

## CHAPTER 10 - CONCRETE REINFORCEMENT

### 10.1 GENERAL

This division furnishing and placing reinforcing steel, epoxy-coated reinforcing steel, and fiber reinforcement.

Steel reinforcement shall be free from rust, oil, grease, paint or other deleterious matter. Use deformed billet-steel bars as specified. All reinforcing bars shall be Grade 40 or Grade 60 as required. Wire Fabric shall conform to ASTM A185-70.

Before supply of steel, the Developer/Contractor shall provide all order lists and bending diagrams for approval of the City Engineer / Public Works Representative. The approval of such lists and diagrams shall in no way relieve the Developer/Contractor of responsibility for the correctness of reinforcing supplied and all expenses incidental to revision of furnished reinforcing steel shall be carried by the Developer/Contractor.

All steel to conform to ACI Standard Code (ACI 318 latest edition), Section 3.5. Gages, spacing and arrangement of wires in welded steel wire fabric shall be as defined in ACI Standard Code (ACI 315 latest edition) for the specified style designations.

Steel reinforcement stored at the site of the work shall be stored above the ground surface on platforms, skids or other supports and shall be protected from mechanical injury and corrosion.

### 10.2 FABRICATION AND PLACING STEEL REINFORCEMENT

#### 10.2.1 Fabrication:

Reinforcement shall be cold bent to the shapes shown in accordance with ACI Standard Code (ACI 318 latest edition), Section 7.1.

#### 10.2.2 Clearances:

All bars shall be of the size specified and shall be placed in the positions shown on the Drawings in such a manner as to be firmly held during the placing of the concrete. Where not otherwise indicated, minimum clearance and cover as required by the ACI Standard Code (ACI 318 latest edition), Section 7.7 shall be maintained.

Reinforcement Clearances	Minimum Cover Inches
Cast In Place Concrete (Non Prestressed)	
Concrete cast against and permanently exposed to earth	3
Concrete exposed to earth or weather:	
No. 6 through No. 18 Bar	2
No. 5 Bar, W31 or D31 wire, and smaller	1 1/2
Concrete not exposed to weather or in contact with ground:	
- Slabs, Walls, and Joists:	
No. 14 and no. 18 Bar	1 1/2
No. 11 Bar and smaller	3/4
- Beams, Columns:	
Primary reinforcements, ties, stirrups, spirals	1 1/2
- Shells, Folded Plate Members:	
No. 6 Bar and larger	3/4
No. 5 Bar, W31 or D31 wire, and smaller	1/2

<b>Reinforcement Clearances</b>	<b>Minimum Cover Inches</b>
Precast Concrete (Manufactured Under Plant Controlled Conditions)	
Concrete exposed to earth or weather:	
- Wall Panels:	
No. 14 and No. 18 Bars	1 1/2
No. 11 Bar and smaller	3/4
-Other Members:	
No. 14 and No. 18 Bars	2
No. 6 through No. 11 Bars	1 1/2
No. 5 Bar, W31 or D31 wire, and smaller	1 1/4
Concrete not exposed to weather or in contact with ground:	
- Slabs, Walls, Joists:	
No. 14 and No. 18 Bars	1 1/4
No. 11 Bar and smaller	5/8
- Beams, Columns:	
Primary reinforcement	1 1/2
Ties, stirrups, spirals	3/8
- Shells, folded plate members:	
No. 6 Bar and larger	5/8
No. 5 Bar, W31 or D31, and smaller	3/8

**10.2.3 Support:**

Bars shall be tied at all intersections except where the spacing is less than twelve inches (12") where alternate intersections shall be tied. Distance from supports shall be by means of ties, hangers, or other approved supports. Metal chairs of approved design shall be used to hold reinforcement from contact with the forms. Metal chairs that are in contact with the exterior surface of the concrete shall be galvanized. Layers of bars or when placing concrete directly on a prepared subgrade reinforcing shall be separated by precast mortar blocks or by other equally suitable devices. The use of stones, pieces of broken brick, metal pipe, or wooden blocks shall not be permitted. Reinforcement in any member shall be placed and then inspected and approved by the City Engineer / Public Works Representative before the placement of concrete begins. Concrete placed in violation of this provision may be rejected in which case removal will be required.

If the fabric reinforcement is shipped in rolls, it shall be straightened into flat sheets before being placed.

**10.2.4 Splicing:**

All splices shall be staggered so that splices in adjacent bars shall be not less than four feet (4') apart, and shall conform to ACI Standard Code (ACI 318 latest edition), Section 12.15.

**10.3 EPOXY COATING**

**10.3.1 Prequalify all Coatings:**

Ensure that epoxy coating applicator has Concrete Reinforcing Steel Institute (CRSI) fusion bonded epoxy coating applicator plant certification. Furnish a copy of the Prequalification Test Report to the City Engineer / Public Works Representative. Provide an 8-ounce sample of the coating material from each batch.

**10.3.2 Coat Bars as Specified:**

The following requirements shall be followed:

- 1) Maintain the coating thickness between 8 and 12 mils.
- 2) Coat bars after bending, unless the fabricator can show that satisfactory results can be obtained by coating before bending
- 3) Reject any bent bars with visible cracks or damage in the coating.

**10.3.3 Handling:**

Do not damage the bars or the coating during handling and storage.

- 1) Use systems with padded contact areas when handling coated bars.
- 2) Pad all bundling bands.
- 3) Lift all bundles with strong back, multiple supports, or a platform bridge.
- 4) Do not drop or drag bars.
- 5) Repair damaged bars or coating at no additional cost to the Owner.
- 6) Use patching material per manufacturer's recommendation to repair damaged coating.
- 7) Have the coated bars inspected for damage to the coating after the bars are in place and immediately before concrete placement.
- 8) Repair all visible defects using the specified patching or repair material.

**10.4 FIELD CUTTING EPOXY-COATED BARS****10.4.1 Cutting:**

Saw or shear epoxy-coated bars that are specified to be cut in the field. Do not flame cut.

**10.4.2 Repairing:**

Repair the sawed or sheared end using the specified patching or repair material.

**10.5 FIBER REINFORCEMENT**

Upon request by the City Engineer, cast-in-place concrete shall contain polypropylene fiber reinforcing with a fiber length of 0.75 inches minimum and mixed at a rate of 1.5 pounds per cubic yard of concrete. The fibers shall be introduced into the concrete mix at the time the concrete is batched in accordance with the manufacturer's recommendations. The required physical characteristics of the reinforcing fiber are as follows:

- |                     |                       |
|---------------------|-----------------------|
| a) Specific Gravity | 0.91                  |
| b) Tensile Strength | 80-110 ksi            |
| c) Fiber Length     | 0.75 inches (minimum) |

The Developer/Contractor will submit documentation to the City Engineer and obtain approval of the fiber material prior to use on the job.