


WYOMING DEPARTMENT OF TRANSPORTATION
ROAD DESIGN MEMORANDUM #09
DATE OF ISSUE: February 21, 2020



Approved by: 
Jeffrey Brown
Highway Development Engineer

Issued by: Project Development, WYDOT, Cheyenne

GENERAL TOPIC: MASH 2016 COMPLIANCE
SUBJECT: PROJECT LEVEL DOCUMENTATION

General

FHWA and AASHTO have approved a Joint Implementation Agreement to sunset the use of NCHRP 350-compliant roadside hardware devices. The intent is to use MASH 2016-compliant devices after December 31, 2019 on NHS projects.

Roadside hardware devices can include guardrail, barriers, cable rail, end terminals, bridge rail, beak away luminaires and signs, traffic control devices, crash cushions, and temporary work zone devices.

To help minimize the number of different types of hardware devices placed along our highways, WYDOT will use MASH 16-compliant devices, when available, on all WYDOT maintained roads.

States must maintain documentation when non-MASH 2016-compliant devices are used and the basis for use. When sole-sourcing MASH-compliant devices, States must comply with Federal and State procurement requirements.

States may specify MASH 2009-compliant or NCHRP 350-compliant devices when:

- a) a MASH 2016-compliant device does not exist to address the situation;
or
- b) a MASH 2016-compliant device exists but does not meet the state's needs given project or regional conditions; or

- c) the state is awaiting completion of MASH 2016 testing for a specific device, in which case the state must document the plan for testing the device that will be used on future projects in lieu of the specified NCHRP 350 device; or
- d) the device is a temporary work zone device that has been in use prior to December 31, 2019, and is still within its normal service life.

Project Level Documentation

For each project that involves roadside safety hardware, design teams need to document compliance and/or non-compliance using form MASHV1 known as the *MASH '16 Compliance Status for Roadside Safety Devices & Project Level Compliance Checklist*.

Exact letting date on the form is not necessary, however the fiscal year of the letting should be indicated on the form.

Project Development will be responsible for getting the checklist filled out and signed by the appropriate Programs (Project Development, Bridge, Traffic, etc.)

The Traffic Program will be responsible for filling out the form and filing in Falcon when they are the lead and Project Development is not involved.

Filing & Distribution

Place the completed *MASH '16 Compliance Status for Roadside Safety Devices & Project Level Compliance Checklist* in Falcon under the project correspondence folder.

Distribute completed document to programs and districts involved via email with a Falcon link.



MASH '16 Compliance Status for Roadside Safety Devices & Project Level Compliance Checklist

Project Number:

Anticipated Letting Date:

Description:

Project on NHS System? Yes No Both

Instructions: In each category check the devices being used.

Category I

Guardrails, Concrete Barrier, Crash Attenuators, Mailbox Supports, Mitered Culvert Ends

<i>Check if Used</i>	<i>Description</i>	MASH 2016 Compliant Yes or No	Status of Device and/or FHWA/AASHTO Joint Implementation reason used if not MASH 2016 Compliant listed in Column Below <i>If further information is required please type in text box below the pre-determined response.</i>
Box Beam Guardrails			
	Box Beam Guardrail Standard Run	Yes	Status: MASH 2016, TL-3 per TTI Report 610031, May, 2019. FHWA Eligibility Letter B-334.

	<p>Box Beam Transition to 42 in. TL-4 MASH, 3-Tube Bridge Rail</p>	<p>No</p>	<p>Status: Unavailable at this time. Research is being conducted at TTI to develop a transition. Hoping to crash test in spring of 2020. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation C) The state is awaiting completion of MASH-2016 testing for a specific device, in which case the state must document the plan for testing the device that will be used on future projects in lieu of the specified NCHRP 350 device</p>
	<p>Box Beam Transition to 29 in. Existing TL-3 (NCHRP 350), 2-Tube Bridge Rail</p>	<p>No</p>	<p>Status: NCHRP 350, TL-3. This transition will only be used for guardrail upgrades where existing bridge rail remains in place. Awaiting results from NCHRP 22-35 to determine MASH status of bridge rail. If bridge rail is found to meet MASH requirements, testing may be conducted for a MASH transition. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation C) The state is awaiting completion of MASH-2016 testing for a specific device, in which case the state must document the plan for testing the device that will be used on future projects in lieu of the specified NCHRP 350 device</p>
	<p>Box Beam Transition to Concrete Parapet</p>	<p>No</p>	<p>Status: NCHRP 350, TL-3. Funding is in place to develop a MASH transition, but waiting to conclude other MASH transition testing first. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation C) The state is awaiting completion of MASH-2016 testing for a specific device, in which case the state must document the plan for testing the device that will be used on future projects in lieu of the specified NCHRP 350 device</p>
	<p>Box Beam (Tangent Terminal) WYBET</p>	<p>No</p>	<p>Status: NCHRP 350, TL-3. WYBET end terminal is not MASH approved however, MASH BEAT Terminal testing is complete, FHWA Eligibility Letter cc-157. We will begin using the MASH BEAT terminal in the near future after the standard plan is developed. This is a proprietary device, but can be obtained from multiple sources, therefore does not require sole source request.</p>

	Box Beam End Anchorage Type I (Downstream Terminal)	No	<p>Status: NCHRP 350 Awaiting testing from NY DOT. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	Box Beam End Anchorage Type II	No	<p>Status: NCHRP 350 Awaiting testing from NY DOT. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	Box Beam Median Barrier	No	<p>Status: NCHRP 350 TL-3 Awaiting work from NY DOT. WYDOT is likely to discontinue use as no MASH terminal is currently being developed for the median barrier version. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
<i>MGS Guardrail</i>			
	MGS Guardrail with Steel Posts	Yes	<p>Status: MASH 2016, TL-3 per FHWA Eligibility Letter B-212.</p>
	MGS Guardrail with Wood Posts	Yes	<p>Status: MASH 2016, TL-3 per FHWA Eligibility Letter B-230A.</p>
	MGS Transition to 42 in. TL-3 MASH 3-Tube Bridge Rail	No	<p>Status: Unavailable at this time. Research is being conducted at TTI to develop a transition. Hoping to crash test in spring of 2020. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>

	MGS Transition to 29 in. Existing TL-3 (NCHRP 350), 2-Tube Bridge Rail	No	<p>Status: NCHRP 350 TL-3. This transition will only be used for guardrail upgrades where existing bridge rail remains in place. Awaiting results from NCHRP 22-35 to determine MASH status of existing bridge rail. If bridge rail is found to meet MASH requirements, testing may be conducted for a MASH transition.</p> <p>FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	MGS Transition to Standard Concrete Parapet	Yes	<p>Status: MASH 2016, TL-3 per FHWA Eligibility Letter B-263</p>
	MGS (Tangent) Terminal Type I	Yes	<p>Note: Contractors may select to install one of the following:</p> <p>Status MGS Terminal Type 1, Option 1, MSKT: MASH 2016, TL-3 per FHWA Eligibility Letters cc-126, cc-126A, cc-126C, cc-126D, cc-126E, cc-126F, cc-126G. Proprietary terminal, competitively bid, also, potentially multiple suppliers.</p> <p>Status MGS Terminal Type 1, Option 2, Softstop: MASH 2016, TL-3 per FHWA Eligibility Letter cc-115, cc-115A, cc-115B, cc-115C, cc-115D. Proprietary terminal, competitively bid, also, potentially multiple suppliers.</p>
	MGS (Flared) Terminal Type 2 - Option 1, MFLEAT	Yes	<p>Status: MASH 2016, TL-3 per FHWA Eligibility Letter cc-143.</p>
	MGS Long Span Over Box Culverts	Yes	<p>Status: MASH 2016, TL-3 per FHWA Eligibility Letter. B-189</p>
	MGS Long Post - Steep Slope Behind	Yes	<p>Status: MASH 2016, TL-3 per FHWA Eligibility Letter. B-211</p>

	MGS Half Post Spacing	No	<p>Status: NCHRP 350, TL-3. Awaiting completion of TTI Pooled Fund Study and NCHRP 22-38 FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	MGS Quarter Post Spacing	No	<p>Status: NCHRP 350, TL-3. Awaiting completion of TTI Pooled Fund Study and NCHRP 22-38 FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	MGS with 6 in. Curb	Yes	<p>Status: MASH 2016, TL-3. Awaiting FHWA Eligibility Letter.</p>
<i>High Tension Cable Guardrail</i>			
	Cable Median Barrier and terminal (HT) Option 1 Brifen 4-Cable TL-3	No	<p>Status: NCHRP 350, until MASH 2016 barrier and terminal is available and acceptable to WYDOT. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	Cable Median Barrier and Terminal (HT) Option 2 Brifen 4-Cable TL-4	No	<p>Status: NCHRP 350, until MASH 2016 barrier and terminal is available and acceptable to WYDOT. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	Cable Median Barrier and Terminal (HT) Option 3 Trinity CASS TL-3	No	<p>Status: NCHRP 350, until MASH 2016 barrier and terminal is available and acceptable to WYDOT. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>

<i>Free Standing Permanent Concrete Barrier</i>			
	32 in. New Jersey Barrier	Yes	Status: MASH TL-3, per NCHRP 20-07 (395) MASH Equivalency Rpt. Note, the was considered a TL-4 barrier under NCHRP 350, and has been downgraded to a TL-3 barrier under MASH.
	42 in. Single Slope Barrier (Texas 11 Degree Slope)	Yes	Status: MASH TL-4, per TTI Report 0-6946-1 and NCHRP 20-07 (395). Under NCHRP 350, considered a TL-5 barrier and testing criteria under MASH has not changed for the TL-5 test. Working on a MASH TL-5 justification by the Midwest States Pooled Fund.
<i>Permanent Crash Attenuators</i>			
	Impact Attenuators - Option 1, SCI Smart Cushion SC1100GM Crash Attenuator	Yes	Status: MASH 2016-TL-3 per FHWA Eligibility Letter cc-128. This is a proprietary device, but can be provided by multiple distributors so a sole source letter is not required. Only one other manufacturer is in the process of submitting data for their impact attenuators at this time.
<i>Mailbox Supports</i>			
	Single and Double Mailbox Supports	No	Status: NCHRP 350. The Midwest States Pooled Fund is working on a MASH justification based on other mailbox support testing. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation
	Multiple Mailbox Support	No	Status: NCHRP 350. The Midwest States Pooled Fund is working on a MASH justification based on other mailbox support testing. FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation

	Cantilever Mailbox Support	No	<p>Status: NCHRP 350. NCHRP 350. Awaiting information from Minnesota on test of this support to MASH.</p> <p>FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
<i>Steel Mitered (Culvert) Ends</i>			
	Steel Mitered End Sections	No	<p>Status: NCHRP 350. Awaiting a national effort to develop these culvert end sections to MASH. AASHTO TCRS proposed an NCHRP project, but AASHTO Committee on Research did not fund last year.</p> <p>FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
<i>Short Radius Treatment at Intersecting Roadways</i>			
	W Beam Short Radius Design	No	<p>Status: Pre NCHRP 350. We will continue to use until there is a better solution. TxDOT developed a short radius design with some MASH testing, but requires sand barrels behind. WYDOT typically doesn't have room for the sand barrels therefore this design has not been accepted. NCHRP 15-53 is working to develop a MASH treatment, but recently experience a failing crash test.</p> <p>FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>

Project Development Engineer Signature: X _____

Date: _____

Category II
Bridge

<i>Check if Used</i>	<i>Description</i>	MASH 2016 Compliant Yes or No	Status of Device and FHWA/AASHTO Joint Implementation reason Used if not MASH 2016 Compliant listed in Column Below <i>If Further information is required please type in text box below the pre-determined response.</i>
<i>Bridge Railing</i>			
	TL4BRGRAIL-MASH (New Installation)	Yes	Status: MASH 2016 Compliant. Terminal connection from MASH bridge railing to roadway guardrail is currently being developed. Approved MASH concrete parapet will be used to transition from MASH bridge railing to roadway guardrail.
	TL3BRGRAIL NCHRP 350 (New Installation)	No	Status: NCHRP 350, TL-3. This is a non NHS route. Terminal connection from MASH compliant bridge railing to roadway guardrail is currently being developed. MASH upgrade on non NHS routes will be deferred until terminal connection is available to avoid concrete parapet transition OR, the exiting bridge has remaining service life and updating to MASH requires significant modification to existing structure; therefore, MASH installation will be deferred until structure is replaced and NCHRP 350 railing will be installed.
	TL4BRGRAIL-NCHRP 350 (In Service)	No	Status: NCHRP 350, TL-4. This rail is typically used when the existing TL-4 bridge railing will remain in service and the scope of work does not involve replacement. Example projects would be bridge rehabilitations, damage repair projects, and guardrail upgrades. Awaiting results from NCHRP 22-35 to determine MASH status of bridge rail.
	TL3BRGRAIL-NCHRP 350 (In Service)	No	Status: NCHRP 350, TL-3. The existing TL-3 bridge railing will remain in service and the scope of work does not involve replacement. Example projects would be bridge rehabilitations, damage repair projects, and guardrail upgrades. Awaiting results from NCHRP 22-35 to determine MASH status of bridge rail.

Assistant State Bridge Engineer Signature: X _____

Date: _____

Category III
Traffic

<i>Check if Used</i>	<i>Description</i>	MASH 2016 Compliant Yes or No	Status of Device and FHWA/AASHTO Joint Implementation reason Used if not MASH 2016 Compliant listed in Column Below <i>If Further information is required please type in text box below the pre-determined response.</i>
<i>Permanent Signing</i>			
	Sign Posts	No	FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation
	STL Break-Away Sign Supports	No	FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation
<i>Temporary Traffic Control</i>			
	Work Zone Wood Post Signs	No	FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation
	Sequential Chevron	No	FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation

	Category 1, 2 & 3 Devices	Yes & No	<p>Status: Standard specification addresses the use of non-MASH '16 devices and their normal service life. Depends on what contractor supplies.</p> <p>FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	Portable Variable Message Sign	No	<p>FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
<i>Permanent Luminaire Poles & RC Gates</i>			
	Steel Luninaire Poles	No	<p>FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	Fiber Glass Luninaire Poles	No	<p>FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation</p>
	Road Closure Gate Assembly	No	<p>Status: Current design meets NCHRP 350. Currently awaiting completion of MASH testing.</p> <p>FHWA/AASHTO Joint Implementation Reason(s): A) A MASH 2016-compliant device does not exist to address the situation C) The state is awaiting completion of MASH-2016 testing for a specific device, in which case the state must document the plan for testing the device that will be used on future projects in lieu of the specified NCHRP 350 device</p>

Assistant State Traffic Engineer Signature: X

Date: _____

Non-MASH16 Compliance Reason Key:

- A) A MASH 2016-compliant device does not exist to address the situation
- B) A MASH 2016-compliant device exists but does not meet the state's needs given project or regional conditions

- C) The state is awaiting completion of MASH-2016 testing for a specific device, in which case the state must document the plan for testing the device that will be used on future projects in lieu of the specified NCHRP 350 device
- D) The device is a temporary work zone device that has been in use prior to December 31, 2019 and is still within its normal service life
- E) This is a damage repair project and the entire system is not being replaced. With the exception of the damaged area, the existing system as a whole still has useful life
- F) This is an off system installation (non-NHS and non-state)