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**5.25 SUPPLY OF W-BEAM GUARDRAIL AND POSTS****5.25.1 GENERAL**

The Work consists of supplying W-Beam guardrail and posts for use as hazard avoidance barriers.

**5.25.2 STANDARDS OF REFERENCE**

Alberta Transportation Drawings:

|          |                            |
|----------|----------------------------|
| TEB 3.01 | Wood Spacer Block and Post |
| TEB 3.02 | Rail Detail                |
| TEB 3.03 | Wing End Section           |
| TEB 3.04 | Buried End Section         |
| TEB 3.06 | Bolt, Nut and Washer       |
| TEB 3.53 | Flex Guard Bracket         |

All materials supplied by the Contractor shall be in accordance with the following standards, specifications or publications. Previously installed materials may not be used.

**Canadian Standards Association(CSA):**

CSA G40.20 and G40.21-M87 - Structural Quality Steels  
CSA G164-M - Hot Dip Galvanizing of Irregularly Shaped Articles  
CSA W59-M - Welded Steel Construction (Metal Arc Welding)  
CSA 080-M - Wood Preservation

**American Society for Testing and Materials(ASTM):**

ASTM A307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength  
ASTM E316.3 - Magnetic gauge testing of galvanizing coating

**American Association of State Highway and Transportation Officials(AASHTO):**

AASHTO Standard Designation M-180-841 "Corrugated Sheet Steel Beams for Highway Guardrail"

**American Road and Transportation Builders Association(ARTBA):**

ARTBA Technical Bulletin No. 268-B

**National Lumber Grades Authority(NLGA):**

NLGA Standard Grading Rules for Canadian Lumber

**Alberta Transportation**

References made to TEB drawings in this Specification refer to drawings found in the manual entitled "Standard Drawings for Highway Construction" which is available from Alberta Transportation.

5.25.3 MATERIALS

The Contractor shall supply all materials necessary to complete the Work.

5.25.3.1 **Rails and Terminal Elements**

W-beam guardrail shall consist of rail sections fabricated to develop a continuous beam strength with the necessary safety end feature components.

All rail sections and other components shall match the design profiles and dimensions of the AASHTO/ARTBA hardware requirements for full interchangeability of similar components regardless of the manufacturer.

The name or trademark of the manufacturer, the metal thickness and the year of production shall be clearly and permanently stamped on each component clear of the splicing overlap and on the face opposite the traffic side.

The rails and terminal elements shall be manufactured from open hearth, electric furnace or basic oxygen semi-spring steel sheet and hot dip galvanized after fabrication, all in general accordance with the AASHTO Standard Designation M180-841 and shall conform to the relevant TEB drawings.

Rails shall be punched for splice and post bolts in strict conformity with the AASHTO Standard to the designated number and centre-to-centre spacing of posts. No punching, cutting or welding will be permitted on site except for special details in unforeseen and exceptional cases with the prior approval of the Consultant.

If any guardrail installation requires curved W-beam rails, the Contractor shall form these to the radius specified by the Consultant.

The rails and terminal elements shall be manufactured according to the following standards:

- Metal properties of the base metal for the rails shall conform to the following requirements:
  - Minimum Yield Point: 345 MPa
  - Minimum Tensile Strength: 483 MPa
  - Minimum Elongation: 12% in 50 mm length
- Sheet thickness shall be in accordance with Table 1 (Class A, Type 2) of AASHTO Standard M180-841 with a nominal base metal thickness of 2.8 mm (2.67 mm minimum).
- Sheet width for the W-beam rail shall be 483 mm, with a permissible tolerance of minus 3.2 mm.

Welding for the fabrication of terminal elements shall conform to the requirements of CSA-W59M.

Rails and terminal elements shall be hot dip galvanized after fabrication, in accordance with CSA-G164M.

5.25.3.2 **Bolts, Nuts and Washers**

Bolts, nuts and washers shall conform to ASTM-A307, and shall be hot dip galvanized in accordance with CSA-G164M (Drawing TEB 3.06).

**5.25.3.3 Wooden Posts**

Posts and offset blocks shall be either douglas fir, hemlock, lodgepole pine or better and shall meet the requirement of the National Lumber Grades Authority (NLGA) for No. 1 Structural Posts and Timbers graded conforming to the NLGA Standard Grading Rules for Canadian Lumber.

Posts and blocks shall be rough sawn with holes drilled to the finished dimensions shown in drawing TEB 3.01. 1.52 m posts are used in most guardrail installations. In areas with steep sideslopes or in areas of frequent collisions, 2.13 m posts may be required.

Posts shall be date stamped at the top of either side of the post not used for rail attachment with the last two digits of the year of fabrication. The stamp shall be 50 mm x 50 mm and have an indentation of 3 mm.

Stamping and drilling shall be completed prior to treating posts. Blocks shall be pressure treated in accordance with the current requirements of CSA Standard 080, with a water borne preservative of chromated copper arsenate (CCA) or ammoniacal copper arsenate (ACA) to 8 kilograms per cubic metre.

The penetration and retention of preservatives shall conform to the requirements of CSA Standard 080.14, Table 1, Minimum Retention of Preservatives in Pressure Treated Wood for Highway Construction, under the headings "Post-Guardrail, Guide, Sign and Sight" for posts, and "Bridge Hand Rails, Guard Rails and Posts" (not in contact with ground or water).

**5.25.4 ACCEPTANCE AND INSPECTION OF MATERIAL****5.25.4.1 General**

Prior to installing any guardrail, the Contractor shall provide the Consultant with a copy of the manufacturer's certificate verifying that materials supplied conform to Section 16 of CSA G40.20M, for each of the mechanical and chemical tests.

**5.25.4.2 Inspection of W-Beam Guardrail Material**

Hot dip galvanized coating shall be smooth, free of beading or sharp projections at edges. Coating adherence shall prevent the peeling of any portion of the zinc coating so as to expose the base metal by cutting or prying with a stout knife under considerable pressure (bond check). A magnetic gauge will be used for checking thickness in accordance with ASTM Standard E316.3(c).

Warped or otherwise deformed rails and terminal elements will be rejected, as will those with injurious defects or excessive roughness of the zinc coating. When the rail is laid on a flat surface, the warpage shall not be greater than 5 cm.

**5.25.4.3 Inspection of Wooden Posts and Blocks**

The Consultant may verify the penetration and retention of the preservative by the assay method.

Posts and blocks shall be subject to inspection by the Consultant when the bundles are opened immediately prior to use.

**5.25.5 MEASUREMENT AND PAYMENT**

Payment for the supply of w-beam guardrail including all required hardware and posts will be included in

the applicable unit price bid per metre for “W-Beam Guardrail - Supply and Install” or “Strong Post W-Beam Guardrail - Supply and Install” in accordance with Specification 2.19, Guardrail and Guide Posts. No separate consideration will be given, regardless of the length of post required in accordance with Section 5.25.3.3, Wooden Posts.