

Implementation of AASHTO's Manual for Assessing Safety Hardware (MASH) 2016

Update from the Technical Committee on Roadside Safety
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MASH 2016

- Overview
- Background
- Ballot Results/Dates
- MASH Implementation Agreement
- Availability of MASH Hardware
- Anticipated Costs
- Implementation Needs
- Available Resources



Overview

- Technical Committee on Roadside Safety
 - Role in AASHTO
 - Responsibilities – RDG & MASH publication
- MASH vs. Roadside Design Guide (RDG)
 - MASH: assessment of roadside hardware
 - RDG: use of roadside hardware
- Roadside hardware:
 - Barriers, crash cushions, work-zone devices, bridge rails, signing/lighting supports, etc.



Background

- NCHRP Report 350 (1993) to MASH 2009
- MASH 2009 to MASH 2016
- MASH 2009 Implementation Agreement



NCHRP 350 to MASH 2009 (Revolution)

- Knowledge gained from use of devices and test methods
- Advances in the science of crash testing
- Additional tests and evaluation criteria
- Changes in nationwide vehicle fleet



MASH 2009 to MASH 2016 (Evolution)

- Major change: Crash testing criteria for cable barriers on slopes
- Minor changes:
 - Soil strength testing
 - Improved documentation of vehicle damage
 - Longer tractor-trailer lengths



MASH 2009 Implementation Agreement

- Did not sunset use of NCHRP 350 hardware
- Anticipated manufacturers would take the initiative to develop MASH-compliant devices (but this didn't happen)



MASH 2016 Ballot Results/Dates

- TCRS – final draft approved April 13th
- SCOD – passed May 18th
- SCOH – pending
- MASH 2016 publish date?



MASH 2016 Implementation Agreement

- Implemented in January
- Additional safety benefits of MASH could only be realized if new hardware was developed
- Incentive: sunset NCHRP 350 criteria for new devices
- Joint FHWA/AASHTO/TCRS group formed, final agreement issued on 1/7/2016
- “Staggered” implementation approach



Overview - Agreement Details

- 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 highway safety hardware for federal-aid reimbursement.



Overview - Agreement Details

- 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.



Overview - Agreement Details

- 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.



Overview - Agreement Details

- For contracts on the National Highway System with a letting date after the sunset dates, only safety hardware evaluated using the 2016 edition of MASH criteria will be allowed for **new permanent installations and full replacements.**



Overview - Sunset Dates

- **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



Overview - Agreement Details

- 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.



Overview - Agreement Details

- 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.

– continued



Overview - Agreement Details

- 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.



Availability of MASH Hardware

- Longitudinal w-beam barrier and cast-in-place concrete barrier (12/31/17):
 - Able to be ready for sunset dates as long as each state does not need to test own configuration
 - Many w-beam systems have been tested
 - Some cast-in-place concrete systems may need additional tests
- W-beam terminals (6/30/2018)



Availability of MASH Hardware

- Cable barriers, cable barrier terminals, crash cushions (12/31/2018)
 - Expect cable barrier to be ready
 - Cable terminals will be more challenging but are also expected to be ready
 - Some transitions require testing
 - Crash cushions should be ready; thrie-beam bullnose testing needs to be funded soon



Availability of MASH Hardware

- Bridge rails, transitions, all other longitudinal barriers and terminals; all breakaway hardware (12/31/2019)
 - Many types of bridge rails in use among the states; testing needs not yet fully known
 - NCHRP 20-7 project to evaluate “grandfathering” of historical bridge rail designs
 - NCHRP 03-119 project to examine sign supports and breakaway hardware



NCHRP 03-119

- Objective

- Identify and evaluate the crash performance of breakaway sign and luminaire supports and crashworthy work-zone traffic control devices that are non-proprietary and commonly used
- Evaluation to address in-service safety performance, potential failure modes, design modifications, and likelihood to comply with MASH test criteria



Availability of MASH Hardware

- MASH-compliant NCHRP 350 devices
 - Guardrail:
 - 29-inch W-beam system (TL-3)
 - 31-inch Midwest Guardrail System (TL-3)
 - Concrete Barrier:
 - 32-inch cast-in-place barrier (TL-3)
 - 36-inch cast-in-place barrier (TL-4)
 - F-Shape portable concrete barrier with 3-loop connection (TL-3)
- New MASH hardware
 - FHWA eligibility reviews
 - Testing Laboratory Capacity



Anticipated Costs

- Testing of non-proprietary devices
 - NCHRP, pooled-fund programs, individual states (unique designs they may use)
- MASH-compliant longitudinal barrier systems
 - Multiple systems currently available (various types)
 - No noted increase in cost vs. previous systems
- MASH-compliant terminals
 - Few systems currently available
 - Initial increase in cost (\$200-\$700)



Implementation Needs

- MASH hardware catalog
- Sharing state QPLs
- Sharing draft state policies
- Encourage pooled fund participation!
 - Midwest Pooled Fund (Univ. of Nebraska)
 - Roadside Pooled Fund (Texas A&M)



Available Resources

- Task Force 13 Barrier Hardware Guide
 - <http://www.aashtotf13.org/Barrier-Hardware.php>
- FHWA website of crash-tested hardware
 - http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/



Questions?

