

## SECTION 051213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:

1. Architecturally exposed structural steel (AESS).
2. Section 051200 "Structural Steel Framing" requirements that also apply to AESS.

- B. Related Requirements:

1. Section 099113 "Exterior Painting" Section 099123 "Interior Painting" Section 099600 "High-Performance Coatings" and Section 078123 "Intumescent Fire Protection" for surface preparation and priming requirements.

#### 1.3 DEFINITIONS

- A. AESS: Architecturally exposed structural steel.
- B. Category AESS 2: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 2 and may be designated AESS 2, AESS Category 2, or Category AESS 2 in the Contract Documents.

#### 1.4 COORDINATION

- A. Coordinate surface preparation requirements for shop-primed items.
- B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

#### 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

## 1.6 ACTION SUBMITTALS

### A. Product Data:

1. Tension-control, high-strength, bolt-nut-washer assemblies.
2. Filler.
3. Primer.
4. Galvanized-steel primer.
5. Etching cleaner.
6. Galvanized repair paint.

### B. Shop Drawings: Show fabrication of AECS components. Shop Drawings for structural steel may be used for AECS.

1. Identify AECS category for each steel member and connection, including transitions between AECS categories and between AECS and non-AECS.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Indicate orientation of mill marks and HSS seams.
4. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed. Indicate grinding, finish, and profile of welds.
5. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation and location of bolt heads.
6. Indicate exposed surfaces and edges and surface preparation being used.
7. Indicate special tolerances and erection requirements.
8. Indicate surface preparation, primer, and coating requirements, including systems specified in other Sections.

### C. Samples: Submit Mockup Samples to set quality standards for AECS. Paint mockups in accordance Section 078123 "Intumescent Fire Protection" to display final surface appearance.

1. Two steel plates, 3/4 by 8 by 8 inches, placed in a T-shape, with long edges joined by a complete penetration groove weld per AECS 2.
2. Two W8x10 x 1 foot long, mitered at a 90 degree corner and joined with complete penetration groove welds, continuous from top flange, through web, to bottom flange, per AECS 2. Remove backer bars and fill weld access holes.
3. Two W8x10 x 1 foot long, placed in a T-configuration to form a beam to girder moment connection. Join flanges with complete penetration groove welds, and webs with fillet welds on each side, per AECS 2. Remove backer bars and fill weld access holes.

## 1.7 INFORMATIONAL SUBMITTALS

### A. Qualification Data: For Installer, fabricator, shop-painting applicator.

### B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

## 1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172) and is experienced in fabricating AESS similar to that indicated on this Project.
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program, is designated an AISC-Certified Erector, Category CSE, and is experienced in erecting AESS similar to that indicated on this Project.
- C. Mockups: Build mockups of AESS to set quality standards for fabrication and installation.
  - 1. Build mockup of typical portion of AESS as described in these specifications.
  - 2. Coordinate intumescent paint requirements with Section 078123 "Intumescent Fire Protection" for surface preparation and priming requirements.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling AESS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AESS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AESS members and packaged materials from corrosion and deterioration.
  - 1. Do not store AESS materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.
  - 2. Replace damaged materials or structures as directed.

## 1.10 FIELD CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with requirements of ANSI/AISC 303, Sections 1 through 9 and as modified in Section 10, "Architecturally Exposed Structural Steel."

### 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength, Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade A325, hex-head assemblies; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish:
  - a. Interior: Plain.
  - b. Exterior exposed to weather: Mechanically deposited zinc coating.

## 2.3 FILLER

- A. Polyester filler intended for use in repairing dents in automobile bodies.

## 2.4 PRIMER

- A. Steel Primer:
  1. Comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," Section 099600 "High-Performance Coatings," and Section 078123 "Intumescent Fire Protection".
  2. SSPC-Paint 23, latex primer; two coats, and compatible with topcoat.
- B. Galvanized-Steel Primer: MPI#26 or MPI#134. MPI#101 When epoxy or other two component systems are specified.
  1. Etching Cleaner: MPI#25, for galvanized steel.
  2. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

## 2.5 FABRICATION

- A. Shop fabricate and assemble AECS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
  1. Use special care handling and fabricating AECS before and after shop painting to minimize damage to shop finish.
- B. Category AECS 2:
  1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
  2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
  3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
  4. Make intermittent welds appear continuous, using filler or additional welding.
  5. Seal weld open ends of hollow structural sections with 3/8-inch (9.5-mm) closure plates.
  6. Limit butt and plug weld projections to 1/16 inch (1.6 mm).
  7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
  8. Remove weld spatter, slivers, and similar surface discontinuities.

9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.
12. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
13. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
14. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
15. Conceal fabrication and erection markings from view in the completed structure.
16. Make welds uniform and smooth.

## 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
  1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

## 2.7 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123/A123M.
  1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
  2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

## 2.8 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
  1. Surfaces to be field welded.
- B. Surface Preparation: Clean nongalvanized surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  1. SSPC-SP 6 (WAB)/NACE WAB-3.
- C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

- D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Stripe prime corners, crevices, bolts, welds, and eased edges.
  - 2. Apply two coats of shop primer to all surfaces. Change color of second coat to distinguish it from first.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
  - 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments, showing dimensions, locations, angles, and elevations.
- B. Examine AECS for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep AECS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
  - 1. Repair damage in accordance with the category of AECS specified to the satisfaction of the Architect.

### 3.3 ERECTION

- A. Take special care during erection to avoid marking or distorting the AECS and to minimize damage to shop painting. Set AECS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.
  - 1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
    - a. Repair damage in accordance with the category of AECS specified to the satisfaction of the Architect.
  - 2. Grind tack welds smooth.
  - 3. Remove backing and runoff tabs, and grind welds smooth.

4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
  5. Remove erection bolts in AESS, fill holes with weld metal or filler, and grind or sand smooth to achieve surface quality approved by Architect.
  6. Fill weld access holes in all AESS with weld metal or filler and grind, or sand smooth to achieve surface quality as approved by Architect.
  7. Conceal fabrication and erection markings from view in the completed structure.
- B. In addition to ANSI/AISC 303, Section 10 requirements, comply with the following.
1. Erection of Category AESS 2:
    - a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
    - b. Comply with AWS D1.1/D1.1M. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
    - c. Remove weld spatter, slivers, and similar surface discontinuities.
    - d. Grind off butt and plug weld projections larger than 1/16 inch.
    - e. Continuous welds shall be of uniform size and profile.
    - f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
    - g. Splice members only where indicated on Drawings.
    - h. No torch cutting or field fabrication is permitted.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

### 3.5 REPAIR

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and touchup galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting:
1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop primer, and paint exposed areas with the same material as used for shop priming, to comply with SSPC-PA 1 for touching up shop-painted surfaces.
    - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

2. Cleaning and touchup painting are specified in Section 099113 "Exterior Painting," Section 099123 "Interior Painting," Section 099600 "High-Performance Coatings," and Section 078123 "Intumescent Fire Protection".

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to inspect AECS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
- B. Architect will observe AECS in place to determine acceptability relating to aesthetic effect.

END OF SECTION 051213