

# *DIVISION* 5

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METALS

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## SECTION 05120

### STRUCTURAL STEEL

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
1. Scope: The Contract Drawings, including schedules, notes and details, show size and location of members, typical connections, and type of steel required. This Section includes all structural steel work as defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as shown on Drawings.
- B. Related Sections:
1. Section 01450 • Testing Laboratory Services
  2. Section 03300 • Cast-In-Place Concrete
- 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, all connections shall develop one-half of the total allowable uniform load capacity of the beam for the given span in the AISC Manual of Steel Construction Beam Tables. Greater loadings will be shown on the drawings.
1. 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.
  2. 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.

##### 1.2 SUBMITTALS

- A. General: Submit the following in accordance with Section 01300. (Hard copies are required.)
- B. Product Data: Producer's or manufacturer's specifications, installation instructions, laboratory test reports and other data to show compliance with specifications (including specified standards) for following products:
1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
  2. High-strength bolts (each type), including nuts and washers.
  3. Structural steel primer paint.
  4. Shrinkage-resistant grout.

- C. Shop Drawings: Complete details and schedules for fabrication and assembly of structural steel members.
  - 1. Include details of cuts, connections, camber, holes, and other pertinent data.
  - 2. Indicate welds by standard AWS symbols. Show size, length, and type of each weld.
  - 3. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other Sections.
  - 4. Submit calculations of all steel connections, excluding connections fully detailed on the Drawings, stamped by a Louisiana Registered Engineer.
- D. All connections not specifically detailed on the drawing, including standard connections shall be designed by a Registered Louisiana Engineer retained and compensated by the contractor.

### 1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
  - 1. AISC "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including "Commentary" and Supplements thereto as issued.
  - 3. AISC "Specifications for Architecturally Exposed Structural Steel."
  - 4. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.
  - 5. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."
  - 6. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
- B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."
  - 1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
  - 2. If recertification of welders is required, retesting will be Contractor's responsibility.
- B. Source Quality Control: Materials and fabrication procedures are subject to inspection and tests in mill, shop and field, conducted by inspection agency specified in Section 01410. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements. Promptly remove and replace materials or fabricated components which do not comply.

### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Delivery Schedule and Sequence:
  - 1. Deliver materials to site at such intervals to insure uninterrupted progress of work.

2. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.
- B. Storage and Handling: Comply with applicable requirements of Section 01600 and the following.
1. Store materials to permit easy access for inspection and identification.
  2. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
  3. Do not store materials in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.
  3. Handle materials to avoid damage to materials and other construction.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: For work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, General: For work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names and roughness. prior to cleaning, treating and application of surface finishes. All steel shall be produced and fabricated from sources in the United States.
- B. Structural Steel Shapes: ASTM A992 Grade 50 as noted on the Drawings. Plates and Bars ASTM A36, Other rolled sections ASTM A572.
- C. Cold-Formed Steel Tubing: ASTM A 500, Grade C.
- D. Hot-Formed Steel Tubing: ASTM A 501.
- E. Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501. Black finish, except where indicated to be galvanized.
- F. Anchor Bolts: ASTM A 307, nonheaded type unless otherwise indicated.
- G. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts. Provide either hexagonal or square, heads and nuts, except use only hexagonal units for exposed connections.
- H. High-Strength Threaded Fasteners: Quenched and tempered medium-carbon steel heavy hexagon structural bolts, heavy hexagon nuts and hardened washers, complying with ASTM A 325.
1. Where indicated to be galvanized, provide bolts, nuts and washers zinc coated by hot-dip galvanizing (ASTM A 153) or by mechanical depositing (ASTM B 695, Class 50).

- I. Electrodes for Welding: Comply with AWS Code.
- J. Structural Steel Primer Paint:
  - 1. SSPC - Paint 13 at all steel not exposed to view in the final structure and not scheduled to receive spray applied fireproofing.
- K. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean, uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum water required for placement of hydration.
- L. Non-Metallic Shrinkage-Resistant Grout:
  - 1. Pre-mixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CE-CRD-C621.
  - 2. Subject to compliance with requirements, products which may be used include, but are not limited to, the following:
    - a. Euco N. S.; Euclid Chemical Company.
    - b. Crystex; L & M Construction Chemicals.
    - c. Masterflow 713; Master Builders.
    - d. SonogROUT G.P.; Sonneborn Building Products.
    - e. Five Star Grout; U. S. Grout Corp.
- M. Shear studs: Shear Studs: Shall be shear connectors with proper ferrules and accessories, especially designed to create composite action between concrete and the supporting beam. Steel for studs shall conform to ASTM A 108, Grades 1015-1020, with a minimum tensile strength of 60,000 psi. Studs shall be of uniform diameter, heads shall be concentric and normal to shaft and the weld end shall be chamfered, welds shall be solid flux.

## 2.2 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.
  - 1. Properly mark and match - mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
  - 2. Where shop painting or galvanizing is required, complete assembly, including welding of units, before start of surface preparation for painting or galvanizing.
  - 3. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Connections: Weld or bolt shop connections, as indicated.
  - 1. Bolt field connections, except where welded connections or other connections are indicated.

2. Provide high-strength threaded fasteners for all bolted connections, except where unfinished bolts are indicated.
- C. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts."
- C. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
- D. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.
1. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
  2. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

### 2.3 PROTECTIVE COATINGS

- A. General: Shop paint structural steel, except galvanized items and members or portions of members to be embedded in concrete and members to receive sprayed on fire proofing. Paint steel which is partially embedded on exposed portions and initial 2" of embedded areas only.
1. Do not paint surfaces which are to be welded or high-strength bolted with friction-type connections.
  2. Apply two (2) coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with the following Steel Structures Painting Council (SSPC) specifications:
1. Nuts and bolts are to be cleaned in accordance with SSPC-SP1 prior to shop painting to completely remove all oil, dirt, grease and all other soluble surface contaminants.
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils for SSPC-Paint 13. Use painting methods that will result in full coverage of joints, corners, edges and exposed surfaces.
- D. Galvanizing: ASTM A123/123M and ASTM A153/153M for threaded fasteners. Galvanizing repair compound shall be a two-component zinc-rich paint, ASTM A 780.

### PART 3 - EXECUTION

### 3.1 ERECTION

- A. Examination: Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.
- B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- C. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces; remove bond-reducing materials and roughen to improve bond. Clean contact surfaces of base and bearing plates.
  - 1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
  - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
  - 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow it to cure. For proprietary grout materials, comply with manufacturer's instructions.
- D. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust members before permanently fastening. Before assembly, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
  - 2. Level and plumb individual members of structure within specified AISC tolerances.
  - 3. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
  - 4. Splice members only where indicated and accepted on shop drawings.
- E. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.

- F. Bolted Connections: 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.
- G. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Architect. Finish gas-cut sections, when permitted, equal to a sheared appearance.
- H. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas.
  - 1. Apply paint to exposed areas of shop primed items, using same material as used for shop painting, by brush or spray to provide a minimum dry film thickness of 1.5 mils.
- I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Shop weld shear connectors, shaped as shown, to beams and girders in composite construction which do not support metal deck. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.
  - 1. Installation of Shear Connectors: Shear studs shall be automatically end welded in the shop in accordance with Article 31 of the AWS Structural Welding Code and the specifications of the shear stud manufacturer. After installation, each ceramic ferrule shall be removed prior to placement of concrete. Adequate welding power must be available for studs being welded.
  - 2. All areas to which studs are to be attached shall be cleaned of all rust, oil, grease, and paint. When the mill scale is sufficiently thick to cause difficulty in obtaining proper welds, it shall be removed by grinding or sand blasting.

### 3.2 QUALITY CONTROL

- A. Testing Laboratory: Independent testing and inspection agency specified in Section 01450 shall inspect high-strength bolted and welded connections, perform tests, and submit test reports.
  - 1. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations there from.
  - 2. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
  - 3. Testing agency may inspect structural steel at plant before shipment; however, Architect reserves right, at any time before final acceptance, to reject material not complying with specified requirements.
- B. Contractor's Responsibilities: Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any noncompliance of original work, and as may be necessary to show compliance of corrected work.

- C. Shop Bolted Connections: Testing laboratory shall inspect in accordance with AISC specifications. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.
- D. Shop Welding: Testing laboratory shall inspect and test during fabrication of structural steel assemblies, as follows:
  - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
  - 4. Perform visual inspections of all welds.
  - 5. Perform tests on random 10% of full-strength welds as follows: Inspection procedures listed are to be used at Laboratory's option.
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 109; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
    - c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T".
    - d. Ultrasonic Inspection: ASTM E 164.
- E. Field Bolted Connections: Testing Laboratory shall inspect in accordance with AISC Specifications. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.
- F. Field Welding: Testing Laboratory shall inspect and test during erection of structural steel as follows:
  - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
  - 2. Perform visual inspection of all welds.
  - 3. Perform tests on random 10% of full strength welds and other welds as required by AISC, as follows:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 109; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
    - c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2- 2T."
    - d. Ultrasonic Inspection: ASTM E 164.

END OF SECTION

## SECTION 05310

### STEEL DECK

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes: Steel deck units for floor and roof applications.
- B. Related Sections:
  - 1. Section 01450 - Testing Laboratory Services.
  - 2. Section 05120 - Structural Steel.

##### 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories.
- B. Shop Drawings: Submit shop drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, cant strips, cut openings, special jointing and other accessories.

##### 1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the following codes and standards, except as otherwise indicated:
  - 1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members".
  - 2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel".
  - 3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks".
- B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.
- C. Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.
- D. FM Listing: Provide metal roof deck units that have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire-rated construction.
- E. Testing: Refer to "Section 01450 - Testing Laboratory Services".

##### 1.4 JOB CONDITIONS

- A. Coordination: Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading structural members.
- B. Safety: Do not use deck for storage or working platforms until units are permanently secured. Do not permit storage and operations on installed deck which could damage or deform the deck units.
- C. Deck Insulation: Coordinate and cooperate with roof insulation installer to provide deck satisfactory for application of insulation.
- D. Ceiling Hangers: Coordinate and cooperate with ceiling installers for placing hangers.

## PART 2 - PRODUCTS

### 2.1 STEEL DECK

- A. Description: Dimensions and properties of steel deck are shown on the Drawings. Deck configuration shall be similar to that indicated. Allowable stress shall equal or exceed that of the deck specified on the Drawings.
- B. Deck Type:
  - 1. Deck sizes and types all indicated on the drawings.

### 2.2 MATERIALS

- A. Steel for Galvanized Metal Deck Units: ASTM A 446, Grade as required to comply with SDI Specifications.
- B. Miscellaneous Steel Shapes: ASTM A 36.
- C. ASTM A 526, commercial quality, galvanized.
- D. Galvanizing: ASTM A 525, G60.
- E. Galvanizing Repair Compound: High zinc dust content paint for repairing damage and regalvanizing welds, with dry film containing not less than 94% zinc by weight, and complying with ASTM A 780.
- F. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

### 2.3 FABRICATION

- A. General: Form deck units in lengths to span three or more supports, with flush, telescoped or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.

- B. Deck Units: Provide deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck".
- C. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units and approximately 6 inches wide.
- D. Metal Closure Strips: Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045-inch min. (18 gage) sheet steel. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General: Install deck units and accessories in accordance with manufacturer's recommendations, shop drawings, and as specified herein.
  - 1. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
  - 2. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.
  - 3. Place deck units flat and square, secured to adjacent framing without warp or deflection.
  - 4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
- B. Floor Deck:
  - 1. Fasten floor deck units to steel supporting members by nominal 3/4 inch puddle welds or elongated welds of equal strength, spaced not more than 12 inches o.c. with a minimum of two welds per unit at each support. Fasten end closures with tack weld or use self-tapping No. 8 or larger machine screws at 3'-0 o.c.
- C. Roof Deck:
  - 1. Fasten roof deck units to steel supporting members by not less than 3/4-inch-diameter puddle welds or elongated welds of equal strength, spaced not more than 12 inches at every support and 6' o.c. at edges. In addition, secure deck to each supporting member in ribs where side laps occur.
  - 2. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Use welding washers where recommended by deck manufacturer.
  - 3. Mechanically fasten side laps of adjacent deck units between supports, at intervals not exceeding 36 inches o.c., using self-tapping No. 8 or larger machine screws
- D. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.

- E. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.
- F. Hanger Slots or Clips: Provide UL-approved punched hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.
  - 1. Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.
  - 2. Locate slots or clips at not more than 14 inches o.c. in both directions, not over 9 inches from walls at ends, and not more than 12 inches from walls at sides, unless otherwise indicated.
  - 3. Provide manufacturer's standard hanger attachment devices.
- G. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units.
- H. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction. Weld into position to provide a complete decking installation.
  - 1. Provide flexible closure strips instead of metal closures, at Contractor's option, wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.
  - 2. Provide a minimum of ¼" edge angle at all floor and roof penetrations.
- I. Touch-Up Painting: After decking installation, wire brush, clean and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
  - 1. Touch-up galvanized surfaces with galvanizing repair paint in accordance with ASTM A 780.

### 3.2 QUALITY CONTROL

- A. Owner selected and compensated independent testing laboratory shall visually inspect all deck attachments to structure and sidelap deck attachment.

END OF DOCUMENT

SECTION 05400

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Non-load-bearing wall framing.
    - a. Provide wall framing behind metal wall panels, as indicated on the drawings and as approved by metal wall panel manufacturer.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
  - 1. Wind Speed: 130 mph.
  - 2. Deflection limits : Design framing systems to withstand design without deflections greater than the following:
    - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.

1.3 SUBMITTALS

- A. General: The following submittal package shall be submitted as a complete package, including the following listed below. Individual submittals will be returned unaccepted until the complete package is submitted.
- B. Product Data: For each type of cold-formed metal framing product and accessory indicated. Include manufacturer's installation instructions, indicating procedures and conditions requiring special attention.
- C. Shop Drawings: Show layout, spacing, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Provide deflection framing system and details.
  - 1. For the cold-formed metal framing system to comply with design loads, include structural analysis data signed and sealed by a qualified professional engineer licensed in the State of Louisiana responsible for their preparation.
- D. Welding certificates: Provide copies of certificates with photo I.D.
- E. Product test reports.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain all types of cold-formed metal framing systems through one source from a single manufacturer.
- B. Installers Qualifications: An experienced installer who has completed cold-formed metal framing similar in material, design and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of Louisiana who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design and extent.
- D. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements.
- E. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel."
- F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
  - 1. Clark Western Building Systems.
  - 2. Dietrich Metal Framing.
  - 3. MarinoWare.
  - 4. SCAFCO Corporation.

### 2.2 MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, with a minimum G60 metallic coating according to ASTM A 653. Cold formed metal framing shall comply with design loads.

### 2.3 NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm) 20 gauge.
  - 2. Flange Width: A minimum 1-5/8-inches.
- A. Steel Track (Running Channel): Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and same minimum base-metal thickness as steel studs.
- B. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges.
- C. Vertical Deflection Clips: Manufacturer's standard bypass head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with straight flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.

- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with straight flanges for fire rated and special conditions.
- F. Cold-Rolled Channel Bridging: 0.0538 inch (1.37 mm) 16 gage, bare-steel thickness, with minimum 1/2-inch wide flanges.
  - 1. Depth: 1-1/2-inch.
  - 2. Clip Angle: Not less than 1-1/2 by 1-1/2-inches, 0.068-inch (14 gage) thick, galvanized steel.

## 2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members, unless otherwise indicated.
- B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- C. Anchor Bolts: ASTM F 1554, Grade as required per design loads threaded carbon-steel headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- D. Expansion Anchors: Fabricated from stainless steel at exterior walls and galvanized with a minimum of G60 coating on all other walls, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- E. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from stainless steel at exterior walls and galvanized with a minimum of G60 coating on all other walls, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- F. Mechanical Fasteners: ASTM C 1513, stainless steel at exterior walls and galvanized with a minimum of G60 coating on all other walls, self-drilling, self-tapping steel drill screws.
- G. Welding Electronics: Comply with AWS standards.

## 2.5 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonstick Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.
- F. Thermal Insulation: Refer to Division 07 Section "Building Insulation."

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## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

### 3.2 INSTALLATION, GENERAL

- A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
- C. Install framing members in one-piece lengths.
- D. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- F. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, and multiple studs at openings, that are inaccessible on completion of framing work.
- G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- H. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### 3.3 WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacing as follows:
  - 1. Anchor Spacing: As shown on Shop Drawings.
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch (3 mm) between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
  - 1. Stud Spacing: 16 inches (406 mm), unless noted otherwise.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame all wall openings (doors, windows and louvers) with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
  2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
  - E. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
    1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
  - F. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
    1. Connect vertical deflection clips to studs and anchor to primary building structure, as indicated on the shop drawings.
  - G. Install horizontal bridging in stud system, spaced as indicated on Shop Drawings, but not more than 48-inches apart. Fasten at each stud intersection.
    1. Top bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track.
    2. Bridging: Cold-rolled steel channel welded or mechanically fastened to webs of punched studs.
  - H. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
- 3.4 FIELD QUALITY CONTROL
- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
  - B. Field and shop welds will be subject to testing and inspecting.
  - C. Testing agency will report test results promptly and in writing to Contractor and Architect.
  - D. Remove and replace work where test results indicate that it does not comply with specified requirements.
  - E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 3.5 REPAIRS AND PROTECTION
- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
  - B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION



SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Miscellaneous steel framing and supports.
  - 2. Shelf angles.
  - 3. Loose bearing and leveling plates.
  - 4. Metal ladders.
  - 5. Metal bollards.
- B. Products furnished, but not installed, under this Section:
  - 1. Loose steel lintels.
  - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
  - 3. Steel weld plates and angles for casting into concrete.
- C. Related Sections:
  - 1. See Division 05 Section "Metal Stairs" for metal-framed stairs.

1.2 SUBMITTALS

- A. Product Data: Submit specification and installation recommendations for manufactured products furnished under this Section, including paint products and grout. List items by manufacturer name and brand name or catalog number.
- B. Design Calculations: For items specified to meet performance criteria, provide structural data to demonstrate compliance with requirements. Data shall be sealed and signed by a professional structural engineer licensed by the State of Louisiana to provide this type of engineering.
- C. Shop Drawings: Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for items to be installed under other sections and for anchors and bolts.

PART 2 - PRODUCTS

2.1 METALS

- A. All metal in the exterior wall and exposed to the weather shall be galvanized, unless noted otherwise.
- B. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.
- C. Ferrous Metals:
  - 1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
  - 2. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.
  - 3. Steel Tubing: ASTM A 500, cold-formed steel tubing.
  - 4. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless otherwise indicated. Provide pipe with galvanized finish for exterior applications and wherever specified; provide black finish elsewhere.
  - 5. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

- D. Nonferrous Metals:
  - 1. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T6.
  - 2. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, alloy 6061-T6.
  - 3. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- E. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- F. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

## 2.2 FASTENERS

- A. General: Provide type 304 stainless-steel fasteners for exterior use and at exterior walls. Select fasteners for type, grade, and class required.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

## 2.3 MISCELLANEOUS MATERIALS

- A. Primer for Ferrous Metal (where indicated to receive paint under Section 09910): Manufacturer or fabricator selected fast-curing, lead and chromate-free, universal modified-alkyd primer complying Section 09910 - Painting.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with ASTM A 780.
- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- D. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.

## 2.4 FABRICATION

- A. General: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
  - 1. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
  - 2. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.
  - 3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
  - 4. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
  - 5. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 24 inches (600 mm) o.c.
- B. Miscellaneous Framing and Supports: Provide steel framing and supports not specified in other Sections as needed to complete the Work. Fabricate units from steel shapes, plates, and bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 1. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2. Anchors: Equip units with welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed. Except as otherwise indicated provide steel straps 1-1/4-inches wide by 1-1/4-inches by 8-inches long, spaced 24 inches on center.
  3. Finish: Galvanize miscellaneous farming and supports in exterior locations. Provide shop-primed finish for interior locations.
- C. Loose Steel Lintels:
1. Descriptions: Fabricate loose structural steel lintels from steel angles and shapes of size and at locations indicated. Weld adjoining members to form a single unit where indicated.
  2. Length: Size lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.
  3. Finish: Galvanize lintels located in exterior walls. Provide prime-painted finish for lintels in interior walls.
- D. Shelf Angles: Fabricate shelf angles of sizes indicated and for attachment to framing. Fabricate with horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c.
1. Shelf Angles in Exterior Walls: Galvanize.
  2. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.
- E. Loose Bearing and Leveling Plates: Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts. Galvanize loose steel lintels located in exterior walls.
- F. Metal Ladders: Comply with ANSI A14.3, unless otherwise indicated.
1. Elevator Pit Ladders: Comply with ASME A17.1.
  2. Space siderails 18 inches (457 mm) apart, unless otherwise indicated.
  3. Siderails: Continuous, 1/2-by-2-1/2-inch (12.7-by-64-mm) steel flat bars, with eased edges.
  4. Steel Ladder Construction: Flat bar siderails, with 3/4-inch- (19-mm-) diameter steel bar rungs fitted in centerline of siderails, plug-welded, and ground smooth on outer rail faces. Provide nonslip surfaces on top of each rung.
- G. Metal Bollards: Fabricate from Schedule 40 steel pipe, galvanize.

## 2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal fabrications after assembly.
- B. Steel and Iron Finishes:
1. Hot-dip galvanize items as indicated to comply with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable.
  2. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting," for shop painting.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.
  - 1. Fit exposed connections accurately together. Weld connections that are not to be left as exposed joints but cannot be shop welded. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication.
  - 2. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
  - 3. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- B. Field Welding: Comply with the following requirements:
  - 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 welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- C. Set bearing and leveling plates on cleaned surfaces using wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts and pack solidly with nonshrink, nonmetallic grout.
- D. Bollards:
  - 1. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
  - 2. Fill bollards solidly with concrete, mounding top surface to shed water.
  - 3. Finish: Section 09960 - High Performance Coatings.
- E. Touch up surfaces and finishes after erection.
  - 1. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 05510

METAL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Preassembled steel stairs with concrete-filled treads at the exterior. Pans shall be drilled with (3) - 1/2-inch diameter drainage holes prior to concrete fill.
  - 2. Industrial-type stairs with steel floor plate treads at the interior. Provide terrazzo treads as indicated on the drawings and as specified.
  - 3. Steel tube railings attached to metal stairs and to walls adjacent to metal stairs.
  - 4. Aluminum pivotal ladder with walk-thru handrails.
- B. See Division 05 Section "Pipe and Tube Railings" for pipe and tube railings.
- C. See Division 09 Section "Epoxy Terrazzo" for terrazzo treads.
- D. See Division 09 Section "High Performance Coatings" for steel metal stair finishes.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Stairs: Provide metal stairs capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Wind Speed: 130 mph.
  - 2. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
  - 3. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
  - 4. Uniform and concentrated loads need not be assumed to act concurrently.
  - 5. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
  - 6. Limit deflection of treads, platforms, and framing members to L/240.
- B. Structural Performance of Railing: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails:
    - 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.

1.3 SUBMITTALS

- A. Product Data: For metal stairs.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of Louisiana responsible for their preparation.

#### 1.4 COORDINATION

- A. 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. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

### PART 2 - PRODUCTS

#### 2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
- D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- E. Wire Rod for Grating Crossbars: ASTM A 510 (ASTM A 510M).
- F. Iron Castings: Either gray iron, ASTM A 48/A 48M, Class 30, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- G. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25 (Grade 170).
- H. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

#### 2.2 MISCELLANEOUS MATERIALS

- A. Fasteners: Provide stainless steel fasteners for exterior use and when built into the exterior wall.
- B. Primer and Finish: Refer to Division 9 Section High Performance Coatings.
- C. Welded Wire Fabric: ASTM A 185, 6 by 6 inches (152 by 152 mm)--W1.4 by W1.4, unless otherwise indicated.
- D. Precast Concrete Treads: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight concrete with a minimum 28-day compressive strength of 5000 psi (35 MPa) and a total air content of not less than 4 percent or more than 6 percent. Reinforce with galvanized, welded wire fabric, 2 by 2 inches (50 by 50 mm) by 0.062-inch- (1.6-mm-) diameter wire.

#### 2.3 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
  - 1. Join components by welding unless otherwise indicated.
  - 2. Use connections that maintain structural value of joined pieces.
  - 3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations.

- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without impairing work.
- E. Weld connections to comply with the following:
  - 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 welding flux immediately.
  - 4. Weld exposed corners and seams continuously unless otherwise indicated.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
- G. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

## 2.4 FABRICATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Alfab, Inc.
  - 2. American Stair, Inc.
  - 3. Sharon Companies Ltd. (The).
- B. Stair Framing: Fabricate stringers of steel channels. Construct platforms of steel channel headers and miscellaneous framing members.
  - 1. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
  - 2. Where stairs are enclosed by gypsum-board assemblies, provide hanger rods or struts to support landings from floor construction above or below.
  - 3. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal-Pan Stairs: Form risers, sub-tread pans, and sub-platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch (1.7 mm).
- D. Metal Floor Plate Stairs: Form treads and platforms from rolled-steel floor plate of thickness needed to comply with performance requirements but not less than 1/8 inch (3.2 mm). Form treads with integral nosing and back edge stiffener. Weld steel supporting brackets to stringers and weld treads to brackets.
- E. Stair Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacing, and anchorage, but not less than that needed to withstand indicated loads.
  - 1. Configuration: 1-1/2-inch- (38-mm-) pipe O.D. (100 jigs to produce uniform curvature without buckling).
  - 2. Material: Carbon steel, ASTM A53, Grade A, minimum tensile strength 48,000 psi.
  - 3. Top and Bottom rails shall be a minimum of 0.188-inch wall thickness.
  - 4. Close exposed ends of railing members with prefabricated end fittings.
  - 5. Provide wall returns at ends of wall-mounted handrails.
  - 6. Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
  - 7. Welded Connections: Fabricate railings with 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. Connect posts to stair framing by direct welding.

8. Form changes in direction of railings by bending or by inserting prefabricated fittings.

#### 2.5 PIVOTAL LADDER

- A. Provide pivotal ladder by Precision Ladders, Inc. or prior approved equal.
- B. Ladder shall have walk-thru handrails. Assembly shall be constructed of 6005-T5 aluminum tubing, channels, rods, etc. to provide a complete assembly/
- C. Finish: Mill aluminum.

#### 2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal stairs after assembly.
- B. Hot-dip galvanize items indicated to be galvanized. Comply with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable.
- C. Refer to Section 09960 High Performance Coating for primer and paint.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.
- C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- D. Place and finish concrete fill for treads and platforms to comply with Division 03 Section "Cast-in-Place Concrete."
  1. Install abrasive nosings with anchors fully embedded in concrete.
- E. Attach handrails to wall with wall brackets.
  1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

#### 3.2 ADJUSTING AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

## SECTION 05513

### PIPE AND TUBE RAILINGS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Aluminum pipe and tube railings.
  - 2. Steel pipe and tube railings.
- B. See Division 05 Section "Metal Stairs" for steel tube railings associated with metal stairs.

##### 1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - 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 Guards:
    - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
    - b. Uniform load of 25 lbf/sq. ft. (1.2 kN/sq. m) applied horizontally.
    - c. Infill load and other loads need not be assumed to act concurrently.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

##### 1.3 SUBMITTALS

- A. Product Data: For railing brackets, grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of Louisiana responsible for their preparation.
- C. Samples: For each exposed finish required.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Aluminum Pipe and Tube Railings:
    - a. Blum, Julius & Co., Inc.
    - b. Pisor Industries, Inc.
    - c. Sterling Dula Architectural Products, Inc.
    - d. Superior Aluminum Products, Inc.
    - e. Thompson Fabricating, LLC.
  - 2. Steel Pipe and Tube Railings:
    - a. Pisor Industries, Inc.
    - b. Sharpe Products.
    - c. Wagner, R & B, Inc.; a division of the Wagner Companies.

### 2.2 METALS

- A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
- B. Aluminum: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
  - 1. Extruded Bars and Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.
  - 2. Extruded Structural Pipe and Round Tubing: ASTM B 429, Alloy 6063-T6.
  - 3. Drawn Seamless Tubing: ASTM B 210 (ASTM B 210M), Alloy 6063-T832.
  - 4. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
  - 5. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.
  - 6. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.
- C. Steel and Iron:
  - 1. Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
  - 2. Pipe Railing:
    - a. Members: 1-1/2-inch pipe OD.
    - b. Material: Carbon steel, ASTM A53, Grade A, minimum tensile strength 48,000 psi.
    - c. Top and Bottom rails shall be a minimum of 0.188-inch wall thickness.
  - 3. Plates, Shapes, and Bars: ASTM A 36/A 36M.
  - 4. Castings: Either gray or malleable iron, unless otherwise indicated.
    - a. Gray Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
    - b. Malleable Iron: ASTM A 47/A 47M.

### 2.3 MISCELLANEOUS MATERIALS

- A. Fasteners: Provide concealed fasteners, unless unavoidable or standard for railings indicated.
  - 1. Exterior Railings: Type 304 stainless-steel fasteners.

2. Interior Railings: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
- B. Anchors: Provide cast-in-place, chemical or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488.
- C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- D. Primers: Provide primers and finish that comply with Division 09 High Performance Coatings Sections.
- E. Grout and Anchoring Cement: Steel: Factory-packaged, nonshrink, nonmetallic grout complying with ASTM C 1107; or water-resistant, nonshrink anchoring cement; recommended by manufacturer for exterior use. Aluminum: Factory-packaged, non-conductive masterflow 648 CP Plus epoxy grout by BASF Building Systems. Install per manufacturers recommendations.

#### 2.4 FABRICATION

- A. 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.
- B. Form work true to line and level with accurate angles and surfaces.
- C. 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 surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- D. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds, using manufacturer's standard system of sleeve and socket fittings.
- E. Form changes in direction by bending.
- F. Bend members in jigs to produce uniform curvature; maintain cross section of member throughout bend without cracking or otherwise deforming exposed surfaces.
- G. Close exposed ends of railing members with prefabricated end fittings.
- H. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.
- I. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

#### 2.5 FINISHES

- A. Aluminum:
  1. Mechanical Finish: AA-M12 Mill finish (Mechanical Finish: nonspecular as fabricated).

- B. Steel and Iron:
  - 1. Galvanized Railings: Hot-dip galvanize exterior railings, after fabrication, to comply with ASTM A 123/A 123M. Provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
  - 2. Refer to Section 09960 - High Performance Coatings for primer and finish.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. General: Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation.
  - 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
  - 2. 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).
- B. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- C. Anchor posts in concrete by inserting into preset steel pipe sleeves and grouting annular space.
- D. Anchor posts to metal surfaces with anchors as indicated on the drawings and as calculated.
- E. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.
- F. Attach handrails to wall with wall brackets.
  - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
  - 2. For steel-framed partitions, fasten brackets with bolts installed through flanges of steel framing or through concealed steel reinforcements.
- G. Adjusting and Cleaning:
  - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting.
  - 2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

## SECTION 05520

### GUARD RAIL INFILL

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section includes: Ornamental welded stainless steel guardrail panels fabricated with flat bars and mesh welded into, modular, open grille railing panels.
- B. Related sections:
  - 1. Section 03300 - Cast-in-Place Concrete: Construction of floor slabs and concrete stairs and landings to receive metal railings.
  - 2. Section 05500 - Metal Fabrication: For miscellaneous flat bar and steel as required to frame in panels for guard rail infill.
  - 3. Section 05513 - Pipe and Tube Railing: For Flat bar and pipe post installation for railing and guardrail installation

##### 1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - 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 Guards:
    - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
    - b. Uniform load of 25 lbf/sq. ft. (1.2 kN/sq. m) applied horizontally.
    - c. Infill load and other loads need not be assumed to act concurrently.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

##### 1.3 SUBMITTALS

- A. Provide product data for components and accessories required for complete assembly.
- B. Shop drawings showing guard rail infill layout, dimensions, spacing of components and anchorage and installation details for guardrail, and sunscreen panel installation.
- C. Sample: Provide 8 by 10 inches minimum size sample of panel infill illustrating design, fabrication workmanship, and selected powder coated factory finish. Provide 6-nch long handrail/guardrail for architect's approval

##### 1.4 WARRANTY

- A. Provide Manufacturer's standard form in which manufacturer agrees to repair or replace infill panel that fails in material, workmanship and installation within specified warranty period.
  - 1. Warranty Period: 2 year warranty.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. HDI Railing Systems; inox guardrail system (Basis-of-Design)
- B. Ametco Manufacturing Corporation
- C. Prior approved equal.

### 2.2 MATERIALS

- A. Plate and sheet: ASTM A666, Type 304
- B. Tubing: ASTM A554, Grade MT304
- C. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, and water reducing and plasticizing additives.

### 2.3 SYSTEM

- A. All rails and other tubular components shall be constructed using the following:
  - 1. Stainless steel, type 304; surface to be 240 grain/grit finish; tubes 1-1/2 inch (28mm) outside diameter by 5/64 inch (2mm) wall thickness.
  - 2. Provide nylon inserts manufactured by BASF
- B. All posts and other components shall be constructed using the following:
  - 1. Stainless steel type 304, surface to be 240 grain/grit finish; bars 2 inch (50mm) by 1/4 inch (6mm), fastened by vertically sliding clamps.
  - 2. Stainless steel type 304, surface to be 240 grain/grit finish for: clamps and end block supplied for top of post, for handrail attachment on the post for end block and clamps attaching post fastener to post so as the match finish of post bars.
- C. Stainless steel grade type 304, surface to be blasted matte finish for post fastening base plate.
- D. Exterior and aggressive environments require stainless steel grade 316 to minimize maintenance requirements.
- E. Fasteners: Stainless steel bolts of type, size, and spacing as recommended by railing manufacturer for specific condition.

### 2.4 STAINLESS STEEL PERFORATED METAL PANELS

- A. Stainless steel perforated metal infill panels with continuous frame. Installed post centers are required complete with sketch, to allow panel fabrication. Standard pattern to be 3/8 inch square holes on 1/2 inch centers surrounded by a continuous 1/3/4 inch frame with hairline joints.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prior to fabrication, field verify required dimensions.

### 3.2 INSTALLATION

- A. Install railing infills in accordance with manufacturer's installation instructions to configurations indicated on Drawings and approved shop drawings.
- B. Do not installed bent, bowed, or otherwise damaged panels. Remove damaged components from site and replace.
- C. Touch-up damaged finish with paint supplied by manufacturer and matching original coating.

END OF SECTION

