

SECTION 032000 – CONCRETE REINFORCING

Scope:

Contractor shall supply and install bar reinforcement and wire mesh reinforcement as shown on the Drawings and specified herein. Bar reinforcement shall be furnished by domestic steel mills and shall conform to the applicable ASTM Specifications and ACI Building Code, as amended to date.

Submittals:

A. Shop Drawings:

- (1) All shop drawings shall be of the same size. Reproductions of Drawings for use as shop drawings are not permitted. Shop drawings shall include placing drawings, bending details and bar lists with bar marks. All details and notes appearing on the Drawings, giving information for the placing of reinforcing steel, shall be shown on the shop drawings.
- (2) Wall reinforcing shall be shown in elevation.
- (3) Show location and size of all penetrations greater than 6-inches in diameter or across the opening with the corresponding added reinforcing around penetrations.
- (4) Submittals shall be complete for each structure. Partial submittals are not permitted and will be returned unmarked. Each submittal shall clearly indicate the structure and Drawing numbers related to the work.
- (5) Location and arrangement of accessories shall be clearly indicated.
- (6) All shop drawings shall be checked by the fabricator and the Contractor prior to being submitted to the Owner.

B. Mill Tests: Mill tests of reinforcing steel shall be submitted prior to use for each 15 tons or less shipped to the site. Tests shall be conducted in conformance with ASTM A 615, and methods prescribed therein.

- (1) Costs of mill tests shall be borne by Contractor.
- (2) Three copies of each test report stating whether the material meets the requirements of the ASTM specifications shall be submitted to the Owner.
- (3) Certified copies of mill tests may be considered evidence of compliance provided such tests are regularly conducted by the reinforcement supplier by experienced, competent personnel using adequate testing equipment.

Products:

A. Bar Reinforcement: Bar reinforcement and wire mesh reinforcement shall be furnished by domestic steel mills and shall conform to the applicable ASTM Specifications and ACI Building Code, as amended to date. Materials, fabrication, and placement of steel bar reinforcement shall be in accordance with the following:

- (1) **Materials:** Bar reinforcement shall be deformed bars and conform to the requirements of ASTM A 615 Grade 60. The steel for bars shall be made by the open hearth, basic oxygen, or electric furnace processes, and the bars shall be rolled

from billets or ingots of properly identified heats. The steel shall be made, and the bars rolled in the United States. The use of cold twisted bars will not be permitted.

- (2) Fabrication: Steel bar reinforcement shall be cold bent to shapes indicated on the Drawings. Bending shall be done in the shop before shipment unless otherwise specified. Bending details for steel bar reinforcement shall conform to the requirements of the ACI Building Code (ACI-318) unless otherwise indicated on the Drawings or specified. Steel bar reinforcement shall be bent, bundled, and tagged in accordance with details furnished by the fabricator.
- a. Design is based upon “non-contact” type vertical splices lapped and specified above as required under the applicable sections of the ACI code. Tied “contact” lapped splices will be allowed for ease in establishing the basic framework for the vertical rebar mats. However, no more than 20% of the required vertical lap splices may be “contact” type splices. All other lap splices shall conform to the minimum and maximum clear distance requirements as specified above and in the applicable sections of the ACI code.
 - b. Hooks: Hooks of 180° shall have a radius of bend on the axis of the bar of not less than three bar diameters plus an extension of four bar diameters (or 2-1/2” minimum) at the free end. Hooks of 90° shall have a radius of bend on the axis of the bar of not less than four bar diameters plus a minimum extension of twelve bar diameters at the free end.
 - c. Openings: Openings 12 inches and larger through concrete walls and slabs shall have a minimum of 8 extra diagonal bars in each face of the wall or slab of the same size as the largest bar in the wall or slab. The length of extra diagonal bars at openings shall be as shown on the Drawings, or diameter of openings plus 24 bar diameters each end of bar.
 - d. Minimum Reinforcing: Minor concrete walls, slabs and other Class “A” concrete sections, where no reinforcement is shown on the Drawings, shall have a minimum area of steel bar reinforcing equal to 0.005 times the cross-sectional area of the concrete work.
- B. Welded Wire Fabric:** Welded wire fabric shall be in flat sheets conforming to ASTM A 185, with wire conforming to ASTM A 82.
- C. Accessories:** All chairs and bolsters shall have plastic covered or galvanized steel legs at formed slabs and beams. For slabs on grade, bare metal is acceptable. For slabs on grade 10-inches or less, all reinforcing shall be supported on chairs or bolsters to properly position the bars. The chairs or bolsters shall be supported on precast concrete pads bearing directly on the subgrade. The concrete pads shall be at least 6 x 6-inches and be no more than 1-1/2 inches thick. Pads shall be made from Class “A” concrete or from mortar made up of one part cement and two parts sand, with wire ties embedded.

Implementation:

- A. Storage:** Reinforcing steel delivered to the site, not immediately placed in forms, shall be protected from mud and excessive rust-producing conditions by storing in a well-drained area and supported off the ground. All reinforcing shall be properly tagged with bar marks and location in the structure clearly noted.
- B. Tolerances:** Allowable tolerances for placing steel reinforcement shall be +1/4 inch maximum from outside of bar to finished surface. Lateral spacing of bars in plane of

reinforcement in slabs and walls shall be within +1 or -1 inch of required spacing. Height of bottom bars in slabs shall be within +1/4 or -1/4 inch of required height. Height of top bars in slabs shall be within +1/4 or -1/4 inch of the required location.

- C. Field Fabrication:** Field fabrication of reinforcing steel is not permitted.
- D. Placing:** Steel bar reinforcement shall be placed in the locations shown on the Drawings and held securely in place during the placing of concrete. The pushing of short bars into new concrete work will not be permitted. Bar reinforcing in walls shall be spaced the proper distance from the face of the wall by the use of approved precast concrete mortar blocks. Bar reinforcing in slabs or beams shall be spaced the proper distance from the bottom of the slab or beams by use of precast concrete mortar blocks, steel chairs with plastic coated legs or plastic tips, or stainless steel chairs. Vertical stirrups shall always pass around main tension members, and be securely attached thereto. Bar spacing, covering, minimum clearance, bond and anchorage shall conform to the requirements of the ACI Building Code (ACI-318, and ACI 350) and as indicated on the Drawings or specified in this section. Covering and minimum clearance shall conform to Building Code ACI-350.
- E. Splices:** Splices shall be Class "B" splices in accordance with ACI 318. Steel bar reinforcement shall be furnished full length unless otherwise indicated on the Drawings. Splices, where permitted, shall be well distributed or located at points of low tensile stress. Splices and dowels shall have minimum laps as shown in the typical details of the Drawings. Splices in horizontal reinforcement shall be staggered. The minimum clear distance between spliced bars, except when bar clamps are specified, shall be 1-1/2 times the maximum size of coarse aggregate. The maximum clear distance between bars spliced by non-contact lap splices shall be one-fifth the required lap but no more than six inches. Mechanical splices may be used instead of lap splices provided that their location and type meets with acceptance of the Owner.
- F. Fastening, Reinforcing, and Placing Concrete:** Steel bar reinforcing, when properly placed, shall be securely wired together at intersections with 18 gauge black annealed wire. Prior to the placing of concrete, all mortar and other foreign matter which may reduce or destroy bond shall be removed from the reinforcement. No concrete shall be deposited until the placement of the reinforcing has been reviewed by the Owner.
- G. Coated Steel:** Epoxy coated reinforcing shall be furnished in accordance with ASTM-4-775-81 where shown on the plans.
- H. Wire Mesh Reinforcement:** Wire mesh reinforcement shall be secured in position by spacer bars and chairs. Spacer bars shall be lapped not less than 5 inches. Precast concrete mortar blocks may be used in lieu of metal chairs in slabs on ground. Mesh shall be checked for position during placing of concrete and any displacement corrected. Mesh overlap measured between outermost cross wires of each sheet shall be 2-inches at edges unless otherwise indicated on the Drawings, and shall be securely tied at ends and overlap.

END OF SECTION