SECTION 031500

CONCRETE ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Anchors for embedment in cast-in-place concrete.

B. Related Work

NTS: Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

1. Section 031000 "Concrete Forming and Accessories"
2. Section 032000 "Concrete Reinforcing"
3. Section 033000 "Cast-In-Place Concrete"
4. Section 055000 "Miscellaneous Metals"
5. [**Section 095113 "Acoustical Panel Ceilings**] [**Section 095123 "Acoustic Tile Ceilings"**] [**Section 095133 "Acoustical Metal Pan Ceilings"**] [**Section 095423 Linear Metal Ceilings"**] [**Section 095423 "Suspended Decorative Grids"**] for primary suspension systems to be supported by embedded anchors provided in this Section.
6. Section 112400 "Façade Maintenance Equipment" for support of façade maintenance equipment.
7. Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for Linear suspension systems to be supported by embedded anchors provided in this Section.
8. Section 220529 "Hangers and Supports for HVAC Pipping and Equipment for suspension systems to be supported by embedded anchors provided in this Section.
9. Section 260529 "Hangers and Supports for Electrical Systems Specification for suspension systems to be supported by embedded anchors provided in this Section.
10. [**Section 270529 "Hangers and Supports for Communications Systems"**] and [**Section 270526 "Cable Trays for Communications Systems"**] for suspension systems to be supported by embedded anchors provided in this Section.

1.2 PREINSTALLATION MEETINGS

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

A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

NTS: Retain first subparagraph below if warranted by complexity of design mixtures and quality control of concrete materials.

1. Require representatives of each entity directly concerned with concrete anchors to attend Review the following:
    a. Special inspection and testing and inspecting agency procedures for field quality control.
    b. Anchor rod and anchorage device installation tolerances.
    c. Forms and form-removal limitations.
    d. Shoring and reshoring procedures.

1.3 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Anchors.

B. Sustainable Design Submittals:

NTS: Retain "Product Data" Subparagraph below to require minimum recycled content for LEED v4 "Material Optimization - Recycled Content."

1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

NTS: Retain "Environmental Product Declaration (EPD)" Subparagraph below for LEED v4 Material Resource Credit "Building Product Disclosure and Optimization - Environmental Product Declarations." See the Evaluations. Verify, with manufacturer, that EPDs are available for each product.

2. Environmental Product Declaration (EPD): For each product.

C. Concrete Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.

D. Shop Drawings:

1. Anchorage Layout: Indicate proposed anchorage layout required.
    a. Location of anchors is subject to approval of the Engineer.

E. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete class designation.
2. Location within project.
3. Exposure class designation.
4. Formed surface finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment, if any.

1.4 INFORMATIONAL SUBMITTALS

NTS: Coordinate "Qualification Data" Paragraph below with qualification requirements in Section 014000 "Quality Requirements" and as supplemented in "Quality Assurance" Article.

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.

NTS: Retain subparagraph below if Contractor retains testing agency for field quality control.

3. Testing agency: Include copies of applicable ACI certificates.

B. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For anchorage in accordance with ICC-Evaluations ESR-4788.

1.5 QUALITY ASSURANCE

NTS: Retain "Installer Qualifications" Paragraph below if required. See Section 014000 "Quality Requirements" for general installer qualifications. Verify availability of qualified personnel with a local ACI chapter or concrete contractors. These desirable programs may have limited grass-roots penetration.

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician [**with experience installing and finishing concrete, incorporating permeability-reducing admixtures**].

NTS: Retain "Laboratory Testing Agency Qualifications" Paragraph below if Contractor retains testing agency for concrete mixture design or material test reports.

B. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing concrete and concrete aggregates for use in construction and employing an ACI-certified Concrete Quality Control Technical Manager.

NTS: Retain subparagraph below if requiring minimum qualifications for laboratory personnel performing testing and for laboratory supervisor.

1. Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency

laboratory supervisor to be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

NTS: Retain "Field Quality-Control Testing Agency Qualifications" Paragraph below if Contractor retains testing agency field quality control. Retain option if field quality-control testing agency employed by Contractor must be approved by authorities having jurisdiction.

C. Field Quality-Control Testing Agency Qualifications: An independent agency, [**acceptable to authorities having jurisdiction,**] qualified in accordance with ASTM C1077 and ASTM E329 for testing layout concrete and concrete aggregates for use in construction.

NTS: Retain subparagraph below, required by ACI 301 (ACI 301M) and ASTM C31/C31M if emphasis is needed. ASTM C1077 notes relevant field certification by ACI, NRMCA, and Portland Cement Association; or the National Institute for Certification in Engineering Technologies may demonstrate evidence of competence.

1. Personnel conducting field tests to be qualified as an ACI Concrete Field-Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

B. Keep anchor thread boxes free of excessive moisture, chemicals or other degrading elements.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

A. Each embedded anchor capable of providing up to 5,000 lbs. of pull resistance when installed in concrete slabs with min. 5000 psi concrete per ICC-ES ESR 4788.

1. For steel anchors: with 6,000 lbs. tensile strength and 9,100 lb. shear strength based on 4,000 psi normal weight concrete with a 6-inch edge distance
2. For stainless Steel Anchors: with 6,000 lbs. tensile strength and 6,750 lbs. shear strength based on 4,000 psi normal weight concrete with a 6-inch edge distance.

NTS: Use the following for anchor threads used for use of anchor threads to support fall protection systems:

3. Minimum breaking strength of 5,000 lbs. (22.2kN) in accordance with OSHA-1910.140c(4) safety standards for personal fall protection systems

B. Reference Standards

1. ASTM E3121 "Standard Test Methods for Field Testing of Anchors in Concrete or Masonry"

2. ICC-ES Evaluation Report, ESR-4788, which references approval in the following Building Codes:

NTS: Edit the following text and to identify building codes applicable to the project:

a. 2021, 2018, 2015, 2012 and 2009 International Building Code IBC and International Residential Code IRC
b. 2014 City of New York Building Code (NYCBC)
c. 2020 City of Los Angeles Building Code (LABC) and 2020 City of Los Angeles Residential Code (LARC).
d. 2019 Chicago Building Code (Title 14B).
e. 2020 Florida Building Code-Building, and 2020 Florida Building Code-Residential per ESR-4788 to be incompliance with the High Velocity Hurricane Zone provisions
f. 2019 California Building Code, and 2019 California Residential Code; California Office of Statewide Health and Planning and Development OSHPD and Division of State Architect DSA and California Residential Code CRC

3. ACI 318 Chapter 17 cast-in-place anchor, including minimum concrete thickness and cover.

2.2 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

2.3 MATERIALS

A. Lock Plate: "Ajustco Anchor Thread J-Bolt" (Ajustco: www.anchorthread.com); Anchoring Products – Safety Built In! [**316L stainless steel**] [**ASTM A325-14 Grade 5 steel, zinc plated**]; with 1/2-inch (12.7mm) diameter by 5 inch (127mm) high J-Bolt - 13 UNC right hand turn threads, 2-inch threads, with 7/8-inch useable thread.

1. Escutcheon Base Plate: Provide 1-1/2-inch diameter ABS escutcheon base plate having a 14-degree taper, lock nut, and lock plates below, furnished with manufacturer provided nails.

a. NLP: Nailable Lock Plate for installation on plywood
b. BLP: Boltable Lock Plate for installation on any material formwork

2. RMPD: Recessed Metal Pan Deck: ABS escutcheon plates for securing though metal pan deck.

B. Accessories:

1. Caps: [**Red**] [**Yellow**] [**Green**] [**Blue**] [**Orange**] [**Glow in the Dark**] [**Limestone Grey**] <**Color as selected by A/E**>.
2. Anchor nut kit: 1/2-inch diameter anchor nut kit, attachment example, heavy duty eye-nut.
3. Anchor Nut Wrench: 1/2 inch-12 anchor nut wrench supplied by manufacturer

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

B. Inspect anchors for damage, including but not limited to corrosion, deformation, pits, burrs, cracking, rust fatigue and alteration. Do not use anchors that sings of damage and fail inspection.

1. Prior to use of anchor threads, confirm with Project Engineer, that concrete strength will be sufficient for intended application.

3.3 INSTALLATION OF EMBEDDED ANCHORS

A. General: Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Accurately locate and install anchor rods to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

B. Install embedded items complying with anchorage manufacturer's current published installation instructions.

C. Installation in Cast-In-Place Concrete Slabs: In compliance with approved shop drawings for location of anchor thread

1. Nail lock plate to the plywood formwork, install reinforcing steel, insert anchor bolt assembly, and turn 90 degrees clockwise to lock in.
2. Turn escutcheon clockwise until it is snug against the formwork to seat the assembly.

3. Cast concrete.
4. When field testing confirms that concrete has achieved required strength, strip formwork
5. Use manufacturer provided escutcheon removal tool to back out escutcheon, so anchor threads are ready for inspection and testing.

D. Installation in Metal Pan Decks: In compliance with approved shop drawings for location of anchor thread

1. Mark the desired anchor position on the lower flute of the metal pan deck.
2. Drill a 1-5/8-inch hole through the metal pan deck with the included hole saw.
3. Position each RMPD assembly through holes made in the metal pan deck, so that the lower portion is below the deck and the clamping portion is above the metal deck.
4. Tighten the escutcheon until hand tight and fully seated in the hole.
5. Use manufacturer supplied wrench to form a tight clamp on the metal pan deck.
6. Cast concrete.
7. When field testing confirms concrete has achieved the desired strength, loosen recyclable plastic components on the bottom side of the metal pan deck with the included wrench.
8. Following inspection and testing, secure attachments to anchorage.

E. Installation on Columns: In compliance with approved shop drawings for location of anchor thread

1. Mark location of lock plate on forms, and mark height of each anchor thread.
2. Nail lock plate (NLP) to plywood formwork or bolt the boltable lock plate (BLP) to any material formwork.
3. Insert anchor bolt assembly and turn 90 degrees clockwise to lock in.
4. Turn the escutcheon clockwise until it is snug against the formwork to seal the assembly.
5. Ensure that the anchor bolt is oriented such that the double bend is within manufacturer's recommended acceptable range.
6. If anchor bolts are oriented within an unacceptable range, remove the anchor bolt assembly, flip it 180 degrees, reinsert, reinstall, and tighten down.
7. With anchor threads installed, and forms assembled, columns are ready for cast in place concrete placement.
8. When field testing confirms concrete has achieved the required strength, strip formwork, and use manufacturer's escutcheon removal tool to back out the escutcheon. Anchor threads are ready for inspection and testing.

3.4 FIELD QUALITY CONTROL

NTS: Retain "Special Inspections" or "Testing Agency" Paragraph below. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

NTS: Alter language to remove concrete testing if contained in concrete sections.

1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.

NTS: Retain the following paragraph for anchor testing:

2. Anchor Testing: Field Test Anchors in accordance with ASTM E3121/3121M "Standard Test Methods for Field Testing of Anchors in Concrete or Masonry".
3. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
4. Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

NTS: Alter language to remove concrete testing if contained in concrete sections.

5. Owner's independent special inspector shall make periodic inspections during installation of anchors to verify:
    a. Concrete type,
    b. Concrete compressive strength,
    c. Spacing,
    d. Edge distances,
    e. Concrete thickness
    f. Concrete cover,
    g. Engagement with lock plate, snug tight against the formwork and
    h. Adherence to the manufacturer's published installation instructions.

NTS: The paragraph and subparagraphs below are based on IBC 2018 and 2018 versions. Revise building code and reference table based on local building code applicable to the Project.

B. Inspections: In accordance with Section 1705.1.1 and Table 1705.3 of [**2018**] [**and 2021**] [**IBC**] <**insert local building code**>.

Retain first five subparagraphs below if special inspections are required. Items below are examples of special inspections and are based on IBC requirements; revise to insert other inspections based on applicable building code.

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

END OF SECTION 031500