SECTION 032000 - CONCRETE REINFORCING

Revise this Section by deleting and inserting text to meet Project-specific requirements.

1. GENERAL
   * + 1. RELATED DOCUMENTS
          1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
       2. SUMMARY
          1. Section Includes:

Steel reinforcement bars.

Welded-wire reinforcement.

* + - 1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" Paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at Project site.

Review the following:

Special inspection and testing and inspecting agency procedures for field quality control.

Construction contraction and isolation joints.

Steel-reinforcement installation.

* + - 1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: For the following:

Each type of steel reinforcement.

Epoxy repair coating.

Zinc repair material.

Bar supports.

Mechanical splice couplers.

Structural thermal break insulated connection system.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE.

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for steel reinforcement bar and mesh within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services*.

* + - * 1. Shop Drawings: Comply with ACI SP-066:

Include placing drawings that detail fabrication, bending, and placement.

Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

* + - * 1. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

Location of construction joints is subject to approval of the Director’s Representative.

Retain "Delegated-Design Submittal" Paragraph below if design services have been delegated to Contractor.

* + - * 1. Delegated-Design Submittal: For structural thermal break insulated connection system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

Coordinate "Qualification Data" Paragraph below with qualification requirements in in "Quality Assurance" Article. If inserting additional entities or specialists, add qualifications in "Quality Assurance" Article.

Retain first option in "Qualification Statements" Paragraph below if design services have been delegated to Contractor. Retain second option if Contractor is responsible for field quality-control testing and inspections.

* + - * 1. Qualification Statements: For **[delegated-design engineer] [testing and inspection agency]**.
        2. Delegated-Design Engineer Qualifications: Include the following:

Experience providing delegated-design engineering services of the type indicated.

Documentation that delegated-design engineer is registered in New York State.

Retain "Welding certificates" Paragraph below if retaining "Welding Qualifications" Paragraph in "Quality Assurance" Article.

* + - * 1. Welding certificates.

Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4

* + - * 1. Material Certificates: For each of the following, signed by manufacturers:

Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

Use subparagraph below for projects over $100,000. See Article 1.4 below.

Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.

* + - * 1. Material Test Reports: For the following, from a qualified testing agency:

Steel Reinforcement:

For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706.

Mechanical splice couplers.

Retain "Field quality-control reports" Paragraph below if Contractor is responsible for field quality-control testing and inspecting.

* + - * 1. Field quality-control reports.

Retain paragraph below if preinstallation conference is held.

* + - * 1. Minutes of preinstallation conference.
      1. QUALITY ASSURANCE

Retain "Testing Agency Qualifications" Paragraph below if Contractor retains testing and inspection agency for field quality control. Retain option if field quality-control testing and inspection agency employed by Contractor must be approved by authorities having jurisdiction.

* + - * 1. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

Retain "Welding Qualifications" Paragraph below if shop or field welding is required. If retaining, also retain "Welding certificates" Paragraph in "Informational Submittals" Article. AWS states that welding qualifications remain in effect indefinitely unless welding personnel have not welded for more than six months or there is a specific reason to question their ability.

* + - * 1. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4.

Retain "Mockups" Paragraph below if required. If retaining, indicate location and other details of mockups on Drawings or by inserts. Revise wording if only one mockup is required or if mockup in another location in a building is required.

* + - * 1. Mockups: Reinforcing for cast-concrete formed surfaces, to demonstrate tolerances and standard of workmanship.

Revise size of panel in first subparagraph below if required. Panel for slab-on-grade may need to be enlarged if powered riding trowels are used and if it is a portion of the floor slab.

Build panel approximately 100 sq. ft. for formed surface in the location indicated on Drawings or, if not indicated, as directed by Director’s Representative.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

Use paragraph below for projects over $100,000. Paragraph is taken from Article 25.4 of the General Conditions.

* + - * 1. If the value of the contract exceeds $100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.
      1. DELIVERY, STORAGE, AND HANDLING

Retain option in "Steel Reinforcement" Paragraph below if zinc-coated, epoxy-coated, or dual-coated steel reinforcement is required.

* + - * 1. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.**[ and to avoid damaging coatings on steel reinforcement.]**

Store reinforcement to avoid contact with earth.

Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.

Do not allow dual-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.

Do not allow stainless steel reinforcement to come into contact with uncoated reinforcement.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications.

* + - 1. PERFORMANCE REQUIREMENTS

Retain "Delegated Design" Paragraph below if Contractor is required to assume responsibility for structural thermal break insulated connection system design.

* + - * 1. Structural Performance of Structural Thermal Break Insulating Connection System: Structural thermal break insulated connection system shall withstand the following loads and stresses:

Dead Loads: As indicated on Drawings.

Shear Load: As indicated on Drawings.

Bending Moment: As indicated on Drawings.

Live Loads: As indicated on Drawings.

Shear Load: As indicated on Drawings.

Bending Moment: As indicated on Drawings.

Retain "Seismic Performance of Structural Thermal Break Insulated Connection System" Paragraph below for projects requiring seismic design. Model building codes and ASCE/SEI 7 establish criteria for buildings subject to earthquake motions. Verify requirements of authorities having jurisdiction.

* + - * 1. Seismic Performance of Structural Thermal Break Insulated Connection System: Structural thermal break Insulated connection system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

Component Importance Factor: **<Insert requirement>**.

* + - 1. STEEL REINFORCEMENT

Revise this article to suit steel-reinforcement requirements; delete if not required.

* + - * 1. Reinforcing Bars: ASTM A615, **[Grade 60] [Grade 75] [Grade 80] [Grade 100]**, deformed.

Retain "Low-Alloy Steel Reinforcing Bars" Paragraph below for reinforcement that is welded or if added ductility is sought.

* + - * 1. Low-Alloy Steel Reinforcing Bars: ASTM A706, deformed.
        2. Headed-Steel Reinforcing Bars: ASTM A970.
        3. Galvanized Reinforcing Bars:

Steel Bars: **[ASTM A615, Grade 60] [ASTM A615, Grade 75] [ASTM A615, Grade 80] [ASTM A615, Grade 100] [ASTM A706]**, deformed bars.

Retain one zinc coating class "Zinc Coating" Subparagraph below. Class I has at least 50 percent more zinc weight than Class II. Class I is normally specified for general construction.

Zinc Coating: ASTM A767, [Class I] [Class II] zinc coated after fabrication and bending.

* + - * 1. Epoxy-Coated Reinforcing Bars:

Steel Bars: **[ASTM A615, Grade 60] [ASTM A615, Grade 75] [ASTM A615, Grade 80] [ASTM A615, Grade 100] [ASTM A706]**, deformed bars.

In "Epoxy Coating" Subparagraph below, ASTM A775 bars are usually epoxy coated before fabrication; ASTM A934 bars are epoxy coated after fabrication and should not be field bent or rebent.

Epoxy Coating: **[ASTM A775] [or] [ASTM A934]** with less than 2 percent damaged coating in each 12-inch bar length.

* + - * 1. Dual-Coated Reinforcing Bars: ASTM A1055.

Steel Bars: **[ASTM A615, Grade 60] [ASTM A615, Grade 75] [ASTM A615, Grade 80] [ASTM A615, Grade 100] [ASTM A706]**, deformed bars.

In "Zinc Coating" Subparagraph below, Type I coating is applied by a thermal-spray method, and Type II is hot-dipped galvanized in accordance with ASTM A1094.

Zinc Coating: ASTM A1055 **[Type I] [Type II]**.

In "Epoxy Coating" Subparagraph below, ASTM A775 bars are usually epoxy coated before fabrication; ASTM A934 bars are epoxy coated after fabrication and should not be field bent or rebent.

Epoxy Coating: **[ASTM A775] [or] [ASTM A934]** with less than 2 percent damaged coating in each 12-inch bar length.

Retain "Stainless Steel Reinforcing Bars" Paragraph below for stainless steel reinforcement. Retain third or fourth option for reinforcement type.

* + - * 1. Stainless Steel Reinforcing Bars: ASTM A955, **[Grade 60] [Grade 75], [Type 304] [Type 316L]**, deformed.
        2. Steel Bar Mats: ASTM A184, fabricated from **[ASTM A615, Grade 60] [ASTM A615, Grade 40] [ASTM A706]**, deformed bars, assembled with clips.
        3. Plain-Steel Welded-Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets.
        4. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064, flat sheet.
        5. Galvanized-Steel Welded-Wire Reinforcement: ASTM A1064, plain, fabricated from galvanized-steel wire into flat sheets.
        6. Epoxy-Coated Welded-Wire Reinforcement: ASTM A884, Class A coated, Type 1, **[plain] [deformed]** steel.
      1. REINFORCEMENT ACCESSORIES

Insert other products for dowels or dowel sleeves if required. These include circular and rectangular plastic dowel sleeves, square dowels, and plastic-surfaced or reinforced-paper-covered dowels.

* + - * 1. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
        2. Epoxy-Coated Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, ASTM A775 epoxy coated.
        3. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

Retain one or more of first three subparagraphs below; revise to suit Project.

For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.

For dual-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.

For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

For stainless steel reinforcement, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

* + - * 1. Mechanical Splice Couplers: ACI 318 **[Type 1] [Type 2]**, same material of reinforcing bar being spliced; **[compression-only type] [tension-compression type] [dowel-bar type] [mechanical-lap type]**.

Retain "Structural Thermal Break Insulated Connection System" Paragraph below if required, typically at concrete balconies.

* + - * 1. Structural Thermal Break Insulated Connection System:

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

Halfen USA, Inc.

Splice Sleeve North America, Inc.

Approved equivalent.

Tension Rods: **[Carbon steel with crimped Type 316 stainless steel rods] [Carbon steel, welded with ASTM A276, Type 316 stainless steel]**.

Shear Reinforcement Rods: **[ASTM A276, Type 316 stainless steel tube] [Carbon steel, welded with ASTM A276, Type 316 stainless steel bar]**.

Pressure pads: ASTM A276, Type 316 stainless steel.

Insulation body: Polystyrene.

* + - * 1. Steel Tie Wire: ASTM A1064, annealed steel, not less than 0.0508 inch in diameter.

Retain third option in "Finish" Subparagraph below for use with epoxy-coated and dual-coated reinforcing bars.

Finish: **[Plain] [Galvanized] [ASTM A884, Class A, Type 1, epoxy coated, with less than 2 percent damaged coating in each 12-inch wire length]**.

Retain "Stainless Steel Tie Wire" Paragraph below for architectural concrete.

* + - * 1. Stainless Steel Tie Wire: ASTM A1022, not less than 0.0508 inch in diameter.
        2. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775.
        3. Zinc Repair Material: ASTM A780.
      1. FABRICATING REINFORCEMENT
         1. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

1. EXECUTION
   * + 1. PREPARATION
          1. Protection of In-Place Conditions:

Do not cut or puncture vapor retarder.

Repair damage and reseal vapor retarder before placing concrete.

* + - * 1. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
      1. INSTALLATION OF STEEL REINFORCEMENT
         1. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
         2. Accurately position, support, and secure reinforcement against displacement.

Locate and support reinforcement with bar supports to maintain minimum concrete cover.

Do not tack weld crossing reinforcing bars.

* + - * 1. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
        2. Provide concrete coverage in accordance with ACI 318.
        3. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
        4. Splices: Lap splices as indicated on Drawings.

Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.

Stagger splices in accordance with ACI 318.

Retain first subparagraph below if couplers are permitted or required.

Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.

Retain subparagraph below if welding is permitted or required.

Weld reinforcing bars in accordance with AWS D1.4, where indicated on Drawings.

Retain first paragraph below if structural thermal break insulated connection system is required.

* + - * 1. Install structural thermal break insulated connection system in accordance with manufacturer's instructions.
        2. Install welded-wire reinforcement in longest practicable lengths.

Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.

Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.

Offset laps of adjoining sheet widths to prevent continuous laps in either direction.

Lace overlaps with wire.

Retain "Epoxy-Coated Reinforcement" Paragraph below if using epoxy-coated reinforcement.

* + - * 1. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963.

Retain "Dual-Coated Reinforcement" Paragraph below if using dual-coated reinforcement.

* + - * 1. Dual-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963.

Retain "Zinc-Coated Reinforcement" Paragraph below if using zinc-coated reinforcement.

* + - * 1. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material in accordance with ASTM A780.
      1. JOINTS

Revise criteria for locating construction joints in "Construction Joints" Paragraph below to suit Project.

* + - * 1. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Director’s Representative.

Place joints perpendicular to main reinforcement.

Continue reinforcement across construction joints unless otherwise indicated.

Do not continue reinforcement through sides of strip placements of floors and slabs.

* + - * 1. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.
      1. INSTALLATION TOLERANCES
         1. Comply with ACI 117.
      2. FIELD QUALITY CONTROL
         1. Special Inspections: Director’s Representative will engage a special inspector and a qualified testing agency to perform tests and inspections in accordance with the requirements of BDC 406 Summary of Special Inspections and BDC 406.1 Statement of Special Inspections and as directed by the Code Compliance Manager.

END OF SECTION 032000