



COLORADO

Department of Transportation

Division of Project Support

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MEMORANDUM

TO: REGION STAFF AND PROJECT SUPPORT UNITS
FROM: SCOTT MCDANIEL, DIRECTOR OF PROJECT SUPPORT *mg*
DATE: DECEMBER 29, 2015
SUBJECT: DIVISION OF PROJECT SUPPORT MEMO 2015-04 / MASH TESTED 31-INCH GUARDRAIL IMPLEMENTATION POLICY AND MASH IMPLEMENTATION DATES

The Project Development Branch is in the process of revising the Standard Drawings and Specifications to begin the implementation to the new Manual for Assessing Safety Hardware (MASH) testing as requested and highly recommended by the Federal Highway Administration (FHWA). The Standards and Specifications Unit is particularly focusing on updating the details to what will replace the current Standard Plan M-606-1 *Guardrail Type 3 W-Beam*, 28 inch high guardrail system to the new M-606-1 *Midwest Guardrail System (MGS) Type 3 W-Beam 31 Inch*. It will be issued on December 29, 2015. Therefore, in consideration of how this will affect the projects the following policies are proposed in conjunction with the Joint AASHTO/FHWA proposed schedule.

The new 31 inch high guardrail Standard Plans use the generic, non-proprietary Midwest Guardrail System (MGS), which meets the recently released AASHTO MASH testing requirements for 31 inch guardrail. The major changes from the current guardrail Standard Plans are:

- raise the height of guardrail from 28 to 31 inches,
- offset blocks are changed from 8 to 12 inches wide,
- change the guardrail splice locations from the guardrail posts to the center of the guardrail post spacing at the end of each of the W-Beam panels;
- and, use an asymmetric versus symmetric transition to the concrete barriers and bridge rail.
- It is important to note that the costs of the new system are about the same as the old rail, but the 31 inch MGS provides better performance.

The current M-606-1 *Guardrail Type 3 W-Beam*, 28 inch high guardrail system only meets the NCHRP Report 350 Test Level 3 criteria for 27¾ inch high guardrail. A deadline for using only the 31 inch high MASH tested rail on highway projects has been set for December 31, 2017 (FHWA is recommending implementation as soon as possible); and therefore, CDOT will begin this implementation, for all projects with new rail, advertised on or after March 31, 2016. Earlier use is allowed.

The following are factors that each region should consider for either raising or replacing existing guardrail on new projects. These procedure are effective for projects that have their Design Scoping Review on or after February 1, 2016. Earlier use is allowed and encouraged:



- If the existing rail is not to be relocated or modified and the height of the rail is 26.5 inch or higher it may remain in place. Obviously, the region may replace the existing rail if it believes that it would be prudent to do so in conjunction with the new project (i.e. the rail is in poor condition, safety assessment demonstrates the need, or new upcoming projects will require replacement).
- If the existing rail height is less than 26.5 inch then the entire rail must be raised or replaced (this is an FHWA requirement). Options to raise or replace existing rails that do not meet the 26.5 inch requirement are as follows:
 1. Use higher additional bolt hole provided in the post to raise the rail to 26.5 inch or higher and then it may remain in the existing configuration (currently this cost to "Modify Guardrail - 210-0435" is approximately \$8/foot).
 2. Use the existing steel (W-Beam rail) and posts (if the majority are in good condition they may be utilized in raising the rail to 31 inches). The blocks must be replaced with the new 12 inch blocks, the posts raised/reset, and the splices (with backing plate) must be mid-span between the posts rather than on the posts (thus additional bolts are required and new bolt holes drilled into the existing steel beam may be required). This would likely raise the cost of "Modify Guardrail to 31-inch MGS" to approximately \$15 to \$18/foot.
 3. Remove existing rail and install new 31 inch MGS rail as detailed. Currently the cost to remove existing rail is approximately \$5/foot and the cost to set new rail is approximately \$18/foot; and therefore, since this cost will remain pretty consistent for the new 31 inch MGS rail, the overall cost for removing and installing new will be approximately \$23/foot.
 - Note that for options 2 and 3, all the end anchorages/sections and the bridge transitions must be replaced as shown on the Standard Plans.
 - Also for options 2 and 3, if new 12 inch blocks cause an issue with the alignment, then the "no block" version of the 31 inch MGS rail may be allowed.

Other safety devices associated with the guardrail will follow the proposed Joint AASHTO/FHWA guidelines, regarding the switch to MASH tested devices, as follows:

- December 31, 2017: 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

I concur:


 Joshua Laipply, P.E., Chief Engineer

12/28/2015
 Date

