

Technical Memorandum

To: Electronic Distribution Recipients

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Subject: W-Beam Guardrail Upgrade Considerations for Preservation Projects

Expiration

This is a new Technical Memorandum and shall remain in effect until August 2, 2022 unless superseded prior to that date.

Implementation

The guidance in this Technical Memorandum is effective immediately for all preservation projects that are in the scoping or early stages of the preliminary design phase. Strong consideration should also be given to incorporating this guidance into projects in a more advanced design phase.

Introduction

The intent of a preservation project is to extend the usable life of the facility. This should also include addressing feasible safety improvements that can be accomplished with the project, since work may not occur again on the facility for a number of years. Guardrail systems are a key roadside safety component. To ensure they perform their intended functions throughout the life of the facility, a review of existing installations should be conducted when planning a preservation project.

Preservation projects are generally those that preserve pavements and bridges. Safety device upgrades on these projects are based on many risk factors including system condition, ADT, crash rate, and funding. All improvements may not be feasible or reasonable, but efforts should be made to incorporate appropriate improvements while work is being done in the area. Evaluation of the guardrail systems within the limits of a project early in the scoping process is the key to assessing whether guardrail upgrades will be necessary, since the inclusion of guardrail improvements can affect project duration, cost, and involvement of specialty offices.

Purpose

The purpose of this Technical Memorandum is to provide guidance in decision-making on the upgrade of w-beam guardrail systems on preservation projects.

Guidelines

Whenever existing w-beam guardrail systems are encountered on a preservation project, the complete system should be evaluated by the district project team. Field evaluation entails looking at each component of the

guardrail system (see Figure A for components), including end terminals/treatments, standard (w-beam) guardrail sections, and transitions, including end posts where guardrail is connected to a bridge. Each component should be inspected for damage, degradation, and compliance with current standards. Refer to the [MnDOT Roadside Safety Design website](#) for evaluation guidance, including information regarding w-beam guardrail defects and repair priorities. Appropriateness of the installation should also be evaluated to determine if the guardrail system is still the appropriate safety device, or if another barrier alternative or other safety improvement may fit the situation better. At a minimum, the following components should be inspected, and findings should be documented:

- End Terminals/Treatments

End terminals should be evaluated for damage, appropriate installation, adequate length of need, and height no less than 27". End terminal posts should be inspected for proper grading, along with rotting, cracking, significant corrosion, or other damage. Bolts, bearing plates and cable anchors should also be inspected. Twist down, BCT (breakaway cable), and ELT (eccentric loader) end terminals shall be replaced with MASH (Manual for Assessing Safety Hardware) compliant end terminals. All other end terminals may be left in place if they are compliant with NCHRP 350 or current MASH standards. Bullnoses are considered a crash cushion, and are addressed in a separate technical memorandum.

- Standard W-beam Guardrail

The standard section of w-beam guardrail should also be evaluated for damage, appropriate installation, adequate length of need and height no less than 27". Posts should be intact and inspected for proper spacing, proper grading, broken, cracked or rotted wood posts, steel posts with significant corrosion, or other damage. Guardrail sections should be inspected for vertical or horizontal tears, significant corrosion, bends, flattening or other damage or deterioration. Blocks should be inspected for presence, cracks, rotting, and twisting.

- Transitions

Transitions to rigid barriers should be inspected for damage, deterioration, significant corrosion, appropriate height, missing posts, and missing bolts. If the transition connects to a bridge end post that is in poor condition, or does not meet end post requirements, (see Chapter 9 of [TM 15-06-B-01](#)), consult the Bridge Office.

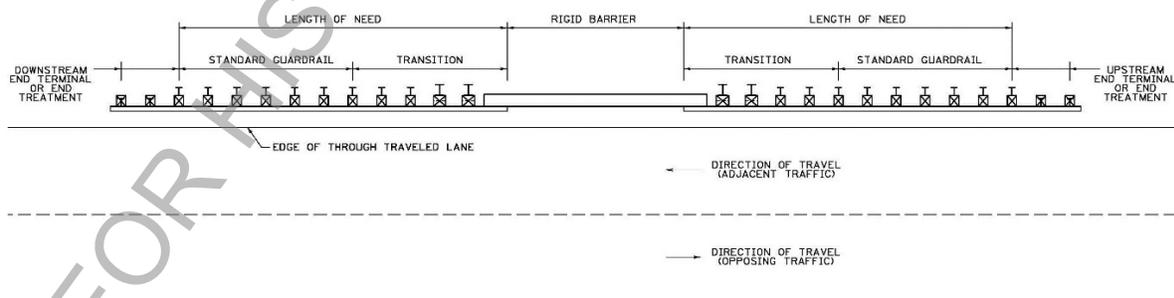


Figure A: Standard Sections of Roadside Barriers

A table detailing specific w-beam guardrail system defects and repair priorities is found on the [MnDOT Roadside Safety Design website](#).

- Priority 1 defects should be assessed by Maintenance as soon as possible. If the defects cannot be addressed by Maintenance, they should be reported to the District Management team to determine further action.
- Priority 2 defects should be addressed with an upcoming project, unless there is a high crash rate or if an impact to the system would cause serious injury. If safety issues exist, priority 2 deficiencies should be assessed by Maintenance as soon as possible.
- Priority 3 defects should be addressed with an upcoming project if guardrail work is planned.

When repairs of defects entail replacement of a substantial part of the guardrail system, the new system or components should meet current MASH standards, with the exception of bridge end post connections, which currently are designed to meet NCHRP 350.

Project Specific Guidance

Pavement Preservation Projects

The extent of guardrail work on a pavement preservation project may vary widely dependent on the pavement work being done. In general, if a project is preserving only the pavement surface, does not include approach panel work at a bridge, and the guardrail system is in good condition (no priority 1 defects, or priority 2 defects with high crash rate) and meets NCHRP 350 standards, no guardrail upgrades are necessary.

However, if a pavement preservation project extends the life of the surface more than 10 years, or increases the height of the surface such that the existing guardrail height will be less than 27", the guardrail should be upgraded to meet the current MASH standard.

If the project includes substantial replacement of guardrail systems or components, the new installations should meet current MASH standards, with the exception of bridge end post connections, which are currently designed to meet NCHRP 350. As with any project, there will be case by case variations that may need to be addressed.

Bridge Preservation Projects

Similar to pavement preservation projects, guardrail attached to bridges included in planned bridge repair or preservation projects should also be evaluated using the aforementioned criteria. Additional guidance regarding end posts and guardrail transitions at bridges is included in chapter 9 of the MnDOT Technical Memorandum [15-06-B-01](#) "Bridge Preservation and Improvement Guidelines."

Other Projects

For other preservation or minor projects, where guardrail may be affected, or could be upgraded or replaced if necessary, an evaluation of the existing guardrail should be completed early on in the scoping process.

Exemptions

If a subsequent project is programmed in the STIP or CHIP, and it is more reasonable to address guardrail improvements with a reconstruction or a new project, then it is not necessary to incorporate the improvements into a preservation project. Documentation should be attached to the district scoping report justifying the delay in guardrail repairs or upgrades. The justification should include system deficiencies and repair priority determination, along with other pertinent information such as ADT, functional classification, right-of-way constraints, roadway alignment, sight distance, and crash rate. Priority 1 defects, and priority 2 defects with crash histories are not exempted, and should still be reported to Maintenance as soon as possible.

Further information and FAQ's can be found on the MnDOT [Roadside Safety Design](#) webpage.

Questions

Any questions regarding the technical provisions of this Technical Memorandum can be addressed to either of the following:

Mike Elle, Design Standards Engineer
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Any questions regarding publication of this Technical Memorandum should be referred to the Design Standards Unit, DesignStandards.DOT@state.mn.us. A link to all active and historical Technical Memoranda can be found at <http://techmemos.dot.state.mn.us/techmemo.aspx>.

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