

Design Memorandum

TO: All Design Section Staff
FROM: Bijan Khaleghi
DATE: December 18, 2014
SUBJECT: Bridge Traffic Barrier Design Requirements for Fall Protection

This design memorandum supersedes the August 30, 2014 Design Memorandum. This design memorandum defines WSDOT policy for bridge traffic barrier design and detailing requirement related to the Washington State Department of Labor and Industries (WAC 296-155-24609, WAC 296-155-24611, and WAC 296-155-24615 2a), and July 2014 AASHTO Resolution for fall protection. The new policy requires a 42-inch (3'-6") traffic barrier for all new bridges, adjoining bridge approach slabs, **walls, and moment slabs (SEW barriers and Geosynthetic wall barriers)**. The WSDOT Bridge Design Manual (BDM) and Standard Drawings will be revised accordingly to reflect this new policy.

The requirement applies to new designs, preliminary plans and ongoing projects at final design stages. This policy memorandum does not apply to existing bridges, bridge rehabilitation projects, existing retaining walls, pedestrian and median barriers.

The WSDOT Bridge and Structures Office standard for new traffic barriers is a 42-inch high Single Slope or F-shape concrete barrier. Single Slope traffic barrier shall be used on all interstates, major highway routes, and over National Highway System (NHS) routes unless special conditions apply. Use of an F Shape concrete bridge traffic barrier shall be limited to locations where there is F Shape concrete barrier on the approach grade to a bridge or for continuity within a corridor. The Bridge General Notes shall indicate the test level used for the bridge. The Standard Drawings for 42-inch F-shape traffic barriers are shown in BDM Appendix 10.2-A5-1A and 10.2-A5-1B for Test Level 4 (TL-4), and TL-5 respectively. The Standard Drawings for 42-inch single slope traffic barriers are shown in BDM Appendix 10.2-A6-1A and 10.2-A6-1B for TL-4, and TL-5 respectively.

All traffic barriers for WSDOT bridges and walls shall be designed using the Test Level 4 (TL-4) design criteria regardless of the height of the barrier safety shape. A Test Level 5 (TL-5) traffic barrier could be used on new structures on a case-by-case basis, and under the following conditions:

- "T" intersections on a structure.
- Accident history suggests a need.
- Barriers on bridges with a radius of curvature less than 500 feet, TL-4 is adequate for the barrier on the inside of the curve.

- Greater than 10-percent Average Daily Truck Traffic (ADTT)
- Where approach speeds are 50 mph or greater (e.g., freeway off-ramps).
- Protection of schools, businesses or other important facilities below the bridge.

AASHTO LRFD Appendix A13 shall be used to design bridge traffic barriers and their supporting elements. Concrete traffic barriers shall be designed using yield line analysis as described in AASHTO LRFD A13.3.1. The impact loads on traffic barriers shall be applied at the height specified for intended test levels in accordance to the AASHTO LRFD Section 13, Table A13.2-1 “Design Forces for Traffic Railing (32-inch for TL-4, and 42-inch for TL-5)”.

Deck overhangs supporting traffic barriers shall be designed in accordance with AASHTO LRFD A13.4. For concrete traffic barriers in Design Case 1, AASHTO requires M_s , the deck overhang flexural resistance, to be greater than M_c of the concrete traffic barrier base. This requirement may result in conservative deck overhang designs in some cases. In order to prevent this unnecessary overdesign of the deck overhang, the nominal traffic barrier resistance to transverse load R_w transferred from the traffic barrier to deck overhang shall not exceed 120 percent of the design force F_t required for a traffic barrier.

Background:

This memorandum is in response to the Washington State Department of Labor and Industries (WAC 296-155-24609, WAC 296-155-24611, and WAC 296-155-24615 2a), and July 2014 AASHTO Resolution for fall protection. This memorandum applies to new bridge designs at preliminary plan and ongoing projects at final design stages. Subsequent policy memorandums will be issued to address existing bridges, bridge rehabilitation projects, moment slabs (SEW barriers and geosynthetic wall barriers), retaining walls, pedestrian and median barriers.

The WSDOT Bridge Design Manual (BDM), Standard Drawings, and Standard Plans will be revised accordingly to reflect this new policy.

The 42-inch high TL-4 concrete traffic barriers are more economical and require less maintenance than a combination barrier composed of 32-inch or 34-inch concrete traffic barrier increased to 42-inches by metal railing. However, a combination barrier may be specified by the Regions on a case-by-case basis for scenic roads and other purposes.

If you have any questions regarding this issue, please contact Bijan Khaleghi at 705-7181 (Bijan.Khaleghi@wsdot.wa.gov).

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