

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1—GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Section Includes:
 - 1. Shop Drawings and Submittals: 013323
 - 2. Testing Laboratory Services: 014529
 - 3. Materials and Equipment: 016000
 - 4. Metal Fabrications: 055000
 - 5. Concrete: Division 3

1.2 STANDARDS

- A. Comply with applicable portions of "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" by AISC as supplemented by requirements of this Section.
- B. Comply with applicable requirements of the "Structural Welding Code," AWS D1.1 as supplemented by requirements of this Section.

1.3 QUALITY ASSURANCE

- A. Fabrication and erection shall be in accordance with AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings," including the "Commentary on the AISC Specifications" and, where work is exposed in the completed construction, the "Specification for Architecturally Exposed Structural Steel."
- B. Welding procedures, welders, welding operations, and tackers shall be in accordance with AWS "Structural Welding Code D1.1." The Contractor shall pay for the services of the Testing Laboratory to certify welders for the project, if their certificates have expired.
- C. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated. Unless otherwise noted on the Drawings, connections shall develop one-half the uniform load capacity of the beam for the given span in the AISC Manual of Steel Construction Beam Tables.

- D. The design adequacy of any detail configuration of connections developed by the fabricator as part of the preparation of Shop Drawings and fabrication of material is not the responsibility of the Owner, Architect, or Architect's consultants.
- E. Paragraph 4.2.1 of the AISC "Code of Standard Practice" referenced herein is hereby amended accordingly to eliminate the acceptance of this responsibility by the Owner, the Architect, and the Architect's consultants as a result of the review and approval of Shop Drawings.

1.4 SUBMITTALS

- A. General: Submit all shop drawings and product data in accordance with the submittal requirements specified in Section 01300—"Shop Drawings and Submittals."
- B. Shop Drawings:
 - 1. Do not fabricate any material or perform any work prior to approval of Shop Drawings.
 - 2. Prepare Shop Drawings to comply with requirements of applicable portions of "Structural Shop Drawings" by AISC.
 - 3. Submit Shop Drawings indicating all shop and erection details, including cuts, copes, connections, holes, threaded fasteners, rivets, and welds.
 - 4. All welds, both shop and field, shall be indicated by AWS "Welding Symbols" A2.0-Latest Edition.
- C. Erection Procedure: Submit descriptive data to illustrate the structural steel erection procedure, including the sequence of erection and temporary staying and bracing.
- D. Welding Procedure: Submit written description as required to illustrate each welding procedure to be performed in the specified work.
- E. Field Welding Equipment: Submit descriptive data for field welding equipment, including type, voltage, and amperage.
- F. Submit Welder Certifications.

1.5 TESTING LABORATORY REPORTS

- A. Submit the following reports, in duplicate, directly to the Architect from testing laboratory, with a copy to the Contractor and others as indicated.
 - 1. Welding Inspection and Test Reports
 - a. Shop Welding:
 - (1). Visual
 - b. Field Welding:
 - (1). Visual
 - 2. Bolted Connection Inspection and Test Reports (Torque Readings)
 - a. High-Strength Bolting, Field

1.6 PRODUCT DELIVERIES; STORAGE AND HANDLING

- A. Material Storage: Protect structural steel members and packaged materials from corrosion and deterioration.
- B. Do not store materials on the structure in a manner that might cause distortion or damage to the members or the supporting structures. Repair or replace damaged materials or structures as directed.

PART 2—PRODUCTS

2.1 MANUFACTURE

- A. Certain items in this specification are listed by manufacturer and/or manufacturer's model number to establish general style, type, character, and quality of products desired. Similar items manufactured by other than those listed will be considered, provided submittals are made according to Pre-Bid Approval requirements.
- B. Where no manufacturer or model number are given, any product meeting performance of design criteria or referenced trade association standard may be used, and Pre-Bid Approval is not required.

2.2 STEEL

- A. All steel required for this structure shall be new stock conforming to the "Specifications for Steel for Bridges and Buildings" of ASTM and as follows:
 - 1. Rolled Steel Plates, Rods, and Bars: ASTM A 36 unless otherwise indicated.
 - 2. Pipes and Tubing: ASTM A 500 Grade B
 - 3. Rolled Shapes: ASTM A572 Gr. 50.
 - 4. Wide Flange: ASTM A992.

2.3 CONNECTIONS

- A. Welding Electrodes: E70 Series of AWS
- B. Bolts and Nuts:
 - 1. Anchor Bolts: ASTM A 307
 - 2. Bolted Connections: ASTM A 325.
- C. Expansion Bolts: USM Parabolt, Red Head Sleeve Anchors, Hilti Kwik-Bolt, or approved equal.
- D. Adhesive Anchors: Two-component vinyl ester resin bonded anchors as manufactured by Hilti, Molly, Ramset/Red Head, or equal.

2.4 GROUTS

- A. Shrinkage Resistant Grout: Non-metallic type, CRD-C 621 (Corps of Engineers), with controlled expansion (not over 0.4% at any age).
- B. Epoxy Grout: Por-Rok Epoxy Grout, Five Star Epoxy Grout, Sikadur Grout-Pak, Dural 211, or approved equal.

2.5 PROTECTIVE COATINGS

- A. Galvanizing: ASTM A 123 and a 386 (A 153 for threaded fasteners).
- B. Galvanizing Repair Compound: Two-component zinc-rich paint, ASTM A780.
- C. Steel Primer Paint: Standard with fabricator and compatible with finish coat.

2.6 FABRICATION

- A. Fabricate structural steel in accordance with current edition of specifications adopted by AISC.
- B. All shop connections shall be welded, unless otherwise noted. Welded joints shall be designed for full strength of each member in shear, and shall be in accordance with latest specifications of AWS.
- C. Shop-fabricate all holes, apertures, chases, and other openings necessary for the installation of mechanical and electrical work. No holes shall be cut in erected structural members without the permission of the Architect. Holes made in the field shall not be burned.

2.7 SHOP PAINTING

- A. Surface Preparation: After inspection and before shipping, clean steel-work to be painted in compliance with SSPC Articles SP 1, "Solvent Cleaning", and SP-3, "Power Tool Cleaning," or SP-7, "Brush-off Blast Cleaning".
- B. Shop-paint all surfaces of non-galvanized structural steel work. Do not paint contact surfaces, which are to be welded, high-strength bolted, or riveted.
 - 1. Apply two (2) coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.
- C. Application: Immediately after surface preparation, apply specified structural steel primer paint, in accordance with manufacturer's instructions and at rate to provide uniform dry-film thickness of 2.0 mils. Use painting methods which will result in full coverage of joints, edges, corners, and all exposed surfaces.

2.8 GALVANIZING

- A. Hot-dip galvanize surfaces of structural steel that will remain exposed to weather upon completion and work that is to be embedded in concrete or masonry. Galvanize other surfaces as indicated.
- B. Galvanize bolts, nuts, screws, and other fastening devices in accordance with ASTM A 153.
- C. Use galvanizing repair compound for small areas not hot-dip galvanized or for retouching or repairing galvanized coating that has been damaged.
- D. Galvanizing requirements do not apply to items specified to be delivered to Project site with factory-applied finish.

PART 3—EXECUTION

3.1 EXAMINATION

- A. Erector must examine areas and conditions under which structural steel work is to be installed, and must notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work.
- B. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to erector.

3.2 GENERAL PROCEDURES

- A. Comply with AISC "Specifications and Code of Standard Practice," and with specified requirements. Maintain work in safe and stable condition during erection.
- B. Install structural steel level, true to a line plumb, or as indicated. Shim bearing plates with metal and grout solid.
- C. Weld field connections unless detailed otherwise. Grind smooth field welds that will remain exposed upon completion of work, and treat with same material as shop coat. Conceal all fastenings where practicable.
- D. Flame cutting of steel on site will be permitted only with specific approval from the Architect.
- E. Comply with AISC Specification "Architecturally Exposed Structural Steel" where erecting steel which will remain exposed in the completed construction.

3.4 ANCHORING SYSTEMS

- A. Provide anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.
- B. Provide templates and other devices as necessary for pre-setting bolts and other anchors in accurate locations.
- C. Expansion bolts will not be permitted, except where indicated on the drawings.

3.5 BASE PLATES

- A. Clean concrete and masonry-bearing surfaces, and roughen to improve bond. Clean bottom surface of base plates.
- B. Set loose and attached base plates for structural members on wedges, bolts, or other adjustable devices.
- C. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut or grind off flush with edge of base plate prior to packing with grout.
- D. Pack shrink-resistant bedding grout solidly between bearing surfaces of bases and plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure. Cure in accordance with manufacturer's written recommendations. See Section 03300 for placement and curing schedule requirements for grout.
- E. Install expansion bearings in accordance with manufacturer's recommendations. Attach with continuous welds.

3.6 FIELD ASSEMBLY

- A. Set structural members to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembling, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- B. Level and plumb individual members of structure within specified AISC tolerances.
- C. Establish required leveling and plumbing measurements on the mean operating temperature of structure.
- D. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- E. Do not use gas cutting torches in field for correcting fabrication errors in structural framing, except with written approval of the Architect. Finish gas-cut sections equal to a sheared appearance.

3.7 FIELD WELDING

- A. Provide all welds in accordance with the latest issue of the AWS "Structural Welding Code." Finished members shall be true to line and free from twists, bends, and open joints. Finished work shall be subject to final approval of Architect. Particular care shall be exercised in welding light members to prevent burning of same.
- B. Do not use any welder on Project unless he or she has been qualified in the past twelve (12) months by an approved testing laboratory in accordance with requirements of the AWS.

3.8 HIGH-STRENGTH BOLTED CONNECTIONS

- A. Install high-strength threaded fasteners in accordance with AISC "Specification for Structural Joints."
- B. Tighten each fastener to provide, when all fasteners in joint are tight, at least the minimum tension shown in "Table 3" of the above publication for size and grade fasteners used. Use only wrenches for tightening, calibrated in accordance with the above publication.

3.9 TOUCH-UP PAINTING

- A. Touch-up paint field welds, bolted connections, and abraded areas of shop coating immediately after erection.
- B. Touch-up damaged galvanized surfaces with galvanizing repair compound or approved equal.
- C. Remove all rust, dirt, weld flux, and welding spatter before touch-up is applied.

END OF SECTION

SECTION 05 73 00

DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior steel decorative railings and benches.
2. Interior steel railings.

B. Related Sections:

1. Division 5 Section "Metal Fabrications" for miscellaneous metal requirements.
2. Division 9 Painting Sections for finishes.

1.2 DEFINITIONS

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Steel: 72 percent of minimum yield strength.

- C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Railings:

- a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
- b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Railings:

- a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
- b. Infill load and other loads need not be assumed to act concurrently.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of railings assembled from standard components.
 - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Qualification Data: For qualified professional engineer.
- E. Mill Certificates: Signed by manufacturers of steel products certifying that products furnished comply with requirements.
- F. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including structural analysis, preconstruction testing, field testing, and in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.

PART 2 - PRODUCTS

2.1 AVAILABLE FABRICATORS AND INSTALLERS

- A. Architectural Glass and Metal, Steve Corts, (225) 751-8889.
- B. Manufab Inc., Rick Ledet, 129 E 3rd St. Kenner LA 70062-7099, (504) 466-2368.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Bars, Plates and Anchors: Same metal and finish as supported rails unless otherwise indicated.
 - 1. Provide formed-steel plates with predrilled hole for bolted anchors with decorative heads.

2.3 STEEL AND IRON

- A. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- B. Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

2.4 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Type 304 stainless-steel fasteners for exterior.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.6 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
- F. Form changes in direction as follows:
 - 1. As detailed.
- G. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- H. Close exposed ends of hollow railing members with prefabricated end fittings.
- I. Provide round plates at intersection of posts and horizontal surfaces.
- J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.8 STEEL AND IRON FINISHES

- A. Non-galvanized-steel railings:
 - 1. Provide non-galvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except stainless steel anchors and galvanized steel base plates to be embedded in, or attached to exterior concrete or masonry.
- B. Finish: Prepare, treat, and coat ferrous metal as per Division 9 Painting Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine concrete assemblies and reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

3.4 ANCHORING POSTS

- A. Use steel sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions or:
- B. Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

3.5 ATTACHING RAILINGS

- A. Attach handrails to walls with wall brackets. Provide brackets with 2-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

3.6 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION