SECTION 051000 – STRUCTURAL ANCHORS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes post-installed metal anchors in concrete, masonry, and steel, as shown on drawings including schedules, notes, and details showing size and location of anchors, typical connections, and types of anchors required.

1. Adhesive anchors.
2. Wedge anchors.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section “Structural Special Inspection.”
2. Division 3 Section “Cast-in-Place Concrete.”
3. Division 5 Section “Structural Steel Framing.”

1.3 SUBMITTALS

A. General: Furnish submittals in quantity, format, and other Conditions of the Contract and as specified in Division 1 of the Project Manual.

B. Product Data for each type of product specified. Include manufacturer’s specifications, load charts, and other data to show compliance with the specifications (including specified standards).

C. Installer Qualifications and Procedures: Submit a letter of procedure stating method of drilling, the product proposed for use, the complete installation procedure, manufacturer training date, and a list of the personnel to be trained on anchor installation.

D. ICC ES Evaluation Reports/Certificates.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Anchors shall be installed by an installer with at least 1 year of experience performing installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Installer Training: Conduct a thorough training with the manufacturer or the manufacturer’s representative for the installer on the project. Training to consist of a review of the complete installation process for drilled-in anchors, to include but not limited to:

1. Hole drilling procedure.
2. Hole preparation & cleaning technique.

3. Adhesive injection technique & dispenser training / maintenance.
4. Rebar dowel preparation and installation.
5. Proof loading/torquing.

C. Certifications: Unless otherwise authorized by the Engineer, anchors shall have an ICC ES Evaluation Report indicating conformance with current applicable ICC ES Acceptance Criteria.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver anchors to Project site in such quantities and at such times to ensure continuity of installation.

B. Store materials to permit easy access for inspection and identification. Protect anchors and packaged materials from erosion and deterioration.

1.6 SEQUENCING

A. Supply anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

B. Wedge Anchors: ASTM A510 or ASTM A108.

PART 2 - PRODUCTS

2.1 ADHESIVE ANCHORS

A. Cartridge Injection Acrylic Adhesive Anchors: two-component material consisting of acrylic resin, hardener, cement and water, suitable for use on dry or damp surfaces. For use in concrete. Anchor to be approved for use with cracked concrete per AC308.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

a. HIT HY 150 Max SD with HAS Super (ASTM A193 Gr B7) threaded rods or rebar, Hilti.

2. ASTM A563 heavy hex carbon-steel nuts; ASTM F436 hardened carbon-steel washers; and ASTM A36 plate washers.

2.2 MECHANICAL ANCHORS

A. Wedge Anchors: Wedge type, torque-controlled, with impact section to prevent thread damage and wedge dimples to prevent spinning during installation, complete with required nuts and washers. Provide anchors with length identification markings conforming to ICBO ES AC01. Type and size as indicated on Drawings. Suitable for fastening into cored, damp, or wet holes. For use in concrete.

1. Interior Use: Unless otherwise indicated on the Drawings, provide carbon steel anchors manufactured from materials conforming to ASTM A510 or ASTM A108 with zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1).
2. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

    a. Hilti Kwik Bolt III.
    b. Red Head Trubolt.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General

1. Drill holes with rotary impact hammer drills using carbide-tipped bits and core drills using diamond core bits. **Drill bits shall be of diameters as specified by the anchor manufacturer**. Unless otherwise shown on the Drawings, all holes shall be drilled perpendicular to the concrete surface.
2. Cored Holes: Where anchors are to be installed in cored holes, use core bits with matched tolerances as specified by the manufacturer. Acrylic Adhesive Anchors shall not be installed in core drilled holes.
3. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.
4. Base Material Strength: Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
5. Observe manufacturer recommendations with respect to installation temperatures for cartridge injection adhesive anchors and capsule anchors.
6. Perform anchor installation in accordance with manufacturer instructions.
7. Contractor shall coordinate all attachment to precast concrete elements with the precast manufacturer. Penetrations shall be located to not disturb or cut prestressing tendons. Attachment to the precast plank shall be located around tendon layout and shall incorporate fasteners designed for use in hollow concrete and that do not penetrate the concrete more than ¾".

B. Cartridge Injection Adhesive Anchors: **Clean all holes per manufacturer instructions** to remove loose material and drilling dust prior to installation of adhesive. Holes may be dry, damp or wet. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive. Follow manufacturer recommendations to ensure proper mixing of adhesive components. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface. Remove excess adhesive from the surface. Shim anchors with suitable device to center the anchor in the hole. Do not disturb or load anchors before manufacturer specified cure time has elapsed.

C. Wedge Anchors: Protect threads from damage during anchor installation. Set anchors to manufacturer's recommended torque, using a torque wrench. Following attainment of 10%

of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the Engineer.

3.2 QUALITY CONTROL

A. General: The Owner will engage an independent testing and inspecting agency to perform inspections and tests and to prepare test reports. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements. Failure to detect any defective materials shall not prevent later rejection when such defect is discovered, or obligate the Architect or Owner for final acceptance.

1. See Section 014110 – Structural Special Inspections for testing and inspection to be performed.
2. Provide access for testing agency to places where structural anchors are being installed so that required inspection and testing can be accomplished.
3. The General Contractor shall provide the testing agency a complete set of approved shop drawings.
4. Reports will be delivered to the Architect, Engineer, and the General Contractor within one week of inspection.
5. Deviations from requirements of the contract documents will be reported in writing to the General Contractor within 24 hours.

B. Testing: 25% of each type and size of drilled-in anchor shall be proof loaded by the independent testing laboratory. Adhesive anchors and capsule anchors shall not be torque tested unless otherwise directed by the Engineer. If more than 10% of the tested anchors fail to achieve the specified torque or proof load within the limits as defined on the Drawings, all anchors of the same diameter and type as the failed anchor shall be tested, unless otherwise instructed by the Engineer.

1. Torque shall be applied with a calibrated torque wrench.
2. Proof loads shall be applied with a calibrated hydraulic ram. Displacement of adhesive and capsule anchors at proof load shall not exceed D/10, where D is the nominal anchor diameter.

C. Correct deficiencies in or remove and replace anchors that inspections and test reports indicate do not comply with specified requirements.

END OF SECTION 051000