

SECTION 57

REINFORCING STEEL

57.1 DESCRIPTION

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

B. Related Work:

Section 55	Cast in Place Concrete Structures
Section 100	Portland Cement
Section 123	Concrete Reinforcement
Section 203	Submittals

57.2 MATERIAL

Reinforcement shall conform to Section 123. Reinforcement shall be furnished in the full lengths indicated on the plans.

57.3 CONSTRUCTION MATERIALS

A. Protection of Material: Reinforcing steel 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 reinforcement 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 a 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 ensure 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 original epoxy coating and the reinforcing steel. This coating material shall be epoxy coating touch up material supplied by an epoxy coating manufacturer who supplies

coating 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 calendar 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 in accordance with the tolerances of ACI 117 and firmly held in the positions specified using steel chairs or other approved methods. Bars shall be tied at all intersections (100%) when spacing is 1 foot or more in any direction (longitudinal, vertical, or horizontal), otherwise a minimum of every other intersection (50%) shall be tied.

All lap splices shown are contact lap splices unless specifically noted otherwise.

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 will not exceed 3 feet 6 inches in either direction. If plastic chairs are used, chair spacing will not exceed 2 feet 6 inches in either direction. The Engineer may require a closer chair spacing for mat rigidity.

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

Welding of reinforcing steel shall not be allowed without written approval of the Engineer. The request for approval shall list the bars to be welded, welding

procedure, type of electrode, joint detail, and mill certificate of the reinforcing steel to be welded.

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.

- 2. 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 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 8 feet. 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 foot longitudinal and transverse intervals with the ties secured to either the forms or bottom mat of slab reinforcing steel.

- D. 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 Engineer through the proper channels for approval.

The mechanical connection shall develop 125% 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% 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.

57.4 METHOD OF MEASUREMENT

Reinforcing steel will be measured as specified in plans. If reinforcing steel measurement is not specified in the plans, it shall be incidental to the associated concrete bid item.

57.5 BASIS OF PAYMENT

Reinforcing steel will be paid for as specified in plans. If reinforcing steel payment is not specified in plans, it shall be incidental to the associated concrete bid item.

END OF SECTION