

ITEM 516

INSTALLATION OF FLEX BEAM GUARDRAIL

516.1 Description. This item shall govern for furnishing and placing 10 or 12 gauge galvanized flex beam guardrail, complete with timber or steel posts.

516.2 Materials. The rail elements shall be of the deep beam type, fabricated to develop continuous beam strength and shall consist of metal plate or sheet formed into a beam not less than 12 inches wide and 3 inches deep as shown on the plans. The beam shall be free from warp.

When tested with a straight edge or string along either edge of a 12 1/2-foot sectional length of beam, the maximum deviation of the beam edges from the straight edge shall not exceed 1/2-inch at any point.

The steel for the rail elements shall conform to the requirements of AASHTO M-180, "Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrail." The rail shall be 10-gauge nominal thickness (0.1345 + 0.008 inch), or 12-gauge (0.1046 + 0.008 inch) as shown on the drawings. The rail element may be galvanized before or after fabrication in accordance with the requirements of ASTM Designation A123, "Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products" or A653, "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process" whichever is applicable, except that the galvanized coating shall be not less than 2.0 ounces per square foot of double exposed surface (single spot test).

Rail elements shall contain no more than 0.04-percent phosphorous no more than 0.05 percent sulfur.

516.3 Posts. The posts shall be either timber or steel as indicated on the plans and shall meet one of the following requirements. Timber posts and spacers shall be Southern Yellow Pine. All posts shall be round. Posts shall not be less, in any place, than 7-inches in diameter. The average diameter at the base of the dome shall not exceed the specified diameter by more than 1-inch. The diameter at the butt of any post shall not exceed the diameter at the base of the dome of that post by more than 2-inches. The length of the posts shall not vary more than 1-inch from the specified length. All timber posts shall be in accordance with ASTM Designation D1165, "Standard Nomenclature of Domestic Hardwoods and Softwoods"

For domed posts, the dome shall be approximately hemispherical in shape and the radius of the dome of each post shall be one-half the diameter of the posts at the base of the domed portion. The dome shall be smooth and the distance from the top of the dome to the base of the dome shall not vary more than 1-inch at any length. The posts shall be machine tooled and trimmed of

all knots and knobs and shall be straight and smooth. For posts that are not domed, the tops shall be sloped.

The posts shall be sound and free from defects such as injurious ring shakes, unsound or loose knots, or other defects that might impair their strength and durability. A line drawn from the center of each end of the post, shall not fall outside the center of the post at any point more than 1-1/4-inch.

Timber posts, where spacers are required, shall be bored and cut to the dimensions shown on the plans before being treated. Posts shall be given a creosote treatment or shall be wolmanized meeting the requirements of AWWA Standard U1, "Use Category system: User Specification for Treated Wood", suitable for Use Category 4A. Wolmanizing material shall be manufactured by the Koppers Company, or approved equal.

Steel posts and spacers shall be of the rolled sections shown on the plans. The posts and spacers shall be structural steel conforming to the requirements of ASTM Designation A36, "Standard Specification for Carbon Structural Steel". All posts shall be beveled and drilled or punched for bolts for rail attachments. Steel posts and spacers shall be galvanized and shall conform to the requirements of ASTM Designation A123.

Fittings shall consist of bolts, nuts and washers and shall conform with the requirements as specified herein. All bolts and nuts shall conform to the requirements of ASTM Designation A307, "Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength". They shall be hot-dip galvanized to conform to ASTM Designation A153, "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware", Class C or D.

516.4 Construction Methods. The posts shall be set plumb and firm to the line and grade shown on the plans. The posts shall be backfilled by thoroughly tamping the material in 4-inch layers. The rail elements shall be erected to produce a smooth continuous rail, paralleling the line and grade of the roadway surface.

The rail elements shall be overlapped in the direction of traffic by bolts and lapped in the direction of traffic in the lane adjoining the guard fence. When designated, any deformed or curved piece shall be shop fabricated prior to delivery to the project site.

After erection, all parts of galvanized steel posts, spacers, washers, bolts, nuts and rail elements on which galvanizing has become scratched, chipped or otherwise damaged shall be thoroughly cleaned by wire brushing the damaged area to remove all loose, cracked or bruised spelt or coating.

The cleaned area shall be painted with two coats of zinc dust-zinc oxide paint conforming to the requirements of Federal Specification TT-P-641bor shall

be repaired by application of galvanizing repair compounds meeting Federal Specification 0-G-93, applied in accordance with the manufacturer's recommendations.

Reuse of old flex beam guard rail shall be allowed if found satisfactory in good condition and shall be subject to approval by the Engineer.

- 516.5 Certification. All shipments shall include certification from the appropriate wood treatment plant. This certificate shall also state that all samples representing each lot have been tested and inspected in accordance with American Wood Preservers' Association Standard M2, "Inspection of Treated Products" and have been found to meet the requirements of applicable American Wood Preservers' Association standards for wood treatment for its intended use.

The Contractor shall submit manufacturer's descriptive literature for flex beam guard rail for Engineer's approval.

- 516.6 Measurement. Flex beam guardrail, except for turndown sections, will be measured by the **linear foot** of rail, complete in place. Measurement shall be made upon the face of the rail in place, from center to center of end posts. Turndown sections shall be measured by **each** unit. Flex beam guardrail, including mowing strips shall be measured by the **linear foot**.

- 516.7 Payment. The work performed and the material furnished as prescribed by this specification, measured as provided under measurement, will be paid for at the unit price bid for "Flex Beam Guardrail", or "Flex Beam Guardrail Including Mowing Strip", which price shall be full compensation for furnishing all materials, for all preparation, hauling and erection and painting of same, and for all labor, tools, equipment and incidentals necessary to complete the work, including excavation, backfilling and disposing of surplus material. Turndown sections shall be paid for per **each**, complete in place.

END OF ITEM 516