SECTION 0303

STEEL REINFORCEMENT

0303.0100 GENERAL

0303.0101 Description of Work. The work under this Section shall consist of fabricating, furnishing, and placing steel reinforcement of the quality, coating, type, size, shape, and quantity designated, all in accordance with the details shown on the plans and the requirements of these specifications.

0303.0104 Delivery, Storage, and Handling. Steel reinforcement shall be protected at all times from damage. When placed in the work, all reinforcement shall be free of dirt, oil, paint, and grease. Rust, surface irregularities, or mill scale shall not be cause for rejection, provided the weight, dimensions, cross-sectional area, and tensile properties of a manually wire-brushed test specimen are not less than the requirements of these specifications.

0303.0105 Testing or Special Inspections. It is the Contractor's responsibility to schedule required testing per specifications, contract, plans, and special provisions. All required testing must be coordinated by the Contractor; failure to schedule required tests will result in rejected work at the Contractor's sole expense.

0303.0200 PRODUCTS

0303.0201 Materials.

(A) Standards. Reinforcing bars, welded wire fabric, and steel wire shall comply with the most recent revision of the following standards:

Table 0303-1
Standards

Subject	Standard Designation
Deformed and plain billet-steel bars for concrete reinforcement	ASTM A615
Cold-drawn steel wire for concrete reinforcement	ASTM A82
Welded steel wire fabric for concrete reinforcement	ASTM A185

(B) Reinforcing Bars. Steel bars used as reinforcement in concrete shall be deformed and shall conform to the requirements of ASTM A615.

Where reinforcing bars are shown on the plans, the bars shall be Grade 60.

(C) Wire. Steel wire used as spirals or ties for reinforcement in concrete shall conform to the requirements of AASHTO M 32.

(D) Welded Wire Fabric. Welded wire fabric used as reinforcement in concrete and mortar shall conform to the requirements of ASTM A185.

0303.0300 EXECUTION

0303.0301 General. The Contractor shall submit shop drawings and lists showing the bending of reinforcement bars to the Engineer for approval. However, such approval shall not relieve the Contractor of his/her responsibility to ensure the accuracy of such drawings and lists.

Shop drawings for reinforcing steel submitted by the Contractor in accordance with City of Tucson General Provisions, Section 104.0200 will not be returned. The Contractor shall supply the Engineer with a copy of all reinforcing steel detail drawings. Changes in reinforcing steel shop drawings shall be called out in the letter of submittal. Such changes shall not be acceptable unless the Engineer has expressed consent to such changes in writing.

Any discrepancy or error found by the Contractor in checking a bar list or bending diagram shown on the project plans, or in preparing shop drawings or lists shall be reported immediately to the Engineer, and the discrepancy or error corrected in advance of fabrication and delivery of materials.

When bending is required, it shall be done without the use of heat, and bars with cracks or splits at the bends will be rejected. Grade 40 bars size No. 8 and larger and all sizes of Grade 60 bars shall not be re-bent at the same location. Grade 40 bars size No. 7 and smaller may be re-bent once at the same location.

Reinforcement shall be accurately fabricated and placed as shown on the plans and shall be firmly held in place with 16-gauge or heavier tie wires and with precast mortar blocks or ferrous metal chairs, spacers, hangers, supporting wires, or other approved supports at the spacing necessary to maintain the specified clearance of the reinforcing steel. The use of pebbles, broken stone, concrete masonry blocks, brick, metal pipe, or wood blocks will not be permitted for the purpose of spacing or support. Steel chairs or other metal devices shall be equipped with snug-fitting, high-density polyethylene tips providing no less than 1/4-inch coverage of the metal that will rest against an exposed concrete surface. Stainless steel chairs meeting the requirements of ASTM A493 or AISI type 430 may be used in lieu of the polyethylene tips. Tack welding of reinforcement will not be permitted unless approved in writing by the Engineer. If tack welding of reinforcement is approved, the reinforcement shall be deformed and shall conform to the requirements of ASTM A706.

The following tolerances will be allowed when placing, tying, and supporting reinforcing steel:

- In slabs, horizontal bars shall be within 1/4 inch—measured vertically—of the position indicated on the plans.

- In vertical walls and similar members, clearance from the forms shall be within 1/4 inch of the clearance shown on the plans.

- In slabs or walls, long runs or bars may vary up to 2 inches in spacing; however, the specified number of bars shall be placed.

No concrete shall be placed until reinforcement has been inspected and approved by the Engineer. Reinforcement not conforming to the above tolerances shall be adjusted or repaired prior to concrete placement.

0303.0302 Splicing and Lapping. All reinforcement shall be furnished in the full lengths indicated on the plans. Splicing of bars, except as shown on the plans, will not be permitted without the Engineer's approval. Splices shall be staggered as far from each other as possible. The type and method of splices or connections shall be approved by the Engineer.

The Contractor may use lap splices, full welded splices, or mechanical connections for reinforcement bars up to and including bar size No. 11. Where the bar size exceeds No. 11, full welded splices or mechanical connections shall be used.

Welding shall be performed in accordance with the requirements of the American Welding Society (AWS).

In lapped splices, the bars shall be placed in contact with one another and wired together in such a manner as to maintain a clearance of not less than the minimum clear distance to other bars and the minimum distance to the surface of the concrete. Lap lengths shall be as shown on the shop drawings.

A full welded splice is one in which the bars are butted and welded to develop, in tension, at least 125 percent of the specified yield strength of the bar. Test requirements shall be as specified in AWS D1.4.

A mechanical connection is one in which the bars are connected to develop an ultimate strength—in tension or compression, as required—of at least 125 percent of the specified yield strength of the bar.

Unless otherwise specified, mechanical splices shall be made in accordance with the manufacturer's recommendations as approved by the Engineer. As a condition of approval, the Contractor shall—in the Engineer's presence—make 3 test splices of each size he/she intends to splice. Two of the test splices shall be tension tested to 125 percent of the specified yield strength of the bar, and one splice shall be tested to destruction by an approved laboratory; certified reports of these tests shall be submitted to the Engineer for approval. Field splices

shall be subject to visual inspection and physical testing. A minimum of 2 percent of the field splices, chosen at random by the Engineer, shall be removed and tested to 125 percent of specified yield strength by the Engineer. Samples shall be at least 42 inches long with the splice at mid length. All testing shall be at the Contractor's expense. Samples of field splices shall not be required in cases where 2 percent of the field splices provide fewer than 3 samples.

Sheets of welded wire fabric or bar mat reinforcement shall overlap each other sufficiently to maintain a uniform strength and shall be securely fastened at the ends and edges. The edge lap shall not be less than 1 mesh width.

0303.0303 Dowel Placement. Dowel placement shall consist of drilling or coring dowel holes, furnishing and placing setting materials, and placing metal dowels in accordance with the details shown on the plans and the requirements of the specifications.

The diameter of dowel holes shall be 1/4 inch larger than the diameter of the dowels to be placed, and the depth of the holes shall be as shown on the plans.

Setting materials shall be an approved epoxy adhesive unless otherwise specified on the plans.

The minimum tensile pull-out strength of the dowel anchorage shall be as specified on the plans.

If required by the Engineer, the Contractor shall submit details of the anchorage system to the Engineer prior to dowel placement.