

**ITEM 07615.8004 M - PIPE HANDRAIL**

**Description**

Under this item, the Contractor shall fabricate, furnish and install galvanized steel handrails as shown on the plans or as directed by the Engineer.

**Materials**

Materials used in this work shall meet the following requirements:

Rails and posts	ASTM A53
Couplings	ASTM A53
Base Plates and Connection Plates	ASTM A36M
Nuts, Bolts, and Washers	ASTM A307
Concrete Grouting Material	Section 701-05

Expansion anchor bolts, when specified, shall meet or exceed the requirements of U.S. Government G.S.A. Specification No. FF-S-32S, Group III, Type I, or Group VIII, Type I. Expansion anchor bolts shall be capable of resisting a direct tension loading for a given bolt size as noted in the following table:

<u>BOLT SIZE</u>	<u>LOADING</u>
6.350 mm	4448 N
7.938 - 9.525 mm	17 793 N
12.700 - 15.875 mm	40 034 N

Anchor bolts, nuts and washers, when specified, shall meet the requirements of Subsection 710-23.

Sleeve type anchorage units, when specified, shall be as indicated on the Plans.

The railing system shall be fabricated and accepted in accordance with the requirements of Section 710-23. Three (3) sets of shop drawings shall be submitted to the Regional Director for approval.

**Construction Details**

The requirements of Subsection 568-3.01, Erection of Bridge and Culvert Railing, shall apply, except for Subsections 568-3.01I through and including 568-3.01M. All approvals shall be the responsibility of the Regional Director.

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All connections which are to be welded shall be ground smooth, cleaned and regalvanized to the satisfaction of the Engineer per Section 719-01, Galvanized Coatings and Repair Methods. The top rail shall be free of welds except at the post and end connections.

Sleeve type anchorage units, when specified, shall be constructed in the manner indicated on the Plans. Field measurements shall be made after the post sleeves have been installed to determine the exact post spacing. The posts and post sleeves shall be dry and free of foreign matter at the time of installation.

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BY EI 12-001

When expansion bolt anchors are specified, the equipment and methods used to drill expansion bolt anchor holes shall be approved by the Engineer. Drilling by means of a lubricant will not be permitted. Drilling methods shall not cause spalling or other damage to the concrete. Concrete which has been spalled, or otherwise damaged by the Contractor's operations shall be repaired at the Contractor's expense in a manner satisfactory to the Engineer. Holes shall be dry, and shall have all foreign and loose material removed immediately prior to the insertion of the anchor.

The handrail shall be erected and anchored in the position and manner indicated on the Plans and as approved by the Engineer. The top rail shall be parallel to the adjacent surfaces and the posts shall be truly vertical to provide neat appearance when completed. When a bottom rail is used, it shall be parallel to the top rail at a distance specified on the Plans. The typical end treatment shown on the Plans shall be provided at both ends of each independent handrail section.

Intermediate posts and a bottom rail shall be provided when the end post spacing is equal to or greater than 2.4m center to center. The spacing between intermediate post(s) and end posts shall be equidistant with a maximum of 2.4m, center to center.

### **Method of Measurement**

The quantity to be paid for under the price bid for this work will be number of linear meters of handrail, measured along the top rail from the center line of end posts, properly furnished and installed in accordance with the contract documents.

### **Basis of Payment**

The unit price bid per linear meter shall include the cost of furnishing all labor, materials and equipment necessary to satisfactorily complete the specified work. The cost of rails, posts, anchorage systems, grouting, materials and incidental materials shall be included in the unit price bid for the handrail.