14.1 Guardrail - General

Guardrail located at bridge approaches is a safety item designed to dampen the stray vehicle impact energy and then deflect it back onto the riding surface. To provide the degree of safety required, it must be installed properly in accordance with the plans and specifications.

14.2 Material

Guardrail consists of W-beam and/or Thrie beam rail sections, connections, posts and blocking, wing and buried sections, and hardware. The Contractor supplies all guardrail material.

- If holes are punched after galvanizing the galvanizing around the hole shall be repaired in accordance with Section 12.2.6(7) of the Specifications for Bridge Construction (ASTM A780, Method A3 Metalizing).

- Curved W-beam rails shall be formed to the radius specified in accordance with drawing TEB 3.54.

- All rails and terminal elements shall be hot dip galvanized after fabrication conforming to CSA-G164M.

- All bolts, nuts and washers shall conform to ASTM-A307, unless noted otherwise on the drawings and shall be hot dip galvanized conforming to CSA-G164M.

- Posts and offset blocks shall be Douglas Fir, Hemlock, Lodgepole Pine or better and shall meet current edition of the National Lumber Grades Authority (NLGA) for No. 1 Structural Posts and Timber graded conforming to the NLGA Standard Grading Rules for Canadian Lumber. Posts shall be date stamped at the top of either side of the post not used for rail attachment with last two digits of the year of installation. The stamp shall be 50 mm x 50 mm and have an indentation of 3 mm.

- Post and blocks shall be pressure preservative treated in accordance with the current requirements of CSA Standard 080.

- Steel for posts, spacers and hardware shall conform to CSA Standard G40.21 Grade 300W or ASTM Standard A36 and shall be hot dip galvanized after fabrication conforming to CSA-G164M.

14.3 Installation

The Bridge Inspector shall ensure that the Contractor installs the Guardrail in compliance with the applicable specification including the following:

- Guardrail shall be accurately set to the required depth and alignment in a manner resulting in a smooth continuous installation. Permissible tolerance for plumb and grade of posts is 6 mm maximum.

- Holes for the guardrail post shall be excavated by auger. The diameter of the holes augered shall be of sufficient size to allow for pneumatic tamping. Unsuitable material at the bottom of the holes excavated shall be replaced with granular material at the Contractor's expense. Surplus excavated material and debris shall be removed from the site.

- Field drilled holes and cuts on treated timber should be retreated by soaking or saturating the unprotected surfaces with sufficient amount of compatible preservative.

- Guardrail laps shall be in the direction of traffic flow except at thrie beam terminal connector to bridgerail connections.

- Bolt shall be tightened to a torque of 100 Nm.

- Precautions are taken to eliminate damage to galvanizing. Minor abrasions shall be repaired by touch up painting with two coats of zinc rich paint.

14.4 Checklist

14.4.1 Bridge Inspectors Responsibilities

- Review and be familiar with applicable specifications and drawings.

- Check guardrail post installation for:
  - Proper post material dimensions (treated timber post lengths are 2.13m and 1.52m).
  - Correct post hole size and depth.
  - Granular backfill material (Designation 2 Class 25) used
  - Sufficient compaction by pneumatic tamping.
  - Post plumbness, elevation and alignment to be within tolerance.

- Check guardrail installation for:
  - Proper blocking and bolt length.
  - Correct rail material thickness (2.8mm and 3.5mm +/- 0.23 mm)
  - Secure attachment.
  - Smooth and pleasing alignment, proper lap in the direction of traffic flow.

- Flame cutting and arc gouging of galvanized material are not permitted. Drilling and coring are permitted only when approved with cut edges touched up with two coats of zinc rich paint.

- Heat bending to form curve rail section is prohibited.

- Field drilled holes and sawcut surfaces on treated timber should be retreated by soaking or saturating with compatible preservative.

- Reject defective material and work failing to meet specifications.

- Initiate payment when work acceptably completed.

SECTION 14

GUARDRAIL

14-1 Approach guardrail to bridge

14-4 Looking northerly at SE corner approach guardrail has excessive curvature

14-2 NE corner has been installed on curvature

14-5 Looking southerly at SE corner approach guardrail has excessive curvature

14-3 NW corner has been installed straight

14-6 SW corner approach guardrail alignment suits situation

SECTION 14

GUARDRAIL

14-7 Thrie-beam/W-beam rail post spacing (5 spaces at 476 mm and 3 spaces at 953 mm)

14-8 W-beam approach guardrail post spacing (1905 mm) closer to the bridge

14-9 W-beam approach guardrail post spacing (3810 mm) farther away from the bridge

14-10 Realigning W-beam rail to shield the curb face at corner facing the direction of traffic

14-11 HSS spacer between modified endwall and double W-beam rail