

# **TECHNICAL SPECIFICATIONS**

## **Guaranteed Rate Field**

### **Scout Lounge Architectural Precast Panel**

### **Removal and Support**

**Guaranteed Rate Field**  
**333 West 35<sup>th</sup> Street**  
**Chicago, Illinois**

**August 27, 2021 – Issued for Bid**

**Client: Illinois Sports Facilities Authority**  
**333 West 35th Street**  
**Chicago, IL 60616**

**Engineer: Wiss, Janney, Elstner Associates, Inc.**  
**330 Pfingsten Road**  
**Northbrook, IL 60062**  
**Phone: (847) 272-7400**

**WJE No. 2021.4701**

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## **SECTION 01 30 00**

### **SUBMITTALS**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes: General administrative and procedural requirements for submittals required for performance of the Work.

##### **1.2 TIMING OF SUBMITTALS**

- A. Submit all data and information required by the Contract Documents to the Engineer allowing ample time for his review, checking for conformance with the design concept, and approval, in any event allowing not less than 15 working days from date of receipt.

##### **1.3 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

- A. General: Except as otherwise specified, submit required shop, layout and setting drawings, product data and samples in accordance with requirements of the General Conditions.
- B. Contractor's Review of Submittals: Contractor shall review and approve all submittals before forwarding for Engineer's review.
  - 1. The Contractor's mark or stamp of approval shall constitute representation that he has, at a minimum, satisfied the review requirements of the General Conditions and shall, in effect, so state. The Contractor's stamp of receipt will not be acceptable for this purpose.
  - 2. Submittals which have clearly not been reviewed by the Contractor will not be checked and will be returned to the Contractor for completion of his review. No claim for delay due to Contractor's failure in this regard will be accepted.
  - 3. Any deviation from the Contract Documents shall be clearly identified in the submittal.
- C. Engineer's Review of Submittals: The Engineer will review Contractor's submittals for conformance with the design concept and requirements of the Contract Documents in accordance with the General Conditions and will approve or take other appropriate action as indicated by his stamp on the returned submittal.
- D. Any item which has been stamped "No Exceptions Taken" and which is subsequently revised by the Contractor beyond noted corrections shall be resubmitted for review and approval.
- E. Partial Submittals: Submittals which are partial or contain only a portion of the data required to describe the item or installation will be rejected unless such partial submittal is coordinated with the Engineer prior to submission, and final approval of all such items will be withheld pending receipt of all required information.
- F. Resubmittal: Major deviations from design concepts or from the requirements of the Contract Documents will require complete resubmittal. If resubmittal is required, correct and resubmit in the same form as before.
- G. Shop Drawings: Process and submit required shop drawings required by the technical specifications.

1. Contractor's Review: Check and verify field measurements, and coordination requirements, and incorporate on drawings. Where items portrayed are to connect to or interface with other elements of the structure, drawings shall specifically show such connections or interfaces and the materials involved.
  2. Engineer's Review: The Engineer will review for conformance with design concept and requirements of the Contract Documents only and will mark corrections and comments on the transparency and return it to the Contractor. Reproducible and copies will be returned except for copies retained by the Engineer and Owner for use in coordination and administration of the Contract. Distribute copies of the approved submittal as required for the execution of the Work.
- H. Product Data: Product data, where required by the Technical Specifications, shall be in the form of catalog cuts, performance characteristics, and/or other descriptive data sufficient for verification of compliance with requirements of the Contract Documents.
1. Form and Content of Submittal: Submittals shall be submitted in electronic format. Digital scans will be rejected if not fully legible (photos, illustrations, graphs, screened data must be easily read).
    - a. Manufacturer's standard drawings and other data shall be modified to delete inapplicable information or supplemented to furnish additional information specifically applicable to the Work.
    - b. Catalog sheets, brochures, diagrams, schedules, performance charts and descriptions, illustrations and other standard descriptive data shall be clearly marked to identify pertinent materials, products, and models and shall include dimensions and clearances required. Product data which is not clearly marked to indicate inapplicable options will be rejected.
  2. Engineer's Review: The Engineer will review for conformance with design concept and requirements of the Contract Documents and will return a digital copy to the Contractor for revision or distribution as required.
- I. Samples: Where required by the technical specifications, submit physical examples to illustrate materials, equipment or workmanship and to establish standards by which the Work will be judged.
1. Form of Submittal: Submit samples in duplicate; sizes, types and requirements as specified in the Technical Specification and in as nearly the form in which the material will appear in the Work as practicable, unless otherwise noted. Samples shall show functional characteristics of product or material with integrally related parts and attachment devices, as applicable, and shall show proposed colors and textures or other finishes.
  2. Engineer's Review: The Engineer will review the submitted samples for compliance with requirements of the Contract Documents and compare them with file samples where applicable; will make final selection of colors and finishes, and will approve sample for application on the Work. Samples not in accordance with requirements will be returned to the Contractor for resubmittal in conformance with requirements.
  3. Disposition of Approved Samples: If approved, sample will be returned to the Contractor as a standard for approval of the completed work, two samples will be retained by the Engineer and Owner for project files.
    - a. Where permitted by the technical specifications, approved samples may be incorporated into the Work. In such instances, all samples will be returned. Note location of incorporated samples on project record documents prior to installation of sample unit.

**PART 2 PRODUCTS - NOT APPLICABLE**

**PART 3 EXECUTION - NOT APPLICABLE**

**END OF SECTION**

## **SECTION 01 50 00**

### **CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Provide temporary construction, equipment, power and convenience utilities for use, convenience and safety of personnel engaged in the Work of the contract.

##### **1.2 QUALITY ASSURANCE**

- A. Materials: Construct temporary facilities on site using only new materials, unless otherwise approved by Engineer; make connections of utility lines and services in approved manner and in accordance with Code requirements.
- B. Installation: Immediately after receipt of the Notice to Proceed, provide temporary services, utilities and construction for use and convenience of those engaged in the Work of the Project.

##### **1.3 TEMPORARY UTILITIES**

- A. Electrical Service: Provide fixtures, wiring, and equipment, and make connections required for temporary electrical service during the construction period; coordinate power and lighting requirements with the Owner.
- B. First Aid Facilities: Furnish personnel trained and certified in first aid. Provide first aid kits on site; types and quantities as required.
- C. Temporary Fire Protection: Provide temporary fire protection as required. Provide minimum of one portable fire extinguisher at each work location.

##### **1.4 GUARDRAILS, CANOPIES AND BARRICADES**

- A. Guardrails: Provide guardrails as necessary.
- B. Canopies: Provide canopies as necessary.
- C. Barricades: Provide barricades as may be directed or required for public protection.

##### **1.5 SECURITY**

- A. Equipment and materials: It is the Contractor's responsibility to furnish security as required for the protection of his equipment and materials.

##### **1.6 PARKING AREAS**

- A. Parking: To be designated by Owner.

**1.7 CONSTRUCTION SITE CONTROL**

- A. General: Confine construction operations and storage to area of site as indicated or as directed; maintain in neat, orderly fashion until completion.
- B. Materials and Equipment: Store all equipment and materials neatly when not in use or until installed on the Work in areas set aside for storage; protect from damage. Store new materials off-site as required until the materials are required for use.
- C. Trash and Debris Removal: Remove all trash and debris resulting from the Contractor's work from site daily; dispose of at Contractor's expense. Do not allow debris, broken or open cartons, or other refuse to collect in or around the project. At completion of the Work, remove waste materials, rubbish, tools, equipment, machinery, surplus materials.

**PART 2 PRODUCTS - NOT APPLICABLE.**

**PART 3 EXECUTION - NOT APPLICABLE.**

**END OF SECTION**

**SECTION 03 20 00**  
**CONCRETE REINFORCEMENT**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. The Work of this Section includes furnishing, fabricating, and placing reinforcing steel.
- B. Related sections:
  - 1. Section 03 95 00 - Concrete Repairs
  - 2. Section 03 60 30 - Epoxied-In Anchors

**1.2 STANDARDS**

- A. ASTM A185, Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement, latest edition.
- B. ASTM A615/A615M, Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement, latest edition.
- C. ACI SP-66, Detailing Manual, latest edition.
- D. ACI 318, Building Code Requirements for Structural Concrete, latest edition.
- E. CRSI Manual of Standard Practice, latest edition

**PART 2 PRODUCTS**

**2.1 REINFORCEMENT AND ACCESSORIES**

- A. LEED Certification: Provide reinforcing having minimum 40% recycled steel content manufactured within 500 miles of the site.
- B. New steel reinforcing bars shall conform with requirements of ASTM A615, Grade 60. Provide diameter and shape specified on drawings.
- C. Accessories:
  - 1. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI Manual of Standard Practice from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete.
    - a. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
    - b. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
  - 2. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775/A775M.



## **2.2 FABRICATION**

- A. All bends and hooks shall conform to bend dimensions defined as "ACI Standard Hooks" in the CRSI Manual of Standard Practice unless otherwise shown on the plans.
- B. Reinforcing bars shall conform to the dimensions shown on the Drawings, within the fabricating tolerances as shown in the CRSI Manual of Standard Practice.

## **PART 3 EXECUTION**

### **3.1 PLACING**

- A. Prior to placing concrete, all reinforcing bars located partially or completely within the pour area shall be supported and securely tied.
- B. Unless permitted by the Engineer, reinforcing shall not be bent after being embedded in hardened concrete.

**END OF SECTION**

**SECTION 03 60 30**  
**EPOXIED-IN ANCHORS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. This work shall consist of providing the necessary labor, materials, equipment and supervision to install epoxied-in anchors and rebar.
- B. Definition
  - 1. Epoxied-in anchor: The completed composite of reinforcing bar or threaded rod dowel surrounded by epoxy within the drilled hole.
- C. Related Sections
  - 1. Section 03 20 00 – Concrete Reinforcement
  - 2. Section 03 95 00 - Concrete Repair

**1.2 STANDARDS AND QUALITY ASSURANCE**

- A. Reference standards
  - 1. American Society for Testing Materials Standards
    - a. Test for Sag Flow of Highly Viscous Resins (ASTM D2730)
    - b. Test for Gel Time and Peak Exothermic Temperature of Reacting Thermosetting Resins (ASTM D2471)
    - c. Test for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading) (ASTM C78)
    - d. Test for Compressive Properties of Rigid Plastics (ASTM D695)
    - e. Test for Deflection Temperature of Plastics Under Flexural Load (ASTM D648)
    - f. Test for Tensile Properties of Plastics (ASTM 638)
    - g. Tests for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials (ASTM D790)
    - h. Specifications for Stainless and Heat-Resisting Steel Bars and Shapes (ASTM A276)
  - 2. American Association of State Highway and Transportation Officials Test for Slant Shear Strength of Epoxy Bonding Agent (AASHTO 237)
  - 3. American Concrete Institute "Manual of Standard Practice for Detailing Concrete Structures" (ACI 315)
  - 4. Concrete Reinforcing Steel Institute "Manual of Standard Practice"
- B. Allowable tolerances:
  - 1. The epoxied-in dowels shall be installed such that the ends of dowels and the clear cover fall within +0 and -1/4 in. of that specified.

**1.3 SUBMITTALS**

- A. The Contractor shall submit the following to the Architect/Engineer:
  - 1. Technical data sheets for each epoxy product or formulation to be used showing that his products meet the requirements of the specifications. Technical data shall include:
    - a. Intended use

- b. Pot life (neat)
- c. Initial cure time (1000 psi)
- d. Tack free (thin film)
- e. Final cure (75% ultimate strength)
- f. Tensile strengths by ASTM D638 (14 days)
- g. Tensile elongation by ASTM D638 modified (14 days)
- h. Flexural strength and modulus per ASTM D790 at 24 hrs, 3 days, and 7 days at 77°F.
- i. 24-hr compressive strength by ASTM C109 modified (1 part epoxy to 3-1/4 parts aggregate)
- j. VOC content

#### **1.4 QUALITY ASSURANCE**

##### **A. Installer Qualifications**

- 1. For horizontal and overhead installations, the installer should be certified by ACI as an adhesive anchor installer.
- 2. The Contractor shall have three years of experience in performing work similar to that shown on the drawings and described in these specifications.
- 3. An on-site supervisor shall be provided by the Contractor for the duration of the epoxied-in anchor work. This supervisor shall have had 2 years documented supervisory experience with the products to be used.

##### **B. Source quality control**

- 1. The material supplier shall provide (via the Contractor) the following test data for each production run or batch of epoxy formulation to be used:
  - a. Tensile strength by ASTM D638
  - b. Elongation at break by ASTM D638
  - c. Flexural strength by ASTM D790
  - d. Flexural modulus by ASTM D790
  - e. Compressive yield strength by ASTM D695
  - f. Compressive modulus by ASTM D695
  - g. Heat deflection temperature by ASTM D648
  - h. Slant shear by AASHTO

##### **C. Mockups**

- 1. Install mock-ups of each anchor type for review by Engineer.
- 2. Perform mock-up in the presence of the epoxy manufacturer and Engineer.

#### **1.5 PRODUCT DELIVERY**

- A. The product shall be delivered and handled according to the manufacturer's recommendations.
- B. Damaged, open containers shall not be used.

#### **1.6 JOB CONDITIONS**

- A. Existing and environmental conditions: The Contractor shall examine the condition of surfaces where epoxied-in anchors are required. The Contractor shall follow the recommendations of the manufacturer with regard to limitations of the materials in various moisture and temperature conditions.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Epoxy for Anchors: The Epoxy shall be Hilti Hilti HIT-HY 200 manufactured by Hilti, Inc. or an approved equal.
- B. Reinforcing Steel: Refer to Section 03 20 00
- C. Accessories
  - 1. All accessories recommended by Manufacturer for installation of epoxy and anchors
  - 2. Hilti Piston Plug as manufactured by Hilti Inc.

## **PART 3 EXECUTION**

### **3.1 INSPECTION**

- A. Examine surfaces where epoxied-in anchors are to be installed to ensure they are sound and free of contaminates.
- B. Where conditions are found which would adversely affect the work, notify the Architect/Engineer and proceed with work at other locations.

### **3.2 PREPARATION**

- A. Lay out the locations of epoxied-in anchors according to the drawings and specifications.
- B. The Contractor locate all reinforcing steel prior to drilling holes to avoid drilling into existing embedded reinforcing. Notify Engineer if location of existing reinforcing steel prevents installation of anchors as specified.

### **3.3 INSTALLATION OF ANCHORS**

- A. For horizontal and overhead installations, the installer should be certified by ACI as an adhesive anchor installer. The installer must strictly follow the manufacturer's printed installation instructions (MPII).
- B. Drilling holes:
  - 1. Holes may be wet-or dry-drilled using either percussive or rotary machines.
  - 2. Wet-drilled holes shall be flushed with clean water to remove residue, then blown out using oil-free compressed air, or allowed to air dry.
  - 3. Dry-drilled holes shall be cleaned in accordance with the manufacturer's instructions. At a minimum, holes shall be cleaned using the following procedure:
    - a. Blow out hole twice with oil-free compressed air
    - b. Brush out hole twice using the correct diameter wire brush for the drilled hole size as specified by the manufacturer. Replace brush before it becomes worn.
    - c. Blow out hole twice with oil-free compressed air
  - 4. Holes shall be the diameter required by the adhesive manufacturer for the specified anchor/threaded rod diameter to be used.
- C. Anchors shall be dry and free from contaminants, such as dirt, oil, and grease.

- D. Proportioning and mixing:
1. Mix the components of the epoxy in proper proportions according to the manufacturer's directions.
- E. Installation:
1. The epoxied-in anchors shall be installed by mixing and injecting a pre-measured quantity of epoxy to the back of the hole and insertion of the anchor.
  2. The method of installation is intended to achieve 100 percent filling of the annular space between the anchor and the drilled hole.
  3. If present, the epoxy coating on the reinforcing steel shall be removed over the length of the bar to be embedded.
  4. The Contractor shall follow the manufacturer's instructions for use and the installation shall be in general accordance with the following method. The initial installation is subject to a review of mock-ups of all anchor types.
    - a. Insert epoxy cartridge into dispensing gun and attach mixing nozzle. Squeeze handle of dispensing gun until epoxy reaches end of the mixing nozzle and discard first three pumps of epoxy discharged from end of mixing nozzle.
    - b. Insert the end of the manufacturer's mixing nozzle to the back of the anchor hole. Begin injection evenly, while slowly withdrawing the tube. For embedment depths equal to or exceeding 8 inches, use a piston plug to reduce the potential for the formation of voids. Inject sufficient quantity of epoxy to ensure annular space surrounding bar over full length of embedment depth is completely filled after insertion of bar.
    - c. Insert anchor into the filled hole while slowly rotating it to avoid the formation of voids and ensure complete encapsulation of the anchor. Insert small wooden wedges into the hole opening to position the anchor temporarily until the epoxy has set.

### **3.4 CLEAN-UP**

- A. The epoxied-in anchors shall be cleanly installed and squared up as shown on the drawings. Excess epoxy shall be cleaned up. Wooden wedges shall be removed.
- B. Safety of Personnel:
1. Avoid skin contact with epoxy materials, solvents and epoxy strippers. Epoxy resins and particularly epoxy hardeners may cause skin sensitization.
  2. Wear rubber gloves (preferably with a cloth liner) and protective clothing. Where splashing may occur, wear goggles or face shields. Barrier creams are recommended but do not substitute for protective clothing.
  3. If skin contact occurs, wash immediately with a waterless cleaner, followed by soap and water. Should eye contact occur, flush immediately with plenty of water for 15 minutes and call a physician.

**END OF SECTION**

**SECTION 03 95 00**  
**CONCRETE REPAIRS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes: Providing the necessary labor, materials, equipment and supervision to place, cure and finish polymer-modified concrete and patching mortar which is placed against properly prepared existing concrete surfaces in repair areas.
- B. Related Sections:
  - 1. Section 03 20 00 – Concrete Reinforcement
  - 2. Section 03 60 30 - Epoxied-In Anchors

**1.2 STANDARDS**

- A. American Society for Testing and Materials
  - 1. Specification for Concrete Aggregates (ASTM C33)
  - 2. Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete (ASTM C42)
  - 3. Standard Test Method for Slump of Portland Cement Concrete (ASTM C143)
  - 4. Specification for Portland Cement (ASTM C150)
  - 5. Test for Air Content of Freshly Mixed Concrete by the Pressure Method (ASTM C231)
  - 6. Specification for Chemical Admixtures for Concrete (ASTM C494)
  - 7. Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction (ASTM E329)
- B. American Concrete Institute
  - 1. Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete, ACI Committee 211 (ACI 211.1)
  - 2. Specification for Structural Concrete in Buildings (ACI 301)
  - 3. Recommended Practice for Hot Weather Concreting (ACI 305R)
  - 4. Recommended Practice for Cold Weather Concreting (ACI 306R)
  - 5. Building Code Requirements for Reinforced Concrete (ACI 318)

**1.3 SUBMITTALS**

- A. Submit reports of concrete tests at the end of each day's testing. Refer to Section 3.4 for testing requirements.
- B. Submit a list of all proposed materials and material sources for the polymer-modified concrete and the patching mortar to the Architect/Engineer at the start of the job, as detailed in subsection 2.5, of this section of the Specifications.

**1.4 UNIT PRICES**

- A. Perform the following Work on unit price basis:
  - 1. Removal and replacement of unsound concrete on overhead surface of slab. Payment based on surface area of repair with an assumed depth of 4 inches.

- B. For the portion of work to be performed on a unit price basis, quantities shall be measured by the contractor and engineer.

## **1.5 WARRANTY**

- A. All concrete repairs shall be warrantied against all surface defects, delamination of the patch material from the substrate concrete, delamination within the patch material itself, and patch deterioration, for a period of three (3) years from the date of substantial project completion.
- B. Any work proving defective within three (3) years from the date of substantial project completion shall be corrected at no cost to the Owner.

## **1.6 MOCKUPS**

- A. All work procedures and materials shall be demonstrated in mockups for each repair type for review and approval prior to beginning any production work.
- B. Perform removal and surface preparation mockup at precast opening.
- C. Fabricate 12 inch by 12 in by 3inch mockup panels to demonstrate adequate match of new concrete to existing architectural precast panel.
- D. Architect/Engineer will observe concrete removal and surface preparation work, prepared concrete removal areas, and installation of repair material. Notify Architect/Engineer and Owner's Representative at least fourteen days in advance of when mockups will be constructed.
- E. If Architect/Engineer or Owner's Representative determines mockup does not comply with requirements, modify mockup or construct new mockup until mockup is approved. Assume fabrication of a minimum of 4 mockup panels.
- F. Approved mockup panel shall be kept onsite throughout Project as basis for acceptance of completed work.
- G. Do not order materials or proceed with repair Work until mockups have been approved by Architect/Engineer and Owner's Representative.

## **1.7 PROJECT CONDITIONS**

- A. Verify existing dimensions and details prior to start of Work. Promptly notify Architect/Engineer of conditions found to be different than those indicated in the Contract Documents. Architect/Engineer will review situation and inform Contractor and Installer how to proceed.
- B. Comply with Owner's limitations and restrictions for Site use and accessibility.

## **PART 2 PRODUCTS**

### **2.1 CONCRETE TYPES, STRENGTHS, AND USES**

- A. The strength indicated is 28-day design compressive strength.
  - 1. Polymer-modified concrete, 5,000 psi, concrete for large concrete patches

2. Patching mortar, 5,000 psi, mortar for small patches (approximately 1-1/2 in. in depth and less than 4 square feet in plan area)

## 2.2 MATERIALS

- A. Portland Cement, ASTM C150, Type I. Convertible Portland Cements and Portland Cement Type III are not permitted.
- B. Calcium chloride shall not be permitted as an additive in the polymer-modified concrete or in the patching mortar or in any admixture.
- C. Aggregates: ASTM C33/C33M; from single source with documented record of at least ten years of satisfactory service using similar aggregates and cementitious materials in similar applications and service conditions.
  1. Alkali Reactivity: Coarse and fine aggregates shall have expansion indicative of innocuous behavior; that is, less than 0.10 percent expansion after 16 days when tested according to ASTM C1260; or mitigating measures shall be included in concrete mix.
    - a. Provide ASTM C1260 test results for aggregates proposed for use, performed within last year.
    - b. If reported expansion is 0.10% or more at 16 days after casting, use mitigation measures shown to render innocuous results when tested according to ASTM C1260 or provide coarse and fine aggregates from a remote source, with expansion indicative of innocuous behavior when tested according to ASTM C1260. ASTM C1293 procedure may be substituted for ASTM C1260.
- D. Water shall be potable and free from substances known to be harmful to Portland Cement.

## 2.3 FORM AND POUR POLYMER-MODIFIED CONCRETE MIX DESIGN

- A. The primary requirements for the polymer-modified concrete are the compressive strength as specified herein; workability that facilitates placement and the achievement of the desired finish; and proper finishing and curing practices to ensure achievement of a low permeability.
- B. The entrained air content shall be no more than 6.5 percent, as measured according to ASTM C231. No air-entraining agent shall be added to the mix. Defoaming agent shall be used to control air content.
- C. Water/cement ratio (including water in the latex emulsion and the aggregate) shall not exceed 0.40.
- D. Pre-packaged mixes may be used in lieu of site mixing and shall be the following:
  1. TintCrete Concrete, manufactured by JE Tomes (custom color matched to existing architectural precast concrete).

## 2.4 GROUT

- A. Pre-packaged grout for filling of void space between 1/2 inch and 3 inches shall be one of the following:
  1. SikaGrout-328, manufactured by Sika Corporation
  2. MasterFlow 100, manufactured by BASF
  3. Approved equal



## **2.5 REINFORCING MATERIALS**

- A. Refer to Specification 03 20 00 *Concrete Reinforcement* for supplemental reinforcing steel requirements.

## **2.6 TESTING OF FORM AND POUR POLYMER-MODIFIED CONCRETE MIX DESIGNS**

- A. The contractor shall submit a list of all proposed materials, and material sources, to the Architect/Engineer at the initiation of the project. The following data shall be submitted to the Architect/Engineer:
  - 1. Sieve analysis for the fine and coarse aggregate
  - 2. Proposed mixing methods
  - 3. Mill certificates from the cement supplier
  - 4. List of materials and sources
- B. At least (3) weeks prior to the start of concrete placement the Contractor shall manufacture four (4) separately mixed test batches of concrete under job conditions, in quantities large enough to accommodate production of the following samples and tests:
  - 1. Four sets of 4 in. x 8 in. test cylinders for use in determining compressive strength of the concrete
  - 2. Two slump test
  - 3. Two air content tests
- C. All samples and tests will be conducted by the Owner's testing agency. The Contractor is responsible for providing the labor and materials to manufacture the concrete for the samples, and for disposal and cleanup of surplus materials.
- D. The Owner and the Architect/Engineer reserve the right to request production of additional test batches of polymer-modified concrete if the material produced does not comply with these Specifications.

## **PART 3 EXECUTION**

### **3.1 BATCHING AND MIXING**

- A. All batching and mixing operations shall be performed in a manner such that quality control is guaranteed, accurate mix proportions are maintained and all ingredients are combined and mixed to a uniform consistency.
- B. Mix components shall be measured and partially combined in a controlled environment prior to final mixing and placing at the repair location.
- C. If concrete mixing will be performed outdoors:
  - 1. No polymer-modified concrete or patching mortar shall be mixed at ambient temperatures lower than 40 degrees F.
  - 2. At temperatures above 85 degrees F, the Architect/Engineer may require placements to be made at night or early morning hours, if in his/her opinion a satisfactory placement is not being achieved during normal working hours.

- D. Water may be added to the polymer-modified concrete to obtain slump within the prescribed limits. Concrete with a slump less than 3 in. may be rejected if it is not placed satisfactorily, with a closed tight surface. Retempering of concrete is not permitted.

### **3.1 SURFACE PREPARATION**

- A. Surface preparation shall be in accordance with notes on the drawings.

### **3.2 PLACING AND FINISHING CONCRETE**

- A. Design, erect, shore, brace, and maintain formwork according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Before placing concrete, all equipment for mixing and transporting concrete shall be cleaned. Vibrators shall be checked for workability. All frost, ice, mud, debris, and water shall be removed from equipment. Forms shall be thoroughly wetted. Reinforcement shall be securely tied in place and thoroughly cleaned of ice and other coatings which may destroy or reduce bonding with concrete. No concrete shall be placed until the Architect/Engineer has observed the forms and condition and placement of reinforcement. Conveying the concrete from mixer to place of deposit shall not cause separation or loss of materials.
- C. Placing of concrete shall be such that it shall be deposited as nearly as possible in its final position to avoid segregation due to rehandling or flowing. Placing shall be at such a rate that at all times concrete shall be plastic and flow readily into corners of forms and into spaces between rebars. No concrete that has partially hardened or that has been contaminated by foreign materials shall be deposited. When being deposited, concrete shall not be allowed to fall a vertical distance greater than 2 ft. from point of discharge to point of deposit. Internal vibrators shall be used, as appropriate, to ensure that proper consolidation of the concrete is achieved.
- D. Placement of the polymer-modified concrete shall be a continuous operation at each patch location. Materials sufficient to complete a patch shall be available prior to commencing a repair.
- E. For areas where new concrete will be cast against existing concrete surfaces, wet the existing surface one hour prior to placement but do not allow puddles to form. At time of placement of concrete, existing concrete surfaces shall be in a saturated, surface dry condition.
- F. The concrete shall be continuously vibrated during placement to consolidate the pour and fill all corners of the patch. External vibration of the formwork may also be used by placing the internal vibrators against the wood forms for short periods of time.

### **3.3 CONCRETE PROTECTION AND CURING**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete above 55 degrees F and in a moist condition for at least 7 days after placing.
- B. Formwork shall remain in place a minimum of 7 days for curing purposes.

### 3.4 FIELD QUALITY CONTROL

- A. At the time of the first field placement of concrete and mortar, and at least four appropriate intervals as directed by the Architect/Engineer, seven standard 4 inch x 8 inch cylinders will be made, cured and tested in accordance with ACI 301, except as noted herein.
- B. All cylinders shall be tested by a qualified approved testing laboratory which meets the requirements of ASTM E329, and their reports sent to the Architect/Engineer and the Contractor. Costs for these tests will be paid for by the Owner. The Contractor or Testing Lab will be responsible for making these cylinders and for seeing that they are transmitted to a testing laboratory. The Contractor shall provide the necessary concrete to make the cylinders.
- C. All cylinders shall be cured under field conditions for the duration of the curing period. Two cylinders shall be tested for compressive strength at 7 days, two at 14 days and two at 28 days. One cylinder shall be stored for potential future testing.
- D. For each set of cylinders made, a slump and air content test shall also be made. The temperature of the concrete shall be taken at the same time cylinders are made. Slump tests shall be made in accordance with ASTM C143. Air content tests shall be made in accordance with ASTM C231.
- E. Testing of cylinders shall be in accordance with ASTM C39, and shall be conducted by the Owner's testing agency. Each test report shall contain the following information for each set of cylinders:
  - 1. Individual test specimen strength, type of failure
  - 2. Slump
  - 3. Air content
  - 4. Concrete and air temperature
  - 5. Specimen number
  - 6. Portion of structure represented by the concrete tested
  - 7. Date cast
  - 8. Date tested
- F. Strength shall be considered satisfactory if the average of the two 28-day tests meets or exceeds 5,000 psi, and neither of the 28-day tests is below 4,500 psi.
- G. Coring
  - 1. If tests results are not in conformance with Specifications, the Contractor shall take 2-in. diameter core samples from completed patches. This additional testing of the concrete mortar will be performed under the direction of the Architect/Engineer. The cost of these additional tests will be borne by the Contractor.
- H. Hammer tap concrete patches to verify their soundness. Remove and recast any unsound patch areas at Contractor's expense.
- I. Repair defective areas identified by Architect/Engineer. Remove and replace concrete that cannot be repaired to Owner and Architect/Engineer's satisfaction. Surface defects on exposed surfaces include:
  - 1. Voids, such as spalls, air bubbles, honeycomb, rock pockets, and form-tie voids, more than 1/4 inch in any dimension in solid concrete but not less than 1/2 inch deep.

2. Cracks at least 1/16 inch wide. Notify Owner and Architect/Engineer of cracks that penetrate through section.

**END OF SECTION**

**SECTION 05 12 00**  
**STRUCTURAL STEEL**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes steel elements indicated on the structural drawings.

**1.2 REFERENCE STANDARDS**

- A. Latest version of each standard shall apply.
- B. American Institute of Steel Construction (AISC)
1. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges
  2. AISC 360 - Specification for Structural Steel Buildings
- C. Research Council on Structural Connections
1. Specification for Structural Joints Using High-Strength Bolts
- D. American Society for Testing and Materials (ASTM)
1. ASTM A6 - General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.
  2. ASTM A36 - Standard Specification for Carbon Structural Steel.
  3. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  4. ASTM A572 - High Strength Low-Alloy Columbium-Vanadium Structural Steel.
  5. ASTM A992 - Standard Specification for Structural Steel Shapes.
  6. ASTM F436 - Standard Specification for Hardened Steel Washers.
  7. ASTM F3125 - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated
- E. American Welding Society (AWS)
1. A2.4 Welding Symbols
  2. A3.0 Terms and Definitions
  3. A5.1 Specifications for Mild Steel Covered Arc-Welding Electrodes.
  4. A5.5 Specification for Low-alloy Steel Covered Arc-welding Electrodes.
  5. A5.17 Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
  6. A5.20 Specification for Carbon Steel Electrodes for Flux Cored Arc Welding.
  7. A5.23 Specification for Low Alloy Steel Electrodes and Fluxes for Submerged Arc Welding.
  8. D1.1 Structural Welding Code - Steel
  9. D1.4 Structural Welding Code - Reinforcing Steel, including Metal Inserts and Connections in Reinforced Concrete.

**1.3 QUALITY ASSURANCE**

- A. Fabricator/Erector: Must be certified with AISC as a Building Fabricator or Erector. Must have plant, facilities, and personnel sufficient to fabricate and/or erect structural steel as indicated on

Drawings. Must have minimum of five years' experience and be able, upon request, to show framing of size, materials, and scope similar to Work of this contract.

- B. Material: Provide only structural steel certified as conforming with specified requirements and fabricate especially to the requirements of this contract. Material which does not conform to the requirements of this contract may be rejected at any time.
- C. Allowable Tolerances: Unless otherwise specified or noted on Drawings or in this Specification, provide structural steel work in accordance with the following minimum tolerances:
  - 1. Fabrication Tolerances: In accordance with requirements of AISC 303 unless noted otherwise, and as required to maintain the erection tolerances specified herein.
  - 2. Erection Tolerances: In accordance with requirements of AISC 303. The Contractor alone shall be responsible for the correct fitting of all structural members.
- D. Connection Identification: Each person installing connections shall be assigned an identifying symbol or mark, and all shop and field connections shall be so identified so that the Owners Testing Lab can refer to the person making the connection.
- E. Test and Inspections: Work is subject to special testing and inspection. Refer to Section 01 40 00. The fabricator/erector shall provide the Owner's Testing Lab and Engineer access to places where material is being fabricated/erected. Notice shall be given for joints requiring inspection for proper end preparation, root opening, etc., prior to welding.
- F. Engineering by Contractor: Design and calculations shall be prepared by a structural Engineer, licensed in Indiana, for the support of hoisting equipment, welding machines, and other superimposed loads, for the stacking of materials, and where required for temporary bracing, shoring and other safety related construction procedures. Contractor shall obtain and pay for such Engineering services.
- G. Welder Qualifications:
  - 1. Each welder performing work on this project shall be qualified in accordance with the American Welding Society, AWS D1.1 and AWS D1.4.
  - 2. Each welder shall have been qualified a minimum of six (6) months before commencement of welding on this project.
  - 3. Copies of each welder's qualification records shall be made available to the Engineer for inspection.
- H. Inspections: Field welds shall be continuously inspected by a qualified inspector. Refer to paragraph 3.03 of this specification section for inspection of shop and field installed bolts.
- I. Vendor Quality Assurance: The fastener supplier shall visit the project site during the bolting start-up to demonstrate proper installation procedures and verify inspection procedure with the Owner's Testing Lab. The fastener supplier must provide documentation of quality assurance including mill reports and descriptions of bolt origin. Submit performance records from two prior projects of similar size. Records should include percentage of bolt failure during erection and rate of replacement required during inspection. Supplier quality assurance program shall also be outlined. Program must include assurance that bolts from only one heat will be included in a keg.

- J. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this section.

#### 1.4 SUBMITTALS

- A. Submit the following in accordance with Section 01 30 00.
- B. Shop Drawings: Submit shop drawings for review prior to commencing any fabrication of structural steel.
  - 1. Before shop drawings are submitted, fabricator shall backcheck drawings to discover obvious drafting and detailing errors.
  - 2. Show framing layout, dimensions, connections with adjoining materials and construction, finishes, welds, bolts and fasteners, anchoring, and all fabrication or erection accessories required.
  - 3. Show field welds, cuts, holes and fasteners.
  - 4. Verify all dimensions and correlate with adjoining construction and materials.
  - 5. Indicate size, type and grade of all members.
  - 6. Include with each detail shown on the shop drawings a reference to the Engineer's drawings and details, where applicable.
- C. Submit fabricator's quality assurance procedures to the Engineer, Owner and Owner's Testing Lab.
- D. Indicate welded connections on shop drawings using standard AWS welding symbols. Show all welded connections with details showing size, length, location, and type of welds.
- E. Mill Reports: Submit certified copies of mill reports indicating heat and melt numbers of steel.
  - 1. If test reports are not submitted or test reports cannot be identified with material proposed for use in the Work, then secure and perform structural tests on five percent of all such unidentified steel.
  - 2. Contractor shall furnish all such material for testing and pay for all such tests.
  - 3. Furnish Owner and Engineer certified copies and fabricator one certified copy of all test reports.
- F. Inspection Test Reports: Upon request, submit to Engineer copies of ultrasonic testing reports.
- G. Placement Plans: Submit placement plans and details as required for the satisfactory placing, connection, and anchorage of all structural members.
- H. Welding Procedures: For all welded joints, submit a Welding Procedure Specification (WPS) prepared in accordance with AWS D1.1, including a detailed description of welding procedures proposed for use on structural metals, including welding of reinforcing steel in accordance with AWS D1.4. Obtain approval of WPS prior to any welding operation. Furnish WPS qualification tests as required by AWS D1.1, for welded joints that cannot utilize a prequalified WPS.
- I. Manufacturer's Certification: Required as follows:
  - 1. Bolts, Nuts and Washers: Furnish complete manufacturer's mill test reports conforming to ASTM F3125 Grade A325 (Type 1), or A490 (Type 1). Markings and chemistry must also comply to specification. Certification numbers must appear on product containers and

correspond to certification numbers on mill test report to be accepted. Mill test report must be supplied to both purchaser and Owner's Testing Lab.

2. Filler material for welding.

J. Erection Procedures: Submit a comprehensive erection procedure including sequencing and crane or lift requirements. The specific means and methods, sequencing and safety procedures are the responsibility of the Contractor. The Engineer's review is solely to determine that the Contractor has complied with the Specification requirements.

## **1.5 DELIVERY, STORAGE, HANDLING**

- A. Comply with the requirements of the general conditions and of ASTM A6, including the following.
- B. Store materials to permit easy access for inspection and identification.
  - 1. Keep steel members off the ground, using pallets, platforms, or other supports.
  - 2. Protect steel members and packaged materials from erosion and deterioration.
- C. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures. Repair or replace damaged materials or structures at no additional expense to Owner.
- D. All Fasteners shall be stored and protected in accordance with the current requirements of the "Specification for Structural Joints using High-Strength Bolts."

## **1.6 JOB CONDITIONS**

- A. Temporary Bracing: Temporary bracing and guidelines shall be provided to adequately protect all persons and property and to ensure proper alignment.
- B. Temporary Platforms: All temporary flooring, planking, and scaffolding necessary in connection with the erection of the structural steel or support of erection machinery shall be provided. The temporary floors or use of steel decking shall be as required by law and governing safety regulations.
- C. Holding and Protection: During assembling and welding, the component parts shall be held with sufficient clamps or other adequate means to keep parts straight and in close contact. In welding, precautions shall be taken to minimize "lock-up" stress and distortion due to heat.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS AND COMPONENTS**

- A. Carbon Steel: Provide steel of structural quality, sizes, and types noted on Drawings, for use in welded and bolted construction.
- B. Steel tube: ASTM A 500, Gr. B
- C. Steel plates, angles, channels: ASTM A36
- D. Steel angles: ASTM A36



- E. High-Strength Fasteners: Quenched and tempered steel bolts and nuts conforming to requirements of ASTM F3125, Grade A325.
  - 1. Only ASTM F3125, Grade A325 (Type 1) bolts shall be supplied in dimensions noted on the drawings.
  - 2. Provide heavy hexagonal head bolts and nuts, and hardened steel washers.
  - 3. Any proposed substitutions must have documentation submitted for review and approval of the Engineer prior to construction.
  
- F. Weld Electrodes:
  - 1. Shielded Metal Arc Welding (SMAW) use E70XX electrodes in accordance with AWS A5.1 and Clause 5.3.2 of AWS D1.1.
  - 2. Flux Cored Arc Welding (FCAW), use E7XT-X, electrodes in accordance with AWS A5.20.
  
- G. Steel Coatings
  - 1. Shop Primer: All new structural steel shall be coated in the shop with the following system or approved equal:
    - a. Stripe coat at all corners, holes and edges: Carbit 325R1 Red Waterborne Primer, 2.0 mils DFT
    - b. Primer: Carbit 325R1 Red Waterborne Primer, 1.0 to 2.0 mils DFT
    - c. Finish: Carbit 325R1 Red Waterborne Primer, 1.0 to 2.0 mils DFT
  
- H. Other Materials: Provide all incidental and accessory materials, tools, methods, and equipment required for fabrication and erection of structural steel framing as indicated on Drawings.

## 2.2 FABRICATION

- A. Fabricate all steel in accordance with requirements of AISC Code of Standard Practice and AISC Specifications, and in accordance with details indicated on the Drawings or as approved on shop drawings.
  - 1. Identify all steel at mill showing grade and yield points.
  - 2. Identify each piece with an erection mark corresponding to identifications noted on erection drawings.
  
- B. Cutting: All holes and openings must be approved by the Owner's Engineer.
  - 1. Do no flame cutting by hand of opening greater than one half the depth of the member, unless approved by Engineer.
  - 2. All flame-cut holes shall be smoothed by chipping, planing or grinding members to required AISC tolerances.
  - 3. Sharp bends or kinks will not be allowed.
  - 4. Flame cutting by hand will not be allowed for holes at connections.
  
- C. Materials shall be properly marked and match-marked where field assembly requires. The sequence of shipments shall be such as to expedite erection and minimize the field handling of material.
  
- D. Milled surfaces shall be completely assembled or welded before milling. Milled surfaces to provide full bearing over the cross section.
  
- E. Beam connections shall be as shown or noted on the Drawings.
  - 1. Unless noted otherwise, standard connections shall be used.

- F. Combination of bolts and welds shall not be used for stress transmission in the same faying face of any connection without prior approval by Engineer.
- G. Welding, filler material, welding techniques and procedures shall conform to the requirements of the following:
  - 1. AISC Code of Standard Practice for Steel Buildings and Bridges
  - 2. AWS Structural Welding Code and AWS Filler Metal Specifications
- H. Welds not specified shall be continuous fillet welds, using not less than the minimum fillet as specified by AWS.
- I. Welding sequences, preheat methods, and detailing of joints shall be such as to reduce the residual stresses to a minimum.
  - 1. Engineer may authorize suitable testing to determine magnitude of residual stresses due to welding on several initial fabricated production units. Such testing will be performed in a timely manner coordinated with the fabricator's production schedule.
  - 2. Types of Welds: Required weld types are indicated by symbols on drawings; characteristics of welds in accordance with standard specifications or codes as applicable; each welder shall mark his identification symbol on his work.
  - 3. Welding: Shape edges to be joined as indicated on drawings; prepare and clean edges of all oil, grease, scale and rust in accordance with AWS D1.1.
- J. The toughness and notch sensitivity of the steel shall be considered in the formation of all welding procedures to prevent brittle and premature fracture during fabrication and erection.
- K. Detailing of connections, welding sequences, and preheat methods shall be such as to minimize restraint and the accumulation and concentration of through thickness strains due to weld shrinkage. Remove projecting ends of runoff tabs, backer bars, and any other erection aids, and grind flush with edges of plates.
- L. Fabrication Tolerances: In accordance with AISC specifications, except as required to maintain the erection tolerances specified herein.

## **PART 3 EXECUTION**

### **3.1 SURFACE CONDITIONS**

- A. Examine the areas and conditions under which Work of this section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### **3.2 ERECTION**

- A. General: Erect structural steel framing in accordance with governing codes and specifications. Conform with configurations and connections as approved on shop and erection drawings.
- B. Bracing: Provide temporary shoring and bracing members as required and according to the AISC Code of Standard Practice.
- C. Field Assembly: Accurately assemble structural framing to lines and elevations indicated within specified or noted tolerances.

1. Align and adjust various members of framing system prior to fastening.
  2. Prior to assembly, clean bearing surfaces and surfaces which will be in permanent contact.
  3. Splice structural members only where indicated or where approved.
  4. Cut holes by drilling only.
  5. Fasten splices of compression members after bringing abutting surfaces completely into contact.
  6. Make all field connections by high strength bolting or welding, unless otherwise noted.
  7. Tighten and leave erection bolts in place after welding. Where high strength bolts are required, provide identified and marked bolts; install using procedure as hereinafter specified; mark tightened bolts.
- D. Do not use gas cutting torches in the field, unless approved by Engineer for correcting fabrication errors in the structural framing.
- E. Furnish shim plates or develop fillers where required to obtain proper fit and alignment.
- F. Drift pins shall not be used to enlarge unfair holes in main material. Holes that must be enlarged shall be reamed up to a maximum of 1/16th in. larger to admit bolts. Burning, drifting and reaming may be used to align unfair holes in members only after approval by the Engineer.
- G. The steel erector shall leave the steel clean of oil or other contaminants as outlined under Part 2 of this specification.

### **3.3 HIGH STRENGTH BOLT INSTALLATION AND INSPECTION**

- A. General: All high strength bolts, nuts and washers, as well as their installation and inspection, shall conform to requirements of current edition of the Research Council on Structural Connections "Specification for Structural Joints using High-Strength Bolts".
1. Bolts shall be snug tight unless indicated as slip-critical, direct-tension or tensioned shear/bearing connections.

### **3.4 WELD CONNECTIONS**

- A. Comply with AWS D1.1 for welding procedure specifications, tolerances, weld appearance, weld quality, and for methods used in correcting welding work.
- B. All welds shall be installed using an approved WPS.
- C. Use AWS-qualified welds and AWS-qualified welders for steel.
- D. Remove paint, dirt, grease, oil, and foreign matter from areas to be welded prior to welding.
- E. Preheat base metal as required by AWS D1.1. Do not exceed interpass temperature of 600 degrees F.
- F. Perform welding in manner to prevent distortion of welded pieces and to develop strength and corrosion resistance of base metals.
1. Obtain fusion without undercut or overlap.
  2. Fill craters at beginning and end of weld beads.
  3. Remove welding flux immediately.
- G. Clean welds thoroughly with steel brush.

### **3.5 CUTTING**

- A. Do not field cut or alter structural members without the written approval of the Engineer.
- B. Do not use gas cutting torches for correcting fabrication errors in structural framing.
- C. Finish gas-cut sections equal to a sheared appearance.

### **3.6 COATING REPAIR**

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of paint. Apply paint to exposed areas using same material as used for shop painting.

### **3.7 FIELD QUALITY CONTROL**

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency which employs an AWS certified weld inspector (CWI) to inspect all new field welds.
- B. Completed welded connections shall be visually inspected according to AWS D1.1 and inspected by magnetic particle examination in accordance with ASTM E1444 or dye penetrant inspection in accordance with ASTM E165; use ASNT Level II or Level III inspector.
- C. Correct deficiencies in Work that inspection and testing indicate do not comply with Contract Documents.

**END OF SECTION**