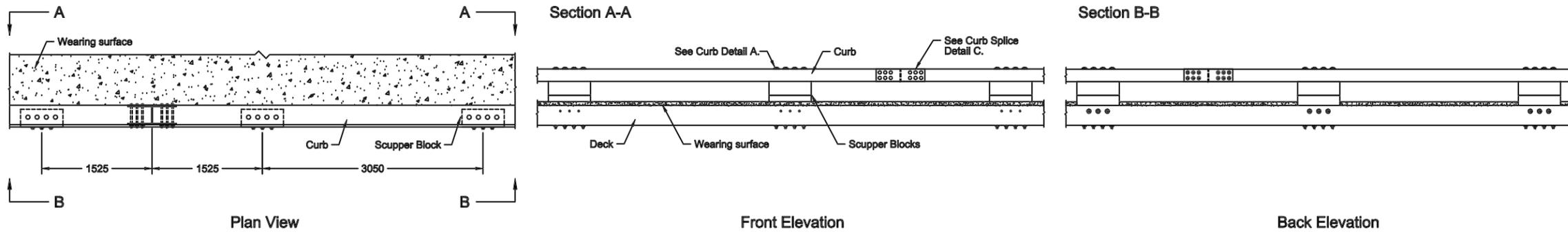


General Configuration All units are in millimeters based on a soft conversion from customary U.S. units.



Design

1. This curb railing was successfully crash tested to the requirements for Test Level 1 (TL-1), as outlined in NCHRP Report 350 (Ross and others 1993). This railing is adaptable to longitudinal stress-laminated, spike-laminated, nail-laminated, and glued-laminated (glulam) timber decks that are 254 mm or greater in actual thickness. For additional information, refer to TL-1 Curb-Type Bridge Railing for Longitudinal Timber Decks Located on Low-Volume Roads (Faller and others 1996c).
2. Actual height of the curb railing rail shall be 451 mm to 476 mm above the traveled way (top of wearing surface or top of bridge deck if a wearing surface is omitted), but not greater than 527 mm above the bridge deck.
3. Dimensions for glulam components are actual dimensions. Dimensions for sawn lumber components are nominal dimensions. Actual sawn lumber dimensions may be up to a maximum of 13 mm less than nominal dimensions to permit the use of surfaced or rough-sawn material.
4. Curb railing splices are midway between scuppers and shall be located so that curb is continuous over not less than two scuppers. It is recommended that the glulam curbs be continuous over the length of the bridge.

Materials

5. Sawn lumber and glulam shall comply with the requirements of AASHTO M168 and shall be pressure treated with wood preservative in accordance with AASHTO M133. Glulam shall be manufactured using wet use adhesives to an industrial appearance grade.

6. Curb railing shall be visually graded glulam Western Species Combination No. 2 or visually graded Southern Pine Combination No. 48. Other species and grades of glulam may be used, provided the minimum tabulated values are not less than the following:

$$F_b = 12.4 \text{ MPa}$$

$$E = 12,410 \text{ MPa}$$

7. Scupper blocks may be sawn lumber or glulam. When sawn lumber is used, material shall be visually graded No. 1 Southern Pine or visually graded No. 1 Douglas Fir-Larch. Glulam and other species and grades of sawn lumber may be used, provided the minimum tabulated values are no less than the following:

$$F_b = 9.3 \text{ MPa}$$

$$E = 10,342 \text{ MPa}$$

8. Steel plates and shapes shall comply with the requirements of ASTM A36.

9. Bolts shall comply with the ASTM A307 requirements, Grade 2, and should preferably be dome head timber bolts. Bolts on top of the curb rail shall be dome head.

10. Split rings shall be manufactured from SAE 1010 hot-rolled carbon steel in accordance with SAE J412 (SAE 1989). Shear plates shall be malleable iron manufactured according to ASTM A47, Grade 32510.

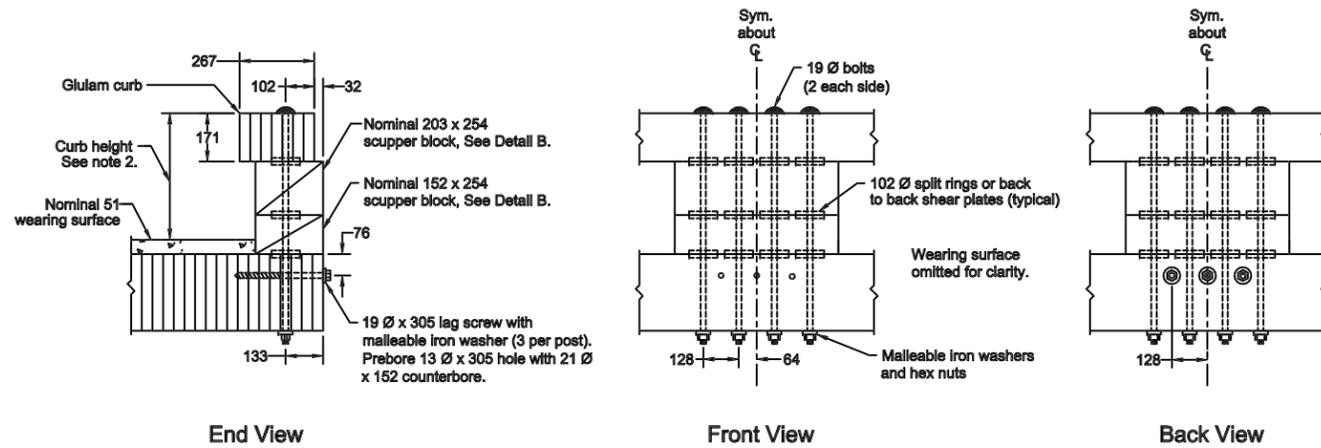
11. All steel components and fasteners shall be galvanized in accordance with AASHTO M111 or M232 or shall otherwise be provided with adequate corrosion protection.

Fabrication and Construction

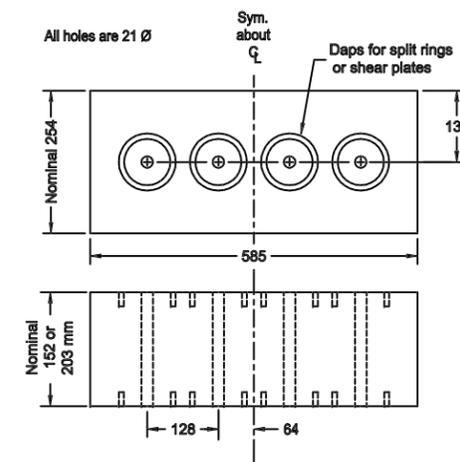
12. To the extent possible, all wood shall be cut, drilled, and completely fabricated prior to pressure treatment with preservatives. When field fabrication of wood is required or if wood is damaged, all cuts, bore holes, and damage shall be immediately treated with wood preservative in accordance with AASHTO M133.

13. Unless noted, malleable iron washers shall be provided under bolt heads and under nuts that are in contact with wood. When the size and strength of the head are sufficient to develop connection strength without wood crushing, washers may be omitted under heads of dome-head timber bolts.

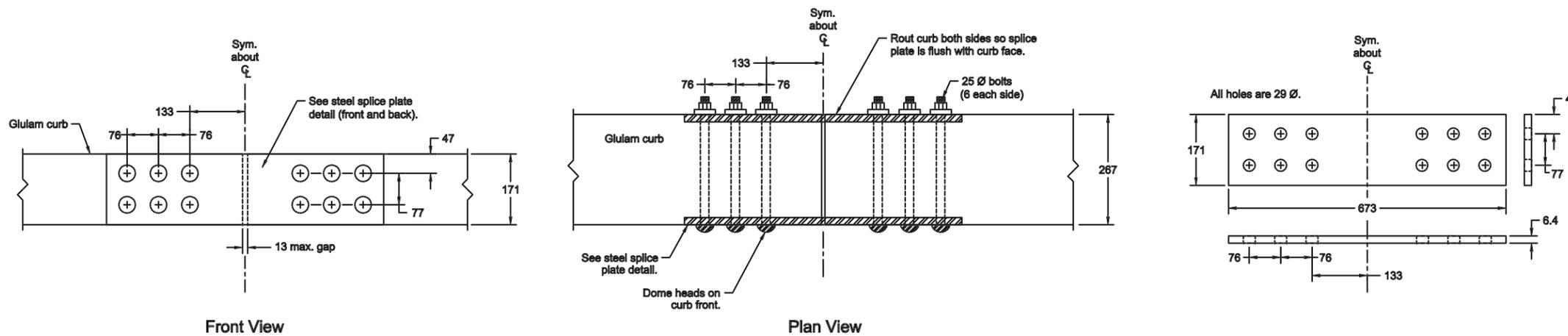
A Curb Details



B Scupper Block Detail



C Curb Splice Details



The bridge railings depicted on these drawings were developed and crash tested under a cooperative research agreement between the Midwest Roadside Safety Facility of the University of Nebraska-Lincoln and the USDA Forest Service, Forest Products Laboratory.



Crash-Tested Bridge Rails for Longitudinal Wood Decks on Low-Volume Roads

Curb Railing
NCHRP 350 Test Level 1 (TL-1)

August 1998

Sheet 1 of 1