

480.1 DESCRIPTION

This work consists of furnishing and placing steel of the specified size and type, as reinforcement in concrete.

480.2 MATERIAL

Reinforcement shall conform to Section 1010. Reinforcement shall be furnished in the full lengths indicated on the plans.

480.3 CONSTRUCTION REQUIREMENTS

A. Protection of Material: Steel reinforcement shall be protected from damage and when placed in the work, it shall be free from dirt, detrimental scale, paint, oil, and other foreign substance. Steel reinforcement shall be stored above ground on platforms, skids, or other supports.

When epoxy coated steel reinforcements is specified, the following requirements also apply:

1. In order to protect the coated reinforcement from damage, the Contractor shall use padded or non-metallic slings or straps to load, unload or move epoxy coated reinforcement.
2. Bundled bars shall be handled in manner as to prevent excessive sagging of the bars so as not to damage the epoxy coating.
3. To prevent damage to the epoxy coating, care shall be taken during placement of epoxy coated reinforcement to assure that the bars are not dropped or dragged.
4. Damaged areas shall be repaired by removing all rust and contaminants from the damaged area and applying an epoxy coating to the damaged area. The touch up epoxy coating material shall be inert in concrete and compatible with the epoxy coating applied to the new epoxy coated reinforcing steel. This coating material shall be the epoxy coating touch up material supplied by an epoxy coating manufacturer who supplies coating for material for new epoxy coated reinforcing steel. Touch up epoxy coatings from spray cans will not be permitted. The touch up epoxy coating shall be allowed to cure for a minimum of 24 hours or as per the manufacturer's recommendations, whichever is more stringent, before concrete is placed.
5. Epoxy coated reinforcing steel shall be covered with a heavy duty waterproof opaque covering to protect the epoxy coating from dirt and debris and from the effects of ultraviolet rays if the reinforcing steel will be stored for more than 30 days.

B. Bending: Reinforcement shall be bent to the shapes specified. Bending and bundling shall conform to the standard practice currently specified by the Concrete Reinforcing Steel Institute.

C. Placing and Fastening: Reinforcing steel shall be accurately placed and firmly held in the positions specified using steel chairs or other approved methods. Bars shall be tied at all intersections except where spacing is less than one foot (300 mm) in each direction, in which case alternate intersections shall be tied.

- 1. General:** Distances from the forms shall be maintained by stays, blocks, ties, chairs, or hangers. Devices for holding reinforcement from contact with the forms shall be of approved shape and dimensions. Layers of bars shall be separated by approved metal devices. The use of pebbles, stone, brick, metal pipe, and wooden blocks will not be permitted.

Wire bar supports, such as ferrous metal chairs and bolsters, shall conform to industry practice as described in the manual of Standard Practice of the Concrete Reinforcing Steel Institute. Chairs or bolsters which bear against the forms for exposed surfaces shall be either Class 1 - Maximum Protection (plastic protected) or Class 2 - Moderate Protection, Type B (stainless steel tipped) for which the stainless steel conforms to ASTM A493, Type 430. Chairs or bolsters which are earth bearing shall be Class 3 - No Protection (bright basic bar supports). For epoxy coated reinforcement, all wire bar supports and bar clips shall be plastic or epoxy coated.

Chair spacing shall not exceed four feet (one meter) in either direction. The Engineer may require a closer chair spacing for mat rigidity. Plastic chairs shall not be used.

Tie wires shall be black-annealed 16 1/2 gauge (1.65 mm) or heavier. Ties will be plastic coated when used in conjunction with epoxy coated reinforcing steel.

Welding of reinforcing steel will not be permitted.

Reinforcement shall be inspected and approved, before the placing of concrete begins. The placing of any reinforcement except mesh during the process of placing the concrete will not be permitted. Concrete placed in violation of this provision may be rejected and ordered removed.

- a. Structures:** When placing bridge deck and box culvert reinforcement either slab bolster (SB) or beam bolster (BB) bar supports shall be used between the mats or reinforcement and the form work. Either slab bolster upper (SBU) or beam bolster upper (BBU) bar supports shall be used between mats of reinforcing steel. Individual high chair (HC) bar supports shall not be used.

On girder bridges either slab bolster upper (SBU) or beam bolster upper (BBU) bar supports shall be used between mats of reinforcement and placed transverse to the girders. Slab bolsters (SB) or beam bolsters (BB) shall be used under the bottom mat placed parallel to the girders.

The top mat of bridge slab and box culvert reinforcement shall be tied down with 16 1/2 gauge (1.65 mm) diameter (minimum) tie wires or other approved devices. It will not be permissible to tack weld reinforcement.

On girder bridges, ties shall be used along each line of beams at longitudinal intervals not to exceed eight feet (2.5 meters). The ties shall be secured to the shear transfer devices protruding from the top of the beam. Where shear transfer devices are not available, the ties may be secured to the bottom mat of slab reinforcing steel.

Other types of bridges and box culverts the top mat of reinforcement shall be tied down at a maximum of 12 feet (3.5 meters) longitudinal and transverse intervals with the ties secured to either the forms or bottom mat of slab reinforcing steel.

- b. Continuous Reinforced Concrete Pavement:** On continuous reinforced concrete pavement, continuous high chair (CHCP) and beam bolsters (BBP) with earth-bearing bases or sand plates (P) shall be used or approved alternate. Individual high chair (HC) bar supports shall not be used.

D. Mechanical Bar Splices

Mechanical bar splices shall only be used when specified in the plans or approved by the Engineer. The model of mechanical bar splice to be used shall be submitted to the Office of Bridge Design through the proper channels for approval.

The mechanical connection shall develop 125 percent of the specified yield strength of a Grade 60 bar. The Contractor shall obtain from the manufacturer and submit to the Engineer certification indicating the mechanical bar splice is capable of developing 125 per cent of the specified yield strength of a Grade 60 bar.

The bar lengths shown in the plans are the lengths of the bars neglecting the mechanical bar splice.

When mechanical bar splices are used to splice epoxy coated bars, the mechanical bar splices shall be epoxy coated by the manufacturer or made of an approved corrosion resistant material. Coating the mechanical bar splice with epoxy touch-up is not an approved method for this situation.

480.4 METHOD OF MEASUREMENT

Reinforcing Steel will be measured by the pound (kg), based on the theoretical weight complete in place. The weights calculated shall be based upon the following table:

Bar Designation (English)

Size	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 14
*Diameter (mm)	6.4	9.5	12.7	15.9	19.1	22.2	25.4	28.7	32.3	43.0
Weight (lb/ft)	0.167	0.376	0.668	1.043	1.502	2.044	2.670	3.400	4.303	7.650

* Soft metric conversion included for informational purposes only.

Bar Designation (Metric)

REINFORCING STEEL

Size	10	13	16	19	22	25	29	32	36	43	57
Weight (kg/m)	0.560	0.994	1.552	2.235	3.042	3.973	5.060	6.404	7.907	11.38	20.24

Allowance will not be made for the clips, wire, or other fastening devices for holding the steel in place.

Mechanical rebar splices will be measured on a per each basis.

480.5 BASIS OF PAYMENT

Reinforcing steel will be paid for at the contract unit price per pound (kg).

All costs involved with supplying and installing the mechanical bar splices shall be included in the contract unit price bid for the respective size of Rebar Splice as specified in the plans.

Payment will be full compensation for furnishing materials, labor, equipment, and all incidentals necessary to complete the work.