MAPA Meeting - November 2, 2021
Recent and Upcoming Policy Changes

1. Sec. 612.4 is being updated to include the use of work zone crash cushions in narrow locations where sand barrel arrays will not fit. EPG 612.2, 612.3, and 617.1 will now include guidance for when to include work zone crash cushions in contract plan sheets.

SECTION 612: IMPACT ATTENUATORS

612.4 Construction Requirements.

612.4.1 Truck or Trailer Mounted Attenuator. A truck mounted attenuator or trailer mounted attenuator (TMA) shall be used for all moving operations conducted under traffic and as specified in the contract. Each TMA shall consist of an impact attenuator unit, a support vehicle, and a truck-mounted or trailer mounted flashing arrow panel. Any damaged TMA shall be removed from service and either repaired or replaced to the satisfaction of the engineer.

612.4.2 Impact Attenuator Array (Sand Barrels). Location, and relocation of the impact attenuator arrays shall be as shown on the plans or as directed by the engineer.

612.4.2.1 Sand shall be measured and placed in accordance with the manufacturer's recommendations and weights shown for each module. Sand shall have a maximum moisture content of five percent at the time of installation. Rock salt shall be five percent of the required weight in each module, and shall be uniformly dispersed in the sand.

612.4.2.2 A decal designed as a Type I object marker with MoDOT fluorescent orange retroreflective sheeting or a Type 3 object marker with MoDOT Type 3 yellow sheeting shall be applied to the lead module facing traffic for arrays located 12 feet or less from the edge of the traveled way.

612.4.2.3 Damaged or deficient modules shall be replaced by the contractor in accordance with Sec 616.4.

612.4.2.4 When no longer needed, modules and sand shall be removed and shall remain the property of the contractor.

612.4.3. Work Zone Crash Cushion. Location~~,~~ and relocation of the crash cushion shall be as shown on the plans or as directed by the engineer.

612.4.3.1 ~~If the crash cushion is w~~Water-filled~~, the~~ crash cushions shall be filled and contain a ~~water~~ mixture to prevent freezing ~~and measured~~ in accordance with the manufacturer's recommendations ~~and weights shown for each module~~.

612.4.3.~~3~~2 Damaged or deficient modules shall be replaced by the contractor in accordance with Sec 616.4.

612.4.~~2~~3.~~4~~3 When no longer needed, work zone crash cushions shall be removed and shall remain the property of the contractor.

612.5 Basis of Payment.

612.5.1 The accepted quantity of truck or trailer mounted attenuators will be paid at the contract unit price. Impact attenuator arrays (sand barrels), will be paid for at the contract unit price for each impact attenuator array per the manufacturer's recommendations for the posted speed limit. Relocation of impact attenuator arrays will be paid for at the contract unit price included in the contract. Work zone crash cushions will be paid for at the contract unit price. Relocation~~s~~ of work zone crash cushions will be paid for at the contract~~tor~~ unit price.

612.5.2 Furnishing and installing replacement sand barrels will be paid for at the contract unit price per each sand barrel. Final payment for this item will be based on the actual number of modules replaced. Replacement of damaged work zone crash cushions is incidental and shall be replaced at no cost to the Commission.

An approved sand-filled impact attenuator may be installed on the exposed end of the barrier where the posted speed prior to construction on an existing facility or the anticipated posted speed of a temporary facility is greater than 35 mph.

A crash cushion will be required on the upstream end for divided facilities, and on both ends for all two-way facilities. When space allows, sand barrel impact attenuators are the preferred choice for temporary protection. However, in the event that sand barrels cannot be used (i.e. insufficient width), work zone ~~C~~crash cushions may be used instead. Work zone crash cushions provide a narrower option than sand barrels, but still perform the same function. Work zone crash cushions are discussed in EPG 617.1.3.3 Crash Cushion. Applicable pay items are included in the plans.

~~Crashworthy end terminals (Types A through E) should be used when sufficient width is not available for sand barrels. More information on proprietary crash cushions is available at EPG 617.1.3.3 Crash Cushion.~~

612.3 Construction Inspection Guidelines

Material (for Sec 612.2) Certifications are to be collected on both the sand and retroreflective sheeting used in or on the sand-filled impact attenuators.

Safety Requirements (for Sec 612.3) The inspector is to request a copy of the manufacturer's certification that states the units comply with the crash test requirements of NCHRP 350 or MASH, Test Level 3, and have FHWA acceptance. This information is to be kept in the project files.

Truck-Mounted Attenuator (for Sec 612.4.1) TMAs are to be inspected to make sure they are structurally sound, the frames are not bent and that they appear to be in good working order. In some cases, the contractor may elect to add TMAs when TMAs are not required. Elective TMAs need to be NCHRP 350 or MASH, Test Level 3, compliant so the certification still needs to be collected. Typically, TMAs are only required and paid for under conditions where the contractor is operating without a lane drop set up (cones, channelizers, etc.). TMAs that the contractor voluntarily adds to an operation are typically not paid for.

Sand-Filled Impact Attenuator Array (for Sec 612.4.2) The inspector is to request a copy of the manufacturer's installation instructions for the particular brand of sand-filled impact attenuator the contractor is using. The use of more than one manufacturer's sand barrels in an array is not allowed. When inspecting the sand-filled impact attenuator arrays, make sure that the array is in the location as shown in the temporary traffic control plans, and set up and filled in accordance with the manufacturer's recommendations. All lids are to be on and secured. MoDOT requires rock salt intermixed with the sand so that any water that gets into the barrels will not freeze and create a safety hazard. When checking the contents of the barrels, rock salt should be visible in the sand mix. During periods of extended cold weather, the sand should be checked periodically to make sure it hasn't frozen because the salt content has been exhausted. If this condition is found, the contractor will need to add more salt or replace the sand/salt mixture.

Work Zone Crash Cushions (for Sec 612.4.3) The inspector is to request a copy of the manufacturer's installation instructions for the particular brand of crash cushion the contractor is using. When inspecting the work zone crash cushion, make sure that the crash cushion is in the location as shown on the temporary traffic control plans, and set up in accordance with the manufacturer's recommendations. If the crash cushion is water-filled, MoDOT requires a mixture content per manufacturer's recommendations so that the crash cushion will not freeze ~~and create a safety hazard~~. During periods of extended cold weather, the crash cushion(s) should be checked periodically to make sure it has no~~n~~'t frozen. If this condition is found, the contractor will need to fix and/or replace the mixture. In the event the work zone crash cushion is damaged and needs replaced, it is ~~should be~~ considered incidental and replaced at no cost to the Commission~~by the contractor~~.

617.1 Temporary Traffic Barriers

617.1.3.3 Crash Cushion

Crash cushions are designed to absorb energy of an impacting vehicle and reduce the force on a passenger to an acceptable level. An approved crash cushion is installed on the exposed end of the barrier where the posted speed prior to construction on an existing facility or the anticipated posted speed of a temporary facility is greater than 35 mph. A crash cushion will be required on the upstream end for divided facilities, and on both ends for all two-way facilities. Sand barrels are discussed in EPG 612.2 Sand-Filled Impact Attenuators (Sand Barrels). Applicable pay items are included in the plans. Special provisions are provided in the plans for non-standard devices. The types of crash cushions currently used are as follows:

- **617.1.3.3.1 Impact Attenuators (Sand Barrels).** This system consists of a group of freestanding sand barrels and is discussed in EPG 612.2 Sand-Filled Impact Attenuators (Sand Barrels).

- **617.1.3.3.2 ~~Proprietary~~ Work Zone Crash Cushions.** These alternate crash cushions may be used when sufficient width is not available for sand barrels. These are typically used on the ends of temporary two-lane, two-way sections on divided highways. For temporary installations, ~~typically acceptable Type C crash cushions are the Quadguard-CZ and the ADIEM II. For more information~~, refer to ~~EPG 606.1.3.2 Approved Crashworthy End Terminals~~ . End Terminals, Crash Cushions and Barrier Systems for a list of approved work zone crash cushions.

MoDOT

105 West Capitol Avenue
P.O. Box 270
Jefferson City, Missouri 65102

Missouri Department of Transportation
Patrick K. McKenna, Director

1.888.ASK MODOT (275.6636)

MoDOT – Sunset Dates for MASH Devices

The Missouri Department of Transportation (MoDOT) will use the following criterion for sunset dates regarding temporary traffic control devices installed in work zones on state highways and the National Highway System. The adoption of categorization for devices will be recognized from NCHRP 350:

Categorization of Temporary Traffic Control Devices
Category 1: Small Lightweight Devices
Examples: Cones, Drums, Skinny Drums, Tubular Markers

Category 2: Devices with Minimum Vehicle Velocity Discharge Device Examples: Barricades, Portable Sign Supports, Vertical Panels

Category3: Devices with Significant Vehicle Velocity Discharge Device Examples: Portable Concrete Barrier, Steel Barrier, Water filled Barrier, Work Zone Crash Cushions, Truck Mounted Attenuators, Break Away Sign Supports

Category 4: Trailer Mounted Devices
Examples: Flashing Arrow Boards, Portable Changeable Message Signs, Temporary Signals, Digital Speed Limit Signs, other trailer mounted devices

Category 1 temporary traffic control devices:
No testing of these devices is required to meet MASH-16 requirements unless modified.

Category 2 temporary traffic control devices:
All Category 2 temporary traffic control devices manufactured on or after January 1, 2023 must meet MASH-16 crash standards. Any of these devices manufactured before this date may be used through January 1, 2026 provided, they meet the standard specification requirements and are approved for use by the Engineer located on the project. Retesting of these devices is required when a major modification has been made since the time of the test. If this has occurred, the device shall be retested according to MASH-16 requirements. If the device was tested to MASH-16, a computer analysis may be used to provide documentation that the modification does not compromise the crashworthiness of the device. A full retest of the device modification can be requested if the computer analysis does not provide conclusive results.

Category 3 temporary traffic control devices:
All Category 3 temporary traffic control devices manufactured on or after January 1, 2023 must meet MASH-16 crash standards. Any of these devices manufactured before this date may be used through January 1, 2030 provided, they meet the standard specification requirements and are approved for use by the Engineer located on the project. Retesting of these devices is required when a major modification has been made since the time of the test. If this has occurred, the device shall be retested according to MASH-16 requirements. If the device was tested to

MASH-16, a computer analysis may be used to provide documentation that the modification does not compromise the crashworthiness of the device. A full retest of the device modification can be requested if the computer analysis does not provide conclusive results.

Category 4 temporary traffic control devices:
Category 4 devices were not tested in NCHRP 350. MoDOT recognizes the benefit of these devices in work zones. Category 4 devices are not required to meet MASH-16 requirements at this time but will encourage the use of MASH-16 tested Category 4 devices when available.

Sunset Dates for Devices with no MASH-16 Availability:
In the event a temporary traffic control device does not have a MASH-16 option available, subsequent sunset dates will be provided for the specific item itself and the sunset dates based on categorization will not apply.

Note: Two-loop Type F Barrier
Two (2) – Loop Type F Barrier may no longer be used on or after January 1, 2023.