crash data, maintenance information, and other critical elements to perform in-service performance evaluations and to use that data to make improvements to crash testing criteria and to installation and maintenance procedures. States should use all information available to determine the continued crashworthiness of roadside safety hardware.

Full analysis and review of each device submitted for a determination of crashworthiness should also include an operational analysis. This operational analysis may include review and input from other State DOT offices including Design, Construction, and Maintenance.

A State may consider the following when conducting its operational reviews:

- Is the device appropriate for use in your State? For example, is it appropriate for the State's climate; is it compatible with legacy hardware?
- Will the device be difficult for contractors to install correctly?
- Will the device be practical to maintain?
- Will the device require new maintenance protocols and/or inventory stock?
- Does in-service performance data from other users exist that identify potential issues with the device?

FHWA Division Office Q&As re: a State DOT Determination of Crashworthiness of Roadside Safety Hardware

1. Does roadside safety hardware installed on the NHS need to be crashworthy?

It is FHWA's longstanding policy that all roadside safety hardware installed on the NHS be crashworthy. This policy is reinforced through design standards incorporated by reference in 23 CFR part 625, including *A Policy on Geometric Design of Highways and Streets*, 2011 (the AASHTO Greenbook).

2. What should be considered in determining the crashworthiness of roadside safety hardware?

The initial determination of the crashworthiness of roadside safety hardware begins with laboratory testing and engineering analysis as defined by the AASHTO MASH. This is just the first step—proper installation and maintenance of roadside safety hardware also plays a crucial role in how hardware will perform. For this reason, States are encouraged to collect and assess in-service performance data of roadside safety hardware and take appropriate action as needed. As selectors of hardware, the States are in the best position with complete access to crash data, maintenance information, and other critical elements to perform in-service performance evaluations and to use that data to make improvements to crash testing criteria and to installation and maintenance procedures. States should use all information available to determine the continued crashworthiness of roadside safety hardware.

3. What is the State DOT's role in determining the crashworthiness of roadside safety hardware?

Each State DOT should have a process in place for determining the crashworthiness of new and modified roadside safety hardware. This process should include documentation supporting the State DOT's determination.

4. Can a State DOT use an FHWA eligibility letter as the sole basis for determining the crashworthiness of a new roadside safety hardware?

While a State DOT may use an FHWA eligibility letter as *one of the resources* for determining crashworthiness, it should not be the sole basis for a State's determination of crashworthiness. Each State DOT should document its basis for a determination of crashworthiness through review of crash test results and engineering analyses provided by accredited crash test labs and manufacturers. It is the State's responsibility to determine the appropriateness of new and modified roadside safety hardware for approval and use for its needs. Each State should consider its own operational issues such as installation and maintenance requirements, climate considerations (e.g., use of wood vs. steel posts), and in-service performance data in determining what roadside safety hardware to place on their highway projects.

5. What is the role of the FHWA Division Office in the process for ensuring crashworthy roadside safety hardware is incorporated on the NHS?

Each FHWA Division Office should ensure that the State DOT has a process in place for determining the crashworthiness of all roadside safety hardware installed on the NHS.

6. Does FHWA require the State DOT to have an FHWA Federal-aid eligibility letter?

No. Each FHWA Division Office should rely on the State DOT process to establish the State's determination of crashworthiness of roadside safety hardware installed on the NHS. If a State DOT does not have a process for determining crashworthiness, the Division Office should work with the State DOT in developing one.

7. What is the role of the State DOTs in working with manufacturers regarding modifications?

An acceptable State process should include a procedure for manufacturers to notify State DOTs of modifications to their devices. State DOT processes should address the review of modifications.

8. Must roadside safety hardware be tested to the full matrix of tests recommended in the AASHTO MASH to be determined crashworthy?

No. Running the full matrix of tests recommended in the AASHTO MASH is only required if a State DOT or manufacturer requests an FHWA Federal-aid eligibility letter for a specific roadside safety hardware device. The AASHTO MASH allows for user agencies (i.e., State DOTs) to determine a critical test matrix for generic devices or to consider a critical test matrix developed by a manufacturer. For proprietary devices, State DOTs and manufacturers should consider consultation with an accredited crash testing lab in determining critical test matrices.

9. Can modifications be made to roadside safety hardware that has received an FHWA eligibility letter?

Yes. Modifications can be made to roadside safety hardware that has previously received an FHWA eligibility letter; however, FHWA no longer considers submissions for Federal-aid eligibility letters for modifications made to an AASHTO MASH-crash tested device. The State DOT should determine the effect of the modification of roadside safety hardware based on the crashworthy criteria established in AASHTO MASH. It is the State DOT's responsibility to determine the appropriateness of modified roadside safety hardware for approval and use for its needs.

10. What is considered a significant modification to roadside safety hardware?

A modification that adversely affects the crashworthy performance of roadside safety hardware based on the crash testing criteria in AASHTO MASH is deemed to be significant. The determination of significance should be based on engineering analyses. A State DOT

may choose to have an accredited crash testing lab make this determination. If a State DOT determines that there has been a significant modification to a previously tested roadside safety hardware device, then the relevant manufacturer should retest the device in accordance with AASHTO MASH criteria.

11. Can new and existing research be used to determine crashworthiness of roadside safety hardware?

Yes. A State DOT may consider new and existing research (e.g., NCHRP reports and synthesis; individual crash test reports) conducted by an accredited laboratory or qualified researchers as part of its process to determine the crashworthiness of roadside safety hardware.

12. Does a State have to make new crashworthiness determinations for existing roadside safety hardware currently in place on the NHS?

No. Existing in-service roadside safety hardware may remain in place until it reaches the end of its service life or it becomes damaged beyond repair. If there is interest in continuing with the same device for future installations, the owner should determine if the device is crashworthy using the latest version of AASHTO MASH criteria.