SECTION 03 20 00

CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

A. Section 03 10 00 - Concrete Forming and Accessories.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 03 37 13 - Shotcrete: Reinforcement for shotcrete.

D. Section 03 45 00 - Precast Architectural Concrete: Reinforcement for precast concrete panels.

E. Section 04 20 00 - Unit Masonry: Reinforcement for masonry.

F. Section 31 62 16.13 - Sheet Steel Piles: Reinforcement for foundation footings.

G. Section 31 62 23.13 - Concrete-Filled Steel Piles: Reinforcement for pile foundations.

H. Section 31 63 29 - Drilled Concrete Piers and Shafts: Reinforcement for drilled pier foundations.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

B. Bar Reinforcement: By the ton. Includes reinforcement, placement, and accessories.

C. Welded Wire Reinforcement: By the square foot. Includes welded wire reinforcement, placement, and accessories.

1.04 REFERENCE STANDARDS

A. REFERENCES AND INDUSTRY STANDARDS LISTED IN THIS SECTION ARE APPLICABLE TO THE WORK. UNLESS MORE RESTRICTIVE CRITERIA OR DIFFERING REQUIREMENTS ARE EXPLICITLY STATED IN THE SPECIFICATIONS, OR MANDATED BY GOVERNING CODES OR REGULATIONS, THE RECOMMENDATIONS, SUGGESTIONS, AND REQUIREMENTS DESCRIBED IN THE REFERENCED STANDARDS SHALL BE DEEMED MANDATORY AND APPLICABLE TO THE WORK.

B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

C. ACI 315 - Details and Detailing of Concrete Reinforcement.

D. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).

E. ACI SP-66 - ACI Detailing Manual; 2004.

F. ACI 530 / 530.1 - Building Code Requirements and Specification for Masonry Structures.

G. ASTM A184/A184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2006 (Reapproved 2011).

H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.

I. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a (Reapproved 2014).

J. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement; 2006 (Reapproved 2011).

K. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement; 2014.

L. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2009 (Reapproved 2015).

M. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2007b (Reapproved 2014).

N. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.

O. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement; 2014.

P. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

Q. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars; 2001 (Reapproved 2007).

R. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

S. CRSI (DA4) - Manual of Standard Practice; 2009.

T. CRSI (P1) - Placing Reinforcing Bars; 2011.

1.05 DESIGN REQUIREMENTS

A. Detailing requirements for reinforced concrete structures shall meet the structural integrity requirements as set in Section BC 1615 of the 2014 NYC Building Code.

B. Provide epoxy-coated reinforcement for all concrete work exposed to the elements, such as exterior framed slabs, exposed faces of site/retaining walls/curbs, parapet walls, etc.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
   1. Prepare shop drawings under seal of a Professional Structural Engineer experienced in design of work of this type and licensed in the State in which the Project is located.

C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

D. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.07 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301.
   1. Maintain one copy of each document on project site.

B. Provide Engineer / Architect with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection.

C. Welders' Certificates: Submit certifications for welders employed on the project, verifying AWS qualification within the previous 12 months.

D. Regulatory Requirements
   1. Building Code
   2. Work of this section shall conform to all requirements of the NYC Building Code. Where more severe requirements than those contained in the Building Code are given in this Section and ACI 318, the requirements of this Section and ACI 318 shall govern.

E. Rebar Installer: Company specializing in performing the Work of this Section shall have three years minimum experience on successful projects of similar size.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Ship and store reinforcement with bars of the same size and shape fastened in bundles with durable tags, marked in a legible manner with waterproof markings showing the same designations as shown on the submitted placing drawings.

B. Store in location to prevent rusting, etc.

C. Store reinforcement off the ground, protect from moisture, and keep free from dirt, oil, or other contaminants. Steel, which cannot be properly identified will be rejected and shall be immediately removed from the work site.

D. Protect reinforcement before, during, and after installation.

E. Insure proper identification after reinforcing bundles are broken

F. Epoxy-Coated Reinforcing Bars
   1. Equipment for handling epoxy-coated bars shall have protected contact areas. Lift Bundles of coated bars at multiple pick-up points to minimize bar-to-bar abrasion from sags in the bundles.
   2. Do not drop or drag coated bars or bundles of coated bars. Store coated bars on protective cribbing.
   3. Fading of the color of the coating shall not be cause for rejection of epoxy-coated reinforcing bars. Coating damage due to handling, shipment, and placing need not be repaired in cases where the damaged areas is 0.1 in2 or smaller. Repair damaged areas larger than 0.1 in2 in accordance with Article 2.02. The maximum amount of damage, including repaired and unrepaired areas, shall not exceed 2% of the surface area of each bar. Bars with greater than 2% damaged areas will be rejected.

G. WWR will be shipped in sheet form only. If the WWR sheets must be lifted by crane at the job site, the contractor may request the manufacturer to install lifting eyes. At all times during off loading of materials, caution must be exercised and all safety regulations and practices must be observed

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Deformed billet-steel bars.
   2. Unfinished.
   3. Galvanized in accordance with ASTM A767/A767M, Class I.
   4. Epoxy coated in accordance with ASTM A775/A775M.

B. Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.
   1. Unfinished.
   2. Galvanized in accordance with ASTM A767/A767M, Class I.
   3. Epoxy coated in accordance with ASTM A775/A775M.

C. Reinforcing Steel: Deformed bars, ASTM A996/A996M Grade 60 (420), Type R.
   1. Galvanized in accordance with ASTM A767/A767M, Class I.
   2. Epoxy coated in accordance with ASTM A775/A775M.

D. Reinforcing Steel Mat: ASTM A704/A704M, using ASTM A615/A615M, Grade 60 (60,000 psi) steel bars or rods, unfinished.

E. Stirrup Steel: ASTM A1064/A1064M steel wire, epoxy coated in accordance with ASTM A775/A775M.

F. Steel Welded Wire Reinforcement (WWR): Class A epoxy coated, deformed type; ASTM A884/A884M. Class A epoxy coated, deformed type; ASTM A884/A884M.
   1. Form: Flat Sheets.
   2. WWR Style: As indicated on drawings.

G. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
3. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.
4. Tie wire for fastening epoxy-coated reinforcing bars shall be nylon-epoxy, plastic-coated, or other material acceptable to the Authority.
5. Epoxy-coated reinforcing bars supported from formwork shall rest on coated wire bar supports, or on bar supports made of dielectric material or other acceptable materials. Wire bar supports shall be coated with dielectric material for a minimum distance of 2" from the point of contact with the epoxy-coated reinforcing bars.
6. Reinforcing bars used as support bars shall be epoxy-coated. In walls having epoxy-coated reinforcing bars, spreader bars, where specified on the Drawings or shop drawings, shall be epoxy-coated. Proprietary combination bar clips and spreaders used in walls with epoxy-coated reinforcing bars shall be made of corrosion-resistant material.

2.02 RE-BAR SPLICING:

A. Coupler Systems: Mechanical devices for splicing reinforcing bars; capable of developing full steel reinforcing design strength in tension and compression.
   1. Products:
      a. Dayton Superior Corporation; Bar Lock Coupler System: www.daytonsuperior.com.
      b. _____.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

B. Dowel Bar Splicer with Dowel-Ins: Mechanical devices for connecting dowels; capable of developing full steel reinforcing design strength in tension and compression.
   1. Products:
      a. Dayton Superior Corporation; Dowel Bar Splicer D101A with Straight Dowel-In: www.daytonsuperior.com.
      b. _____.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

C. Taper Tie Hole Plug: Mechanical device for plugging tie holes; anchors optional flush or recessed grout.
   1. Products:
      a. Dayton Superior Corporation; A58 Sure Plug: www.daytonsuperior.com.
      b. _____.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

D. Grout: Cementitious, non-metallic, non-shrink grout for use with manufacturer's grout sleeve reinforcing bar coupler system.
   1. Products:
      a. Dayton Superior Corporation; Sleeve-Lock Grout: www.daytonsuperior.com.
      b. _____.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Welding of reinforcement is not permitted.

C. Welding of reinforcement is permitted only with the specific approval of Engineer / Architect. Perform welding in accordance with AWS D1.4/D1.4M.
   1. Galvanized Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI (DA4).

D. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.
   1. Bending of Epoxy-Coated Reinforcement: Bend all epoxy-coated reinforcement cold unless otherwise approved by the Authority. When epoxy coated reinforcement bars are

field or shop bent, repair coating damage in accordance with paragraph below. Rollers of bending apparatus shall have neoprene collars.

2. Coating Repair: Repair coating damage due to fabrication or handling in cases where damaged area is 0.1 in2 or greater. Repair all damaged areas larger than 0.1 in2 with patching material. The maximum amount of damage shall not exceed 2% of the surface area of each bar. Patch in accordance with the patching material manufacturer's recommendations. Repair ends of bars cut in the field with the patching material.

E. Locate reinforcing splices not indicated on drawings at point of minimum stress.
   1. Review locations of splices with Engineer / Architect.

PART 3 EXECUTION

3.01 PREPARATION

A. Before placing concrete, clean reinforcement of foreign particles, including mortar, oil, grease, dirt, loose mill scale, rust and any other coating that will prevent or reduce bond.

B. Place in position, support, and secure reinforcement to prevent displacement during concrete placement. Do not deviate from alignment or spacing as shown on the Contract Drawings.

3.02 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Maintain concrete cover around reinforcing as follows:
   1. Beams:____ inch
   2. Supported Slabs and Joists: ____ inch.
   3. Column Ties: ____ inch.
   4. Walls (exposed to weather or backfill): ____ inch.
   5. Footings and Concrete Formed Against Earth: ____ inch.
   6. Slabs on Fill: ____ inch.
   7. Provide minimum protective cover given in Section BC 1907.7.1 of the 2014 NYC Building Code if not indicated on Drawings.

E. Conform to applicable code for concrete cover over reinforcement.

F. Bond and ground all reinforcement to requirements of Section 26 05 26.

G. Splices
   1. All splices not shown on the Project Drawings shall be shown on the shop drawings and reviewed by the Engineer of Record.
   2. Mechanical Connectors
      a. Provide where indicated on Drawings. Install in accordance with splice device manufacturer's recommendations.
      b. After installing mechanical connectors on epoxy-coated reinforcing bars, coating damage shall be repaired in accordance with Article 2.02. All parts of mechanical connectors used on coated bars, including steel splice sleeves, bolts, and nuts shall be coated with the same material used for repair of coating damage.

H. Dowels
   1. Drilling and bonding dowels shall conform to the details shown on the contract drawings.
   2. If reinforcement is encountered during drilling, before the specified depth is attained, notify the Engineer. Unless the Engineer approves coring through the reinforcement, the hole will be rejected. If hole is rejected, drill a new hole, in which reinforcement is not encountered, adjacent to the rejected hole to the depth shown on the Contract Drawings. Grout rejected hole.
   3. Dowels shall conform to the provisions for reinforcing steel bars specified in the Contract Drawings.

4. Clean concrete areas to be in contact with grout of all loose or foreign material that would in any way prevent bond between the concrete surfaces. Flush with water and allow to dry to a surface dry condition immediately prior to grouting.
5. After placement of reinforcement, seal ends of the drilled hole containing the reinforcement, with one vent tube and one injection feed tube. Place tubes in the hole in a manner which will allow the air to vent and the hole to be completely filled with grout. Achieve sufficient pressure to ensure that the hole is free of voids. Pump grout through the hole and continually waste grout until no visible slugs or other visible evidence of water or air are ejected and the efflux time of ejected grout is not less than 11 seconds.

3.03 FIELD QUALITY CONTROL

A. Do not proceed with the completion of wall forms until all reinforcement has been approved and recorded by the Special Inspector

B. An independent testing agency, as specified in Section 01 40 00, will inspect installed reinforcement for conformance to contract documents before concrete placement.

C. Do not proceed with concreting until all reinforcing in place has been approved and recorded

D. Promptly correct all reinforcement displaced during pouring of concrete

E. Damaged reinforcement shall not be used.

3.04 SCHEDULES

A. Reinforcement For Superstructure Framing Members: Deformed bars, epoxy coated finish.

B. Reinforcement For Foundation Wall Framing Members and Slab-on-Grade: Deformed bars and welded wire reinforcement, epoxy coated finish.

3.05 CLEANING

A. Steel reinforcement shall be free of all rust, scale, oil, paint, grease, loose mill scale, and all other foreign matter that will prevent bonding of concrete and steel just prior to pouring of concrete.

END OF SECTION