Section 905. STEEL REINFORCEMENT

905.01. General Requirements. Steel reinforcement for use in concrete structures and pavements must meet the requirements of this section 905 and subsection 105.01.

905.02. Testing. Steel reinforcement materials testing will be in accordance with ASTM A 370, ASTM E 8 or other specified ASTM, AASHTO or Department methods, as modified by this section.

If requested, provide the Engineer with two copies of the chemical analysis of reinforcing bars, in accordance with the relevant ASTM specifications.

905.03. Bar Reinforcement for Structures. Deformed bars, must meet the requirements of ASTM A 706 or of ASTM A 615, ASTM A 616, ASTM-96a, or ASTM A 617-96a for Grade 60 steel bars, unless otherwise required.

Unless otherwise specified, spiral reinforcement must meet the requirements for plain or deformed Grade 40 steel bars of ASTM A 615, ASTM A 617-96a, or the requirements for cold-drawn wire of ASTM A 82.

Bar reinforcement for prestressed concrete beams must meet the requirements of ASTM A 616-96a for Grade 60 steel bars, except the Engineer will allow bar reinforcement that meets the requirements of ASTM A 615 or ASTM A 617-96a for Grade 40 steel bars for stirrups in prestressed concrete beams.

A. Bending. Bent bar reinforcement must be cold shop bent to the shapes shown on the plans. Complete all field bending cold as specified. Heat bending is cause for rejection.

The diameter of a bar bend, measured on the inside of the bar, must meet the requirements of Table 905-1.

<table>
<thead>
<tr>
<th>ASTM Bar Designation No.</th>
<th>Minimum Inside Diameter of Bend</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 3 – No. 8</td>
<td>6 bar diameters</td>
</tr>
<tr>
<td>No. 9 – No. 11</td>
<td>8 bar diameters</td>
</tr>
<tr>
<td>No. 14, No. 18</td>
<td>10 bar diameters</td>
</tr>
<tr>
<td>Stirrups and Ties, No. 3 – No. 5</td>
<td>4 bar diameters</td>
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</table>

Bar cutting and bending must be in accordance with the CRSI Code of Standard Practice and the ACI Detailing Manual.
B. **Bundling and Tagging.** Ship bar reinforcement in standard bundles, tagged and marked in accordance with the CRSI Code of Standard Practice.

C. **Epoxy Coating.** Epoxy coated steel reinforcement, if required, must be coated in accordance with AASHTO M 284, with the following exceptions and additions:

1. Select coating material from the Qualified Products List.
2. The Department may test samples at the coating applicator’s plant or at the laboratory to determine thickness of coating, adhesion of coating, and holidays. Coat more bars than shown on the plans to allow splicing to replace bars removed for test samples.
3. Include written certification that the coated reinforcing bars were cleaned, coated, and tested in accordance with AASHTO M 284 with the coating applicator.
4. Coat bars before or after bending. Repair damage to the coating in accordance with subsection 706.03.E.8.

D. **Bar Chairs and Wire Ties for Epoxy Coated Steel Reinforcement.** The bar chairs and wire ties required for placing and fastening steel reinforcement must conform to the following:

1. Bar chairs must be plastic coated wire, epoxy coated wire, or plastic.
2. Wire ties must be plastic coated wire, epoxy coated wire, or molded plastic clips.
3. Tie-down wires must be plastic coated.

905.04. **Bar Reinforcement for Pavements.** Bar reinforcement for pavement tie bars and bars for use as dowels for load transfer in pavement expansion joints and contraction joints must meet the requirements of section 914.

905.05. **Dowels and Bar Reinforcement for Curb, Glare Screen, Concrete Barriers, and Filler Walls.** Deformed steel bars must meet the requirements of ASTM A 706 or the requirements for Grade 40, Grade 50, or Grade 60 of ASTM A 615, ASTM A 616-96a, or ASTM A 617-96a.

905.06. **Steel Welded Wire Fabric.** Deformed wire fabric for prestressed concrete must meet the requirements of ASTM A 497.

Fabric for concrete pavement reinforcement must meet the requirements of ASTM A 185 and fabricated as required.

905.07. **Strand for Prestressed Concrete.** Strands for prestressed concrete must have a 0.500 inch nominal diameter and a 0.153 square inch cross-sectional area or a 0.6000 inch nominal diameter and a
0.217 square inch cross-sectional area and must meet the requirements of ASTM A 416, for Grade 270, Low Relaxation Strand, as required.

Identify each reel or pack number and provide a Test Data Certification, including a load-elongation curve to at least 1 percent elongation.

Protect prestress strands from physical damage, rust, and contaminants.

**905.08. Tendons for Lateral Post Tensioning of Box Beams.**

Tendons for lateral post tensioning of box beams must meet the requirements of ASTM A 416, for Grade 270 steel strand or ASTM A 722, for high-strength steel bars.

If selecting bars, consider the tolerances allowed in manufacturing and placing precast concrete box beams and determine the required bar lengths accordingly.