

TO: All Design Section Staff  
FROM: Amy Leland  
DATE: March 21, 2023  
SUBJECT: WSDOT Differential Grade Concrete Barrier Clarifications

This design memorandum provides revisions to the WSDOT differential grade concrete barrier sections clarifying language that the differential grade concrete barrier is both a wall and a barrier and provides background for the allowances when the WSDOT permits the Equivalent Static Load (ESL) to be employed to the metrics included in this manual.

### Bridge Design Manual Revisions

The following sections of the WSDOT Bridge Design Manual are revised as follows:

*Revise Section 10.3.1 with:*

#### **10.3.1 Differential Grade Concrete Barriers**

*Insert the following as a new paragraph after "...follow the Design Manual M 22-01."*

Differential grade concrete barriers are walls and barriers. All applicable limit states, design considerations, detailing, and constraints associated with walls and barriers shall apply. This includes, but is not limited to, provisions in AASHTO LRFD-BDS, the WSDOT GDM, and the WSDOT Design Manual for both walls and barriers.

Differential grade concrete barriers placed adjacent to a slope require implications of the slope to be incorporated into the design. The bench requirements for walls from the WSDOT GDM are applicable.

*Revise Section 10.3.1A with:*

#### **10.3.1.A Differential Grade Concrete Barriers**

*Replace the following paragraph at the end of this section:*

~~Median traffic barriers with grade difference greater than 4'-0" shall be designed as standard plan retaining walls with a traffic barrier at the top and a barrier shape at the cut face.~~

Traffic barriers supporting a soil height greater than 4'-0" shall be designed as reinforced concrete retaining walls with a traffic barrier at the top and a barrier shape at the cut face. For external stability, the full loadings for the Extreme Event Limit State from AASHTO LRFD-BDS, Section 13 are applicable.

When using these AASHTO loadings the associative phi factors from AASHTO are applicable. These provisions do not waive any requirements for walls or barriers from other codes, manuals, or sources.

### **15.10.3 At Grade Concrete Barriers**

*Insert the following immediately following 15.10.3*

Differential grade concrete barriers are walls and barriers. All applicable limit states, design considerations, detailing, and constraints associated with walls and barriers shall apply. This includes, but is not limited, to provisions in LRFD-BDS, the WSDOT GDM, and the WSDOT Design Manual for both walls and barriers.

Differential grade concrete barriers placed adjacent to a slope require implications of the slope to be incorporated into the design. The bench requirements for walls from the WSDOT GDM are applicable.

Modifications for barriers supporting a soil height less than or equal to 4'-0" included within this manual are criteria allowing the more permissive Equivalent Static Load (ESL) for overall stability, bearing, overturning and sliding associated with the vehicular collision force CT. All other criteria for Strength, Service, and Extreme Limit States are still applicable and have not been modified. Overall stability checks other than those associated with vehicular collision force CT are applicable and unmodified. See limits and requirements for when the ESL is allowed in the provisions and references below.

*Delete the following*

~~Differential grade concrete barriers with grade difference greater than 4'-0" shall be designed as reinforced concrete retaining walls with a traffic barrier at the top and a barrier shape at the cut face.~~

*Insert the following after the deleted section*

Differential grade concrete barriers supporting a soil height greater than 4'-0" shall be designed as reinforced concrete retaining walls with a traffic barrier at the top and a barrier shape at the cut face. For external stability, the full loadings for the Extreme Event Limit State from AASHTO LRFD-BDS Chapter 13 are applicable. When using these AASHTO loadings the phi factors from AASHTO are applicable. These provisions do not waive any requirements for walls or barriers from other codes, manuals, or sources.

### **Background**

The intent for the split between grade differences greater than 4'-0" and less than or equal to 4'-0" was intended to allow the more permissible ESL for shorter barriers, predicated upon the conditions within 10.3.1A. There has been some confusion with some contractors or consultants attempting to waive wall requirements for these systems, which is not how it was written, nor was it the intent. The revisions in this design memo clarifies the language that the existing limit states and design implications for both walls and barriers are applicable.

The revised language on barriers supporting a soil height greater than 4'-0" of soil provides additional clarity on what is required for overall stability when the provisions of 10.3.1A are not met.

### **Contact Information**

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