SECTION 051200 - 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. Description:
   1. This section includes elements of the structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
   2. This section does not include Miscellaneous Metal Fabrications.

B. Related Documents and Standards:
   1. All referenced standards and cited publications shall be those specifically denoted within the applicable building code noted in the General Notes of the Construction Drawings.
   2. All Structural Steel work on this project shall conform to the Construction Documents, applicable building code including referenced standards, and the requirements of AISC 360 “Specification for Structural Steel Buildings”, RCSC “Specification for Structural Joints Using High-Strength Bolts”, and AISC303 “Code of Standard Practice for Steel Buildings and Bridges” in coordination with clarifications, exemptions, and additions in the Construction Documents.

C. Related Sections:
   1. Division 05 Specifications – Steel Construction.
   2. Division 09 Specification – Finishes

1.3 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 (Acceptance Criteria 172)..

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Structural-steel materials.
   2. High-strength, bolt-nut-washer assemblies.
   3. Shear stud connectors.

4. Anchor rods.
5. Threaded rods.
6. Forged-steel hardware.
7. Slide bearings.
8. Prefabricated building columns.
9. Shop primer.
10. Galvanized-steel primer.
11. Etching cleaner.
12. Galvanized repair paint.
13. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.
1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. 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 and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. Identify members and connections of the seismic-load-resisting system.
6. Indicate locations and dimensions of protected zones.
7. Identify demand-critical welds.
8. Identify members not to be shop primed.
9. Delegated Design Submittal: For structural steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation who shall be licensed in the state of Georgia.

1.5 INFORMATION SUBMITTALS

A. Qualification Data: For qualified Installer and Fabricator.

B. Welding certificates.

C. Material (Mill) test reports for structural steel, including chemical and physical properties.

D. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength bolt-nut-washer assemblies.
4. Steel headed stud anchors (shear connectors/shear studs).
5. Shop primers.

E. Source quality-control reports.

F. Survey of existing conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
   1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
   2. Clean and relubricate bolts and nuts that become dry or rusty before use.
   3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting fasteners after lubrication.

1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

C. All Structural Steel not receiving fire-proofing shall receive one shop coat of rust-inhibitive primer. All steel with exterior exposure shall be painted with a double coat of rust prohibitive epoxy primer (material and thickness to be specified by Architect) unless noted as galvanized or architecturally exposed structural steel.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connection Design Information:
   1. Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
   2. Use Allowable Stress Design; data are given at service-load level.
   3. Where beam shear is not noted, the connections shall develop the beam shear V = W/2 where W is the total allowable beam uniform load based on laterally supported simple span moments per tables located in the AISC Steel Construction Manual.

B. Moment Connections: Type FR, fully restrained.

C. Steel Frame Construction Type: As indicated in the Structural Construction Drawings.

2.2 STRUCTURAL-STEEL MATERIALS

A. Provide Structural Steel materials meeting the standards and grades set forth in the Construction Drawings.

2.3 BOLTS, CONNECTORS, AND ANCHOR RODS

A. Provide Bolts, Connectors, and Anchors of materials meeting the standards and grades set forth in the Construction Drawings.

2.4 SHRINKAGE-RESSISTANT GROUT

A. Provide shrinkage-resistant grout materials meeting the standards and grades set forth in the Construction Drawings.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with AISC 303 "Code of Standard Practice for Steel Buildings and Bridges" and to AISC 360.
   1. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
   4. Mark and match-mark materials for field assembly.
   5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermally cut, or punch holes perpendicular to steel surfaces. Do not free-hand thermally cut bolt holes or enlarge holes by burning.

D. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members only as indicated in Structural Construction Drawings.
   1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not free-hand thermally cut bolt holes or enlarge holes by burning.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
   3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

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 in the Construction Drawings.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

2.7 PRIMER PAINT

A. Fabricator's standard rust-inhibiting grey primer. Do not prime steel that is to receive fire-proofing spray. Provide finish where indicated on Construction Drawings (see Architectural Drawings and Division 09 specifications).

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to Structural Steel according to ASTM A123.
   1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
   2. Galvanize lintels, shelf angles, any framing exposed to earth or weather, and other framing as indicated in the Construction Drawings.

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. 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 Structural Steel 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, bracing, and diaphragms are in place unless otherwise indicated.

3.3 ERECTION

A. Set Structural Steel accurately in locations and to elevations indicated and in accordance with AISC 303 and AISC 360.

B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of base plate where indicated in Structural Construction Drawings.
   3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

C. Maintain erection tolerances of Structural Steel within AISC 303 "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Construction Drawings.
   2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

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 in the Construction Drawings.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
   2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
   3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION 051200