

## CONSTRUCTION SPECIFICATION

### **34. STEEL REINFORCEMENT**

#### 1. SCOPE

The work shall consist of furnishing and placing steel reinforcement for reinforced concrete or pneumatically applied mortar.

#### 2. MATERIALS

Steel reinforcement shall conform to the requirements of Material Specification 539. Before reinforcement is placed, the surfaces of the bars and fabric and any metal supports shall be cleaned to remove any loose, flaky rust, mill scale, oil, grease or other undesirable coatings or foreign substances. Epoxy-coated steel reinforcement shall be free of surface damage. After placement, the reinforcement shall be maintained in a clean and serviceable condition until it is completely embedded within the concrete.

#### 3. BAR SCHEDULE, LISTS AND DIAGRAMS

Any supplemental bar schedules, bar lists or bar-bending diagrams required in Section 10 of this specification to accomplish the fabrication and placement of steel reinforcement shall be provided by the Contractor. Prior to placement of reinforcement, the Contractor shall furnish four copies of any such lists or diagrams to the Engineer for approval. Acceptance of the reinforcement will not be based on approval of these lists or diagrams, but will be based on inspection of the steel reinforcement after it has been placed, tied, supported and ready to receive concrete.

#### 4. BENDING

Reinforcement shall be cut and bent in compliance with the requirements of the American Concrete Institute Standard 315. Bars shall not be bent or straightened in a manner that will injure or weaken the material. Bars with kinks, cracks or improper bends will be rejected.

#### 5. SPLICING BAR REINFORCEMENT

Method 1 Splices of reinforcement shall be made only at locations shown on the drawings and provided by the steel schedule. Placement of bars at the lap splice locations shown, when not in contact, shall not be farther apart than one-fifth (1/5) the shown lap length and in any case no greater than six (6) inches.

Method 2 Splices of reinforcement shall be limited to those locations shown on the drawings. Splice lengths shall be determined prior to fabrication and meet the requirements of ACI Standard 318 "Building Code Requirements for Reinforced Concrete" based upon design information contained in Section 10 of this specification. Bar placement drawings and schedules shall be provided for approval prior to fabrication. The drawings shall show all splice locations, layouts, and lap dimensions.

## 6. SPLICING WELDED WIRE FABRIC

Unless otherwise specified, welded wire fabric shall be spliced in the following manner:

- a. Adjacent sections shall be spliced end to end (longitudinal lap) by overlapping a minimum of one full mesh plus two (2) inches plus the length of the two end overhangs. The splice length is measured from the end of the longitudinal wires in one piece of fabric to the end of the longitudinal wire in the lapped piece of fabric.
- b. Adjacent sections shall be spliced side to side (transverse lap) a minimum of one full mesh plus two (2) inches. The splice length shall be measured from the centerline of the first longitudinal wire in one piece of fabric to the centerline of the first longitudinal wire in the lapped piece of fabric.

## 7. PLACING

Reinforcement shall be accurately placed and secured in position in a manner that will prevent its displacement during the placement of concrete. Tack welding of bars will not be permitted. Metal chairs, metal hangers, metal spacers and concrete chairs may be used to support the reinforcement. Metal hangers, spacers and ties shall be placed in such a manner that they will not be exposed in the finished concrete surface. The legs of metal chairs or side form spacers that may be exposed on any face of slabs, walls, beams or other concrete surfaces shall have a protective coating or finish by means of hot dip galvanizing, epoxy coating, plastic coating, or be stainless steel. Metal chairs and spacers not fully covered by a protective coating or finish shall have a minimum cover of 3/4 inch of concrete over the unprotected metal portion except for those with plastic coatings may have a minimum cover of 1/2 inch of concrete over the unprotected metal portion. Pre-cast concrete chairs shall be manufactured of the same class of concrete as specified for the structure and shall have the tie wires securely anchored in the chair or a V-shaped groove at least 3/4 inch in depth molded into the upper surface to receive the steel bar at the point of support. Pre-cast concrete chairs shall be clean and moist at the time concrete is placed.

High density or structural plastic rebar accessories, designed to insure maximum concrete bond, may be substituted for metal or concrete accessories in spacer applications as approved by the Contracting Officer. Exposure of plastic rebar accessories at the finished concrete surface shall be kept to a minimum. Plastic rebar accessories, when used, shall be staggered along adjacent parallel bars and shall be placed at intervals no closer than twelve (12) inches. Plastic rebar accessories shall not be used in concrete section six (6) inches or less in thickness.

Reinforcement shall not be placed until the prepared site has been inspected and approved. After placement of the reinforcement, concrete shall not be placed until the reinforcement has been inspected and approved by the Engineer.

## 8. STORAGE

Steel reinforcement stored at the work site shall be placed on platforms, skids or other supports and in a manner that contact with the ground is avoided and be protected from mechanical damage and/or corrosion.

## 9. MEASUREMENT AND PAYMENT

Method 1 For items of work for which specific unit prices are established in the contract, the weight of steel reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest pound by computation from the placing drawings. Measurement of hooks and bends will be based on the requirements of ACI Standard 315. Computation of weights of reinforcement will be based on the unit weights established in Tables 34-1 and 34-2 of this specification. Computation of weights for welded wire fabric not shown in Table 34-2 shall be based on ACI Standard 315. The area of welded wire fabric reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest square foot by computation from the placing drawings with no allowance for required laps. The weight of steel reinforcing in extra splices or extra-length splices approved for the convenience of the Contractor or the weight of supports and ties will not be included in the measurement for payment.

Payment for furnishing and placing reinforcing steel will be made at the contract unit price. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work including preparing and furnishing bar schedules, lists or diagrams; furnishing and attaching ties and supports; and furnishing, transporting, storing, cutting, bending, cleaning and securing all reinforcements.

Method 2 For items of work for which specific unit prices are established in the contract, the weight of bar reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest pound by computation from the placing drawings. Measurement of hooks and bends will be based on the requirements of ACI Standard 315. Computation of weights of bar reinforcement will be based on the unit weights established in Table 34-1 of this specification. The weight of steel reinforcing in extra splices or extra length splices approved for the convenience of the Contractor or the weight of supports and ties will not be included in the measurement for payment.

The area of welded wire fabric reinforcement placed in the concrete in accordance with the drawings will be determined to the nearest square foot by computation from the placing drawings with no allowance for required laps.

Payment for furnishing and placing bar reinforcing steel will be made at the contract unit price for bar reinforcement. Payment for furnishing and placing welded wire fabric reinforcing steel will be made at the contract unit price for welded wire fabric reinforcement. Such payment will constitute full compensation for all labor,

materials, equipment and all other items necessary and incidental to the completion of the work including preparing and furnishing bar schedules, lists or diagrams; furnishing and attaching ties and supports; and furnishing, transporting, cutting, bending, cleaning, and securing all reinforcement.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule, will be included in the payment for the item of work to which it is made subsidiary. Such items to which they are made subsidiary are identified in Section 10 of this specification.

**TABLE 34 – 1. STANDARD REINFORCING BARS**

<u>Bar Size No.</u>	<u>Weight (lb./ft.)</u>
3	0.376
4	0.668
5	1.043
6	1.502
7	2.044
8	2.670
9	3.400
10	4.303
11	5.313
14	7.650
18	13.600

**TABLE 34 – 2. RECTANGULAR WELDED WIRE FABRIC**

<u>Style Designation</u>		<u>Weight</u>
<u>By Steel Wire Gauge</u>	<u>By W-Number</u>	<u>(lb./100 Sq. Ft.)</u>
6 x 6 – 10 x 10	6 x 6 – W 1.4 x W 1.4	21
6 x 6 – 8 x 8	6 x 6 – W 2.1 x W 2.1	30
6 x 6 – 6 x 6	6 x 6 – W 2.9 x W 2.9	42
6 x 6 – 4 x 4	6 x 6 – W 4.0 x W 4.0	58
4 x 4 – 10 x 10	4 x 4 – W 1.4 x W 1.4	31
4 x 4 – 8 x 8	4 x 4 – W 2.1 x W 2.1	44
4 x 4 – 6 x 6	4 x 4 – W 2.9 x W 2.9	62
4 x 4 – 4 x 4	4 x 4 – W 4.0 x W 4.0	85
4 x 12 – 8 x 12	4 x 12 – W 2.1 x W 0.9*	25
4 x 12 – 7 x 11	4 x 12 – W 2.5 x W 1.1*	31

NOTE: Style Designation is defined in ACI Standard 315 of the American Concrete Institute.

\*Welded smooth wire fabric with wires smaller than Size W1.4 is manufactured from galvanized wire.