

STATE OF NEW HAMPSHIRE
BRIDGE DESIGN MEMORANDUM

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FROM: Peter E. Stamnas, PE
Administrator

DATE: March 14, 2016
AT (Office): Bureau of Bridge Design

SUBJECT: Design Memorandum 2016-01
Bridge Railing Bending Requirements

TO: Bureau of Bridge Design staff, Bridge Design Consultants, FHWA, NHDOT Bureaus

The Bureau of Bridge Design is updating the Bridge Design Manual. During this process, certain design decisions are being issued for immediate implementation as noted by the following:

A. 2016 Standard Specifications for Road and Bridge Construction, Section 563 – Bridge Railing:

The following has been added to the 2016 Standard Specifications:

3.2 Fabrication.

3.2.1 Shop fabrication drawings shall be submitted for approval in accordance with 105.02.

3.2.1.1 The shop fabrication drawings shall show the lengths of all individual rail sections and locations of all field splices. Rail sections shall be supplied in continuous lengths as shown or specified on the plans. Butt welding of short pieces of rail to form the specified continuous length of rail section will not be permitted. Butt splices, if approved, shall be made in the shop with complete joint penetration (CJP) groove welds and inspected by ultrasonic testing.

3.2.1.2 Horizontally-curved rail sections shall be shop bent to form a smooth curve, unless approved otherwise. It is required to secure the services of a specialty bend facility to do the work, as necessary, for small radii (e.g., less than 50 feet). Curvatures with radii less than seven feet may be achieved by miter cut and welding the tube in chords lengths appropriate for the bend. A “miter-cut-and-weld” joint, where three sides of a tube are cut, the fourth side bent, and the cut edges welded with a backing bar, is considered to be a CJP. Curvature for T101 bridge rail tubes may be achieved with miter-cut-and-weld joints for radii less than 20 feet, if approved, since the tubes are hidden from view.

B. Summary:

The above noted revisions are being implemented to specify the following:

- The steel bridge rail can be bent for radii \geq 50-ft. by all steel Fabricators.
- If the bridge rail radii is between 7-ft. and 49-ft., it requires the rail to be sent to a specialty shop to be bent. This will require additional cost in which the Contractor should include in the bid price. A note shall be put on the Bridge Rail Layout plan noting, “Shop bend only. No butt splices permitted.”
- If the bridge rail radii $<$ 7-ft., the curvature can be obtained by miter-cut-and-welding the tube, if approved by the Design Chief. A miter-cut-and-weld detail should be shown on the plans. Confirm the shop plans show the bridge railing is structural tubing welded together and *not* individual plates welded together to form a tube.
- The Department prefers the bridge rail to be designed for a shop bent smooth curve.
- Since the steel rail Fabricator may not notice the new wording in the 2016 Spec. Book, the Fabricator shop plans should be *carefully* reviewed so that they show what was called for on the plans. If the Contract Plans show a radii between 7 and 49-ft. and the Fabricator shop plans show the tubes with butt splices that weren’t called for on the plans, the shop plans should be “marked up” to require the tubes be sent to a specialty shop to be bent (no miter-cut and weld joints). Reference Section 563.3.2 of the 2016 Spec. Book.

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- No additional wording has been put on the standard plans.
- The T101 rail tubes are hidden from view, so miter-cut and weld joints may be used.

C. Background:


This memorandum incorporates the changes to information available at the NHDOT Bridge Design Website in accordance with the changes being made to the Bridge Design Manual.

NHDOT bridge plans have been showing steel rail bend dimensions that cannot be done without sending to a specialty shop. The steel bridge rail shop plans have been showing miter-cut-and-weld joints for the radii because the Contractor was not notified that a specialty shop bend was required. After speaking with steel Fabricators to determine their bending limitations, the specification for bridge railing was updated to note NHDOT's policy. The new wording in the specification provides guidance to the designer and Fabricator.

This Memorandum clarifies NHDOT's policy for the design and fabrication of steel bridge railing that shall be included in the contract plans.

D. Implementation:

The update to the Bridge Design Manual shall be implemented as of the date of this memo and shall be used on all applicable projects.



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