MASH 2016

- Overview
- Background and Context
- MASH Implementation Agreement
- Availability of MASH Hardware
- Anticipated Costs
- Implementation Activities/Next Steps
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.
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 Implementation Agreement

- 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.
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

– 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 project to examine sign supports and breakaway hardware
Availability of MASH Hardware

- **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)

*(NCHRP 22-14(02))*
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 Activities/Next Steps

- 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)
Ongoing Research related to MASH

- NCHRP 20-7 (395) - MASH Equivalency of NCHRP 350-Approved Bridge Railings
- Roadside Pooled fund
  - MASH Coordination Effort
Questions / Discussion