

## Memorandum

TO: All Design Section Staff

FROM: Bijan Khaleghi  
 DATE: January 8, 2010  
 SUBJECT: Wall Type Design Specifications and Stamping Policy

This design memorandum is to provide guidance on the wall design specification requirements. This design memorandum supersedes the design memorandum issued on August 4, 2008.

The Design Manual has a flow chart for Retaining Wall Design Process (see Figures 1130-4a and 1130-4b). This flow chart applies to all wall types for determining if the Bridge and Structures Office prepares the PS&E. In situations where it will be more efficient for the Bridge and Structures Office to prepare the PS&E, such as standard retaining walls adjacent to either special design walls or bridges, a request can be submitted from the Region Design Office to the Bridge and Structures Office. All PS&E prepared by the Bridge and Structures Office shall be stamped and signed in accordance with the Memorandum dated June 4th, 2008.

Details designed by the HQ Geotechnical Division shall be included in the wall plan set as a self contained sheet(s). These sheets will include all information provided by the geotechnical engineer, the names of the engineers who provided this information and the name of the detailer from the Bridge & Structures Office who prepared the sheet in the title block, and the stamps of the geotechnical engineers or supervisors involved. The Geotech who seals should have the opportunity to review the sheet. These sheets will be numbered and included with the other wall plan sheets provided by the Bridge & Structures Office.

All retaining walls shall include seismic design load combinations. The design acceleration for retaining walls shall be determined in accordance with the AASHTO Guide Specifications for LRFD Seismic Bridge Design. Once the design acceleration is determined, the designer shall follow the applicable design specification requirements listed below:

Wall Types	Design Specifications	
Soldier Pile Walls With & Without Tie-Backs	<b>General</b>	Cantilever soldier pile walls shall be designed to the current AASHTO LRFD Bridge Design Specifications  Soldier Piles with Tie-backs shall be designed to the current AASHTO Specifications for LRFD Bridge Design along with the FHWA Geotechnical Engineering Circular No. 4,

		<p>“Ground Anchors and Anchored Systems” – 1999.</p> <p>Fascia shall be designed to the current AASHTO LRFD Bridge Design Specifications. Lagging shall be designed per the WSDOT Bridge Memorandum 5/16/07.</p>
	<b>Seismic</b>	AASHTO LRFD Bridge Design Specifications 1000 yr map design acceleration
	<b>Traffic Barrier</b>	Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings with Ft distributed over Lt at the top of barrier. Load from top of barrier is distributed at a 45 degree angle into the wall
Pre-Approved Proprietary Walls	<b>General</b>	These walls are designed per GDM and the AASHTO Standard Specifications for Highway Bridges - 17th Edition.
	<b>Seismic</b>	AASHTO LRFD Bridge Design Specifications 1000 yr map design acceleration, and the AASHTO Standard Specifications for Highway Bridges- 17th Edition
	<b>Traffic Barrier</b>	<p>Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings.</p> <p>Current STD Specs allows railing design per AASHTO STD Specs but needs to be changed to AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings</p>
Non-Preapproved Proprietary Walls	<b>General</b>	These walls shall be designed to the current AASHTO LRFD Bridge Design Specifications and Appendix 15 of the GDM.
	<b>Seismic</b>	AASHTO LRFD Bridge Design Specifications 1000 yr map design acceleration, and current AASHTO LRFD Specifications
	<b>Traffic Barrier</b>	Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings TL-4
Standard Plan Geosynthetic Walls	<b>General</b>	This wall system has Standard Plans that are based on AASHTO Standard Specifications for Highway Bridges - 17th Edition (ASD/LFD Design Methodology).
	<b>Seismic</b>	These walls were designed in accordance with the AASHTO Standard Specifications for Highway Bridges - 17th Edition. They were designed for 0.15 g and 0.30 g accelerations. Since they were designed, WSDOT has adopted the AASHTO LRFD Bridge Design Specifications 1000 yr Seismic Acceleration map. The Standard Plan Geosynthetic walls may only be used were the ground

		acceleration ( $A_s$ ) from the AASHTO 1000 yr map is less than the acceleration shown on the Standard Plan.
	<b>Traffic Barrier</b>	Use Standard Plan D-3b or D-3c barriers or use special designed barriers designed in accordance with AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings TL-4
Non-Standard Geosynthetic Walls	<b>General</b>	These walls shall be designed to current AASHTO LRFD Bridge Design Specifications
	<b>Seismic</b>	AASHTO Standard Specifications for Highway Bridges - 17th Edition and AASHTO LRFD Bridge Design Specifications 1000 yr map design acceleration
	<b>Traffic Barrier</b>	Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings TL-4
Standard Plan Reinforced Concrete Cantilever Walls	<b>General</b>	This wall system has Standard Plans that are based on current AASHTO LRFD Bridge Design Specifications
	<b>Seismic</b>	AASHTO LRFD Bridge Design specifications 1000 yr map design acceleration
	<b>Traffic Barrier</b>	Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings.  The current Standard Plan walls are deigned for TL-4 loading distributed over 48 ft at base of wall
Non-Standard Non Proprietary Walls	<b>General</b>	These walls shall be designed per current AASHTO LRFD Bridge Design Specifications
	<b>Seismic</b>	AASHTO LRFD Bridge Design Specifications 1000 yr map design acceleration
	<b>Traffic Barrier</b>	Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings and BDM section 8.1.3B
Soil Nail Walls	<b>General</b>	All soil nail walls and their components shall be designed using the publication "Geotechnical Engineering Circular No. 7" FHWA-IF-03-017.  The HQ Geotechnical Division completes the internal design of the soil nail wall and provides recommendations for nail layout. The structural designer will layout the nail pattern as the nail placement and facing design are integral designs. The geotechnical designer will review the nail layout to insure that their design recommendations were

		<p>properly incorporated into the wall plans.</p> <p>The Bridge and Structures Office shall design the temporary shotcrete facing as well as the permanent structural facing, including the nail head, bearing plates, and shear studs.</p> <p>The upper cantilever of the facing that is located above the top row of nails shall be designed per current AASHTO LRFD Bridge Design Specifications</p>
	<b>Seismic</b>	<p>AASHTO LRFD Bridge Design Specifications 1000 yr map design acceleration,</p> <p>Fascia per AASHTO LRFD Bridge Design Specifications</p>
	<b>Traffic Barrier</b>	<p>Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings and BDM section 8.1.3B</p>
Standard Plan Noise Barrier Walls	<b>General</b>	<p>AASHTO Guide Specifications for Structural Design of Sound Barriers – 1989 &amp; Interims.</p>
	<b>Seismic</b>	<p>AASHTO Guide Specifications for Structural Design of Sound Barriers – 1989 &amp; Interims.</p>
	<b>Traffic Barrier</b>	<p>AASHTO Guide Specifications for Structural Design of Sound Barriers – 1989 &amp; Interims.</p>
Non-Standard Noise Barrier Walls	<b>General</b>	<p>These walls shall be designed per current AASHTO LRFD Bridge Design Specifications Wind load shall be per WSDOT BDM chapter 3 and foundation design shall be per GDM chapter 15.</p>
	<b>Seismic</b>	<p>Design per BDM Chapter 3</p>
	<b>Traffic Barrier</b>	<p>Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings and BDM section 8.1.3B</p>
Pre-Approved and Standard Plan Moment Slabs for SE Walls and Geosynthetic Walls	<b>General</b>	<p>Appendix 15-A gives the Venders for Pre-Approved Proprietary Walls the ability to design to the AASHTO Standard Specifications for Highway Bridges - 17th Edition.</p> <p>There is a Standard Plan for moment slabs on Geosynthetic walls and it is designed for the current AASHTO LRFD Bridge Design Specifications</p>
	<b>Seismic</b>	<p>AASHTO LRFD Bridge Design Specifications 1000 yr map design acceleration</p>
	<b>Traffic</b>	<p>Design per AASHTO LRFD Bridge Design Specifications</p>

	<b>Barrier</b>	section A13.3 for Concrete Railings TL-4
Non-Pre-Approved and Non-Standard Moment Slabs for SE Walls and Geosynthetic Walls	<b>General</b>	These moment slabs shall be designed to the current AASHTO LRFD Bridge Design Specifications
	<b>Seismic</b>	AASHTO LRFD Bridge Design Specifications 1000 yr map design acceleration
	<b>Traffic Barrier</b>	Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings
Non Standard Non Proprietary Walls Gravity Blocks, Gabion Walls	<b>General</b>	These walls are designed per GDM and the AASHTO Standard Specifications for Highway Bridges- 17th Edition.
	<b>Seismic</b>	AASHTO LRFD Bridge Design Specifications 1000 yr map design acceleration
	<b>Traffic Barrier</b>	Design per AASHTO LRFD Bridge Design Specifications section A13.3 for Concrete Railings

Exceptions to the cases described above may occur with approval from the Bridge Design Engineer and/or the State Geotechnical Engineer.

### **Background**

While the Bridge and Structures Office has adopted the AASHTO LRFD Bridge Design Specifications, several wall types either have not yet been brought up to that standard or those wall types are not covered by that standard. To assist designers with knowing what design specification they are responsible to meet and to track the process of moving all wall designs to the current specifications, this document is created.

Additional confusion and concern has arisen about responsibility for plan sheets. Components designed by the HQ Geotechnical Division were being included on Bridge Plan Sheets with supervisors' stamps that did not oversee the work. To avoid these conditions, the work performed by each office will be separated onto different plan sheets with the names of the engineers involved and the stamps of the correct supervisors included for signatures.

If you have any questions regarding this issue, please contact Monique Pawelka at 705-7754, Stuart Bennion at 705-7168, or Bijan Khaleghi at 705-7181.

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