# PART 1 - GENERAL

## 1.1 SUMMARY

A. Section Includes:
1. Reinforcing bars for cast-in-place concrete.
2. Reinforcing mesh for cast-in-place concrete.
3. Accessories, including but not limited to, chairs and tie wires.
4. Furnish and deliver to site steel bar reinforcing for masonry.
5. Reinforcing bars for site-cast concrete.
6. Miscellaneous concrete work, including but not limited to areaways, cast-in-place valve boxes, pits, splash blocks, equipment bases, and other items as shown or required to complete all Work.

B. Related Requirements:
1. Section 018113 “Sustainable Design Requirements.”

## 1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Division 3 sections 033000 “Cast-In-Place Concrete” for installation of reinforcing bars in concrete.

## 1.3 SUBMITTALS

A. General: comply with Division 1 section “Shop Drawings, Product Data, and Samples”

B. LEED Submittals: Credits MRc4 & MRc5. Refer to Section 018113 “Sustainable Design Requirements” for additional submittal requirements.

C. Shop Drawings: Submit shop drawings including complete layouts, sections, and details, typical bending diagrams and offsets, splice lengths and locations, proposed layout where vertical and horizontal bars intersect, and wherever welding is proposed, detailed to conform to AWS and Applicable Code Requirements. Reproductions of the contract documents will not be accepted.

D. Certification: Submit copies of welding operator's AWS certification.

E. Chemical Analysis: Provide for bars to be welded, in accordance with Applicable Code Requirements.

F. Provide written verification of recycled content from manufacturer.

## 1.4 QUALITY ASSURANCE

A. Source Quality Control: Refer to Section 01400 for general requirements and to following paragraphs for specific procedures. University’s Testing Laboratory will perform following conformance testing, shall select test samples of bars, ties, and stirrups from the material at the site or from place of distribution, each sampling including at least two 18" long pieces, and perform the following tests according to ASTM A615 and/or A706.

1. Identified Bars: If samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with Identification Certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of bars. Submit mill reports when samples are selected.
2. Unidentified Bars: When positive identification of reinforcing bars cannot be made and when random samples are obtained, perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.

B. Certification of Welders: All welding both in shop and in field shall be performed by AWS certified welding operators.

1.5 MARKING AND SHIPPING

A. General: comply with Division 1 section “Material & Equipment”

B. Bundle bars, tag with identification, and transport and store so as not to damage any material. Use metal tags indicating size, length and other marking shown on placement drawings. Maintain tags after bundles are broken.

1.6 EXTRA MATERIAL

A. Provide 50 tons of reinforcing steel in addition to quantities shown on drawings. This additional steel shall be installed during construction, in sizes and locations as directed by the Structural Engineer. Provide unit price for purpose of adjusting contract price to reflect quantity of extra material actually used. All unused material shall be credited to the owner based upon the agreed unit prices.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing bars: ASTM A706, Grade 60, unless otherwise indicated on drawings.

B. Reinforcing bars for welding: ASTM A706, Grade 60.

C. Reinforcing mesh: ASTM A185, mesh size and gauge as shown, 60 ksi minimum tensile strength. Furnish and install mesh in flat sheets only.

D. Tie wire: ASTM A82, Annealed copper-bearing steel, 16 gauge minimum.

E. Chairs and similar support items:
1. Standard manufactured products conforming to CRSI Manual of Standard Practice.
2. Use dense precast concrete supports with embedded wire ties for reinforcement placed on grade. Elsewhere, use wire bar supports.

F. Welding electrodes: AWS D1.4, Table 5.1 and 5.5 low hydrogen electrodes, E9018 for Grade 60 steel, E70XX Series for grade 40 steel.

G. Reinforcing bar couplers: Contractor shall submit proposed coupler and proposed location for review and approval by the University's Representative.

2.2 FABRICATION OF REINFORCING BARS

A. Comply with CRSI Manual of Standard Practice for Reinforced Concrete Construction for fabrication of reinforcing steel.

B. Bending and Forming: Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bend bars No. 6 size and larger in the shop only. Bars with unscheduled kinks or bends are subject to rejection. Use only tested and approved bar materials.

C. Welding: Use only ASTM 706 steel where welding is proposed. Perform welding, where shown or approved, by the direct electric arc process in accordance with AWS D1.4 using specified low-hydrogen electrodes. Preheat 6" each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is prohibited. Do not tack weld bars. Clean metal surfaces to be welded of all loose scale and foreign material. Clean welds each time electrode is changed and chip burned edges before placing welds. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds or parts of welds found defective with chisel and replace with proper welding. Prequalification of welds shall be in accordance with AWS D1.1.

D. Galvanizing: Hot-dip galvanize fully completed reinforcing assemblies in accordance with ASTM A123 where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF REINFORCING

A. Furnish and install additional reinforcing bars at wall and slab openings as required. Before placing bars, and again before concrete is placed, clean bars of loose mill scale, oil, or any other coating that might destroy or reduce bond.

B. Securing in Place: Accurately place bars and wire tie in precise position where bars cross. Bend ends of wire ties away from the forms. Wire tie bars to corners of ties and stirrups. Support bars according to the current edition of "Recommended Practice for Placing Bar Supports" of Concrete Reinforcing Steel Institute, using approved accessories and chairs. Place precast concrete cubes with embedded wire ties to support reinforcing steel bars in concrete placed on grade and in footings. Use care not to damage vapor barriers where they occur.

C. Exposed Concrete Surfaces: Furnish and install stainless steel or exterior quality vinyl plastic tipped chairs, bolsters, and accessories where exposed on exterior or interior concrete surfaces not to be painted or permanently covered.

D. Clearances: Maintain minimum clear distances between reinforcing bars and face of concrete as indicated or approved by University's Representative.

E. Splices: Do not splice reinforcing bars at the points of maximum stress except where indicated. Lap splices as shown or required to develop the full strength or stress of bars. Stagger splices in horizontal wall bars at least 48" longitudinally in alternate bars and opposite faces.

F. Field Welding of Bars: As specified for fabrication.

G. Maintaining Bars In Position: Take adequate precautions to assure that reinforcing position and spacing is maintained during placement of concrete.

H. Reinforcing Mesh: Lap one full mesh plus 2", or 12" whichever is greater, at splices, wire tie, and support the same as specified for bars.

I. Splice Devices:
   1. Contractor shall submit proposed coupler and proposed location for review and approval by the University's Representative.
   2. Install in accordance with manufacturer's written instructions.
   3. Splice in a manner developing at least 125% of the yielding strength of the bar.

3.2 FIELD QUALITY CONTROL

A. General: Comply with division 1 sections "Quality Control" and "Inspection of Work."

B. Inspection: Obtain inspection and approval of reinforcing before concrete is placed.

C. Welding Inspection. Whether welding is done in the shop or at the site, perform welding of reinforcing bars under inspection of the University's Testing Laboratory Welding Inspector.

3.3 WASTE MANAGEMENT

A. Collect recyclable cutoffs or scrap, if any, and place in designated area for recycling, in accordance with the Waste Management Plan.

END OF SECTION