



OHIO DEPARTMENT OF TRANSPORTATION
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January 18, 2008

To: Users of the Bridge Design Manual

From: Tim Keller, Administrator, Office of Structural Engineering

By: Sean Meddles, Bridge Standards Engineer

Re: 2008 First Quarter Revisions

Revisions have been made to the ODOT Bridge Design Manual, January 2004. This package contains the revised pages. The revised pages have been designed to replace the corresponding pages in the book and are numbered accordingly. Revisions, additions, and deletions are marked in the revised pages by the use of one vertical line in the right margin. The header of the revised pages is dated accordingly.

To keep your Manual correct and up-to-date, please replace the appropriate pages in the book with the pages in this package.

To ensure proper printing, make sure your printer is set to print in the 2-sided mode.

The January 2004 edition of the Bridge Design Manual may be downloaded at no cost using the following link: <http://www.dot.state.oh.us/se/BDM/BDM2004/bdm2004.htm>

Attached is a brief description of each revision.

Summary of Revisions to the January 2004 ODOT BDM

BDM Section	Affected Pages	Revision Description
304	3-82 through 3-83	The purpose of this revision is to clarify the type of “Proposed Work” that requires NCHRP Report 350 compliance of the bridge railing.

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304 RAILING

304.1 GENERAL

All railing on bridges with the type of “Proposed Work” listed below, shall meet acceptance criteria contained in NCHRP Report 350. The minimum acceptance level shall be TL-3 unless supported by the Design Data Sheet entitled “Railing Selection Procedure” available on the Office of Structural Engineering website.

“Proposed Work” that requires NCHRP Report 350 compliance includes:

- A. New construction on all routes.
- B. Complete deck replacements on all routes.
- C. Replacement of deteriorated deck edges on all routes.
- D. Superstructure widenings on all routes.
- E. Rigid concrete overlays on NHS routes.
- F. Rigid concrete overlays on non-NHS routes with design speeds of 40 mph or greater.

For other types of “Proposed Work”, including roadway railing upgrade projects, NCHRP Report 350 compliance of the bridge railing is not warranted, but a positive connection between the approach railing and the existing bridge railing is required.

Bridge railings that have been found acceptable under the crash testing acceptance criteria defined in NCHRP Report 230 and the AASHTO Guide Specification for Bridge Railing, 1989 including all interims, will be considered as meeting the requirements of NCHRP Report 350 without further testing as indicated in the following table.

Bridge Railing Testing Criteria	Acceptance Equivalencies					
	TL-1	TL-2	TL-3	TL-4	TL-5	TL-6
NCHRP 350						
NCHRP 230		MSL-1 MSL-2		MSL-3		
AASHTO Guide Specification		PL-1		PL-2	PL-3	

Section 304.2 of this Manual lists standard ODOT bridge railing types available along with the corresponding NCHRP 350 level of acceptability. For non-standard railing designs, a review submission, concurrent with the Structure Type Study, shall be made to the Office of Structural Engineering as stated in Section 201 of this Manual. The design of all non-standard railing systems shall be based on the NCHRP 350 level of acceptability. Designers may be required to submit actual crash test report data to verify the level of acceptability of a proposed design.

Modifications to the ODOT standard railing types or other NCHRP 350 approved railing system should be avoided. Additional structural steel tubing added to satisfy pedestrian concerns does not require additional crash testing provided these elements do not protrude nearer to the roadway than the rail elements on the tested design and they do not present any type of snagging potential to an impacting vehicle. If an accepted crash tested railing system is modified, the face geometry (i.e. offset, rail height, spacing, etc.) shall match the tested design and the static strength and deflections shall remain at least equal to the tested design. Include with the preliminary design submission to the Office of Structural Engineering, strength and deflection calculations to support these modifications. The calculations shall follow the procedure defined in the AASHTO LRFD Bridge Design Specifications, 2nd Edition, Sections A13.1-3. The intent of any modification shall be to maintain the original NCHRP 350 acceptability level.

All railing elements fabricated with ASTM A500 steel tubing shall specify a drop-weight tear test per CMS 707.10. Provisions shall be made at tube splices for expansion and contraction. Steel railing systems shall also allow for structural movement at expansion joints without adversely affecting the system's level of acceptability.

Aesthetically pleasing railing systems have been successfully crash tested but are for use only where TL-2 acceptability requirements are allowed. These systems include the Texas Classic Traffic Railing, Type T411 with open windows, a smooth stone masonry barrier with reinforced concrete core wall and an artificial stone precast concrete barrier. Detailed information regarding the latter two systems may be found in FHWA Report No. FHWA-RD-90-087 "Guardrail Testing Program: Final Report", June 1990 and FHWA Report No. FHWA-SA-91-051 "Summary Report on Selected Aesthetic Bridge Rails and Guardrails", June 1992.

The recommended railing design for bridges with combination vehicular and pedestrian traffic is detailed in Standard Bridge Drawing BR-2-98. Other designs are allowed as previously mentioned above, provided the following requirements are met:

- A. The curb height shall be 8".
- B. The sidewalk width shall be 5'-0" or greater.

A pedestrian railing may be used in lieu of a crash tested barrier at the deck edge provided a crash tested barrier system meeting the minimum requirements for the specific location is used to separate the vehicular and pedestrian traffic. Pedestrian railing shall be designed in accordance with AASHTO.

304.3 STANDARD RAILING TYPES

Drawing No.	Description	NCHRP Level
BR-1	36" Deflector Parapet Type	TL-4
BR-1	42" Deflector Parapet Type	TL-5
BR-2-98	Bridge Sidewalk Railing with Concrete Parapet	TL-4
DBR-2-73	Deep Beam Bridge Guardrail	TL-2
PCB-91	Portable Concrete Barrier (Fully Anchored)	TL-4
	Portable Concrete Barrier (Unanchored)	TL-3
SBR-1-99	42" Single Slope Parapet Type	TL-5
TBR-91	Thrie Beam Bridge Railing (Retrofit)	TL-4
TST-1-99	Twin Steel Tube Bridge Railing	TL-4

304.4 WHEN TO USE

304.4.1 PARAPET TYPE (BR-1 & SBR-1-99)

The department currently has three (3) standard concrete parapet type bridge railing systems: a 36" New Jersey shape, a 42" New Jersey shape and a 42" single slope shape. These systems are for use on roadway and railroad overpass structures with no sidewalks and structures where the finished deck surface is 25 ft [7.62 m] or more above the ground line or water surface. Details for these parapet types, including end transitions to terminal assemblies, are provided in the Standard Bridge Drawings. The transition section may be placed on a structure's turned back wingwalls, widened approach slab or directly on the actual structure. If the transition section is placed directly on the structure, a curb is required for the full length of the approach slab.

The 36" barrier section is for use on structures located on two (2) lane routes with an ADTT in one direction less than 2500.

The 42" barrier sections are for use on structures located on interstates, divided highways of four (4) lanes or more, and two (2) lane routes with an ADTT in one direction of 2500 or more. Final decision of which section to use rests with the districts and should be finalized during the preliminary structural design review. The single slope barrier section is unaffected by the placement of future overlays, but weighs 23% more than the 42" New Jersey type parapet.

A 50" deflector type median barrier and a 57" single slope median barrier are for use on structures where protection against oncoming headlight glare is required. The structure's barrier height and type shall match the design of the adjoining roadway median barrier.