

## SECTION 05100 - STRUCTURAL STEEL

### PART 1 GENERAL

- 1.1 SUMMARY: The Contractor shall provide structural steel and accessories as shown on the drawings, as specified in this section, and as needed for a complete installation.
- 1.2 SUBMITTAL: The Contractor shall submit sufficient technical data, and complete shop drawings showing all members, spans, connections and similar data to demonstrate compliance with the construction documents.
- 1.3 QUALITY ASSURANCE:
- A. The steel structure is a non-self-supporting steel frame, and is dependent upon diaphragm action of the metal roof deck for stability and resistance to wind forces. The Contractor shall provide all means and methods of temporary support necessary for stability and resistance to wind forces, until the steel frame, metal roof deck and all exterior walls are completely installed and are capable of providing support.
  - B. The Contractor shall provide welding with electric arc process, in accordance with AWS "Code for Arc and Gas Welding in Building Construction" and all local codes having jurisdiction.
  - C. In addition to complying with pertinent codes and regulations, all structural steel work shall comply with AISC "Specifications for Design, Fabrication, and Erection of Structural Steel for Building", AISC "Code of Standard Practice", and "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
  - D. Structural Steel Inspection: Structural steel inspection shall be provided per Section 01410-Construction Quality Control Services.
- 1.4 DELIVERY, STORAGE, AND HANDLING:
- A. Delivery and storage:
    - 1. Deliver materials to the jobsite property marked to identify the location for which they are intended. Markings shall be used to correspond to symbols or notes shown on approved shop drawings.
    - 2. Store in manner to maintain identification and prevent damage, off the ground, using pallets or other supports, and to permit easy access for inspection.
- 1.5 WARRANTY: The Contractor shall include a copy of the Steel Erector/ Installer's Warranty for all work provided under the general contract for construction for a term of 1 year after the Date of Substantial Completion in the Building Maintenance Manuals, submitted to the Landlord after the Date of Final Completion, in accordance with Section 01700-Contract Closeout requirements.

## PART 2 PRODUCTS

### 2.1 MATERIALS:

- A. Provide the following where called for on the drawings or otherwise required.
1. Rolled steel shapes, plates and bars: ASTM A572 Grade 50.
  2. Cold formed steel plates, etc.: ASTM A283, Grade C.
  3. Steel Tubing: ASTM A500/A501, Grade B (Fb = 27,700 psi; E = 24,000,000 psi).
  4. Steel Pipe: ASTM A53, Type E or S, Grade B.
  5. Machine Bolts: ASTM A307, Grade A, and ANSI B18.2, square and/or hexagonal heads.
  6. High Strength Bolts: ASTM A325, Type F.
  7. Arc Welding Electrodes: ASTM A233, E70XX series.
  8. Primer: Meeting or exceeding Fed. Spec. TT-P-636, light gray primer on all exposed members.

### 2.2 FABRICATION:

- A. Shop fabrication and assembly:
1. Fabricate items of structural steel in accordance with AISC specifications and as shown on the approved shop drawings.
  2. Where finishing is required complete the assembly, including welding of units, before starting of finishing.
  3. Provide finish surfaces of members exposed in the final structure free from marking, burrs, and other defects.
- B. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
- C. Do NOT flame cut holes or enlarge holes by burning.

### 2.3 SHOP PAINTING:

- A. General:
1. Thoroughly clean structural steel, removing all loose mill scale, grease, dirt, and foreign matter by scraping or sandblasting.
  2. Apply the specified paint to a dry film thickness not less than 1.5 mils.
- B. Do not paint contact surfaces of high strength bolted members.

### 2.4 GALVANIZING:

- A. Provide in accordance with ASTM A123, minimum 1.25 oz. per square foot.
- B. Galvanize steel items embedded in concrete slabs and/or as noted on drawings.

- 2.5 OTHER MATERIALS: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the contractor, subject to approval.

### PART 3 EXECUTION

3.1 SURFACE CONDITIONS: The Contractor shall examine the areas and conditions under which work of this section will be provided, shall correct conditions detrimental to the timely and proper completion of the work, and shall NOT proceed until unsatisfactory conditions are corrected.

#### 3.2 ERECTION:

##### A. Surveys:

1. Establish permanent benchmarks necessary for accurate erection of structural steel.
2. Check elevations of concrete surfaces and locations of anchor bolts and similar items, before erection proceeds.

##### B. Temporary shoring and bracing:

1. Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads.
2. Provide temporary guylines to achieve proper alignment of the structure for erection.
3. Remove temporary connections and members when permanent members are in place and final connections are made.

##### C. Anchor Bolts:

1. Furnish and install anchor bolts and other connections required for securing structural steel to adjacent work.
2. Provide templates and other devices as needed for presetting bolts and other anchors to accurate locations.

##### D. Setting bases and bearing plates:

1. Clean concrete bearing surfaces free from bond reducing materials, and then roughen to improve bond to surface.
2. Clean the bottom surface of base and bearing plates.
3. Set loose and attached base plates and bearing plates for structural members in wedges or other adjusting devices.
4. Tighten anchor bolts after supported members have been positioned and plumbed.
5. Do not remove wedge or shims but, if protruding, cut off flush with the edge of the base or bearing plate prior to packing with grout.
6. Pack non-shrink grout solidly between bearing surfaces and bases or plates to assure that no voids remain. Use non-shrink grout as specified in Section 03300- Cast-In-Place Concrete.
7. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's recommendations as approved.

##### E. Field Assembly:

1. Set structural frames accurately to the lines and elevations indicated.
2. Align and adjust the members forming part of a complete frame or structure before fastening permanently.
3. Clean the bearing surfaces and other surfaces which will be in permanent contact before assembly.
4. Adjust as required to compensate for discrepancies in elevation and alignment.

5. Level and plumb individual members of the structure within specified AISC tolerances.
6. Establish required leveling and plumbing measurements on the mean operating temperature of the structure, making allowances for the difference between temperature at time of erection and the mean temperature at which the structure will be when completed and in service.
7. Comply with AISC specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to welds.

F. Gas Cutting:

1. Do not use gas cutting torches for correcting fabricating errors in structural framing, except on secondary members where prior approval is obtained.
2. When gas cutting is permitted, finish the gas cut section to a sheared acceptable appearance.

3.3 PAINTING:

- A. Secure all required approvals of welding and connections prior to application of field primer.
- B. Prime coat structural steel and fittings, except galvanized items, with light gray primer on all exposed members.
1. Prepare surfaces by removing loose rust, loose mill scale, spatter, slag and flux deposits.
  2. Clean steel in accordance with Steel Structures Painting Council SP-3, "Power Tool Cleaning".
  3. After erection, clean spots and surfaces where paint has been removed, damaged, or burned off, field bolts and other field connections not concealed in the finished work.
  4. Remove dirt, oil and grease.
  5. Apply a spot coat of the approved primer.
  6. Do not apply paint to wet, damp, oily, or improperly prepared surfaces.
  7. Spray apply the primer, filling joints and corners, and covering surfaces with a smooth unbroken film of at least 1.5 dry mils thickness.

3.4 STRUCTURAL STEEL INSPECTION AND PUNCHLIST:

- A. Structural Steel Inspection:
1. The Contractor shall notify the Testing Lab seven (7) days prior to requiring the final Structural Steel Inspection.
  2. The Structural Steel Inspection will be provided by the Testing Lab and paid for by the Contractor in accordance with Section 01410.
- B. Punchlist: The Structural Steel Punchlist will be provided by the Testing Lab and shall be completed by the Contractor in a timely manner.
- C. Metal Deck Fastening Inspection: The Contractor shall provide a Metal Deck Fastening Inspection and report of the metal decking installation. Refer to Section 01410- Construction Quality Control Services and Section 05300- Metal Decking.

END OF SECTION

## SECTION 05200 - STEEL JOISTS

### PART 1 GENERAL

1.01 SUMMARY: The Contractor shall provide Steel Joists as shown on the drawings, as specified in this Section, and as needed for a complete installation.

1.02 SUBMITTALS: The Contractor shall submit sufficient technical data to demonstrate compliance with the specified requirements, and complete shop drawings showing all members, spans, connections and similar data per submittals requirements in Section 01400.

#### 1.03 QUALITY ASSURANCE:

- A. Provide welding with electric arc process and in accordance with AWS "Code for Arc and Gas Welding in Building Construction".
- B. In addition to complying with pertinent codes and regulations, all work shall comply with AISC "Specifications for Design, Fabrication and Erection of Structural Steel for Building", "Code of Standard Practice", AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", and "Standard Load Tables" and pertinent specifications of the Steel Joist Institute.
- C. Welding shall comply with the provisions of Section 05100- Structural Steel.

#### 1.04 DELIVERY AND STORAGE:

- A. Deliver materials to the jobsite properly marked to identify the intended location.
- B. Use markings corresponding to markings shown on the approved shop drawings.
- C. Store in a manner to maintain identification and prevent damage, off the ground, using pallets or other supports, and to permit easy access for inspection.

### PART 2 PRODUCTS

2.01 MATERIALS: Provide steel joists and accessories system in the dimensions and arrangements shown on the drawings.

#### 2.02 FABRICATION:

- A. Fabricate the steel joist system in strict accordance with the approved shop drawings and the requirements of governmental agencies having jurisdiction, and in accordance with the following, where applicable:
  - 1. Verify dimensions prior to fabrication.
  - 2. Provide top and bottom joist chord extensions where indicated on the drawings or otherwise required.
  - 3. Camber joists to accommodate the dead load deflection.

- B. Primer: Except where galvanizing may be called for on the drawings or the approved shop drawings, shop-prime the steel joist system using one coat of a light gray primer on all exposed members meeting Fed. Spec. TT-P-636.

2.03 OTHER MATERIALS: Provide other materials, not specifically described but required for a complete and proper installation.

### PART 3 EXECUTION

3.01 SURFACE CONDITIONS: The Contractor shall examine the areas and conditions under which work of this Section will be provided, shall correct conditions detrimental to the timely and proper completion of the work, and shall NOT proceed until unsatisfactory conditions are corrected.

#### 3.02 INSTALLATION:

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this section.
- B. Install the work of this section in strict accordance with the original design, the approved shop drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended and approved installation procedures.

END OF SECTION

## SECTION 05300 - METAL DECKING

### PART 1 - GENERAL

- 1.1 SUMMARY: The Contractor shall provide Metal Decking as shown on the drawings, as specified in this Section, and as needed for a complete installation.
- 1.2 SUBMITTALS: The Contractor shall submit shop drawings and sufficient technical data showing the layout of decking, with details of materials, gauges, accessories, openings, finishes, welds, and other pertinent data per the Submittals section of the specifications.
- 1.3 QUALITY ASSURANCE:
  - A. All metal deck shall be in accordance with the pertinent Steel Deck Institute specification and Factory Mutual-approved.
  - B. Mechanical Fastening: All mechanical fastening shall comply with the contract documents.
- 1.4 DELIVERY, STORAGE & HANDLING: In compliance with Section 05100- Structural Steel.
- 1.5 METAL DECK INSPECTION FOR MECHANICALLY FASTENED METAL DECK:
  - A. The Contractor shall coordinate the Metal Deck Fastening Inspection as specified in the Quality Control Services section of the specifications.

### PART 2 - PRODUCTS

- 2.1 METAL DECK UNITS:
  - A. Design metal deck units in accordance with AISC "Specification for Design of Light Gage Cold Formed Steel Structural Members", with appropriate steel fiber stress and maximum live load deflection limitations.
  - B. Provide pattern as shown on the drawings, galvanized in accordance with ASTM A446, Grade A, and ASTM A525, designation G60, with properties, shape, pattern, and loading capacities in accordance with the Steel Deck Institute and Factory Mutual.
- 2.2 ACCESSORIES:
  - A. Provide metal deck fasteners as detailed or specified on the drawings.
  - B. Provide accessories specifically designed to be used with metal decking and the uses shown on the drawings, and provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor, subject to approval.

### PART 3 - EXECUTION

- 3.1 SURFACE CONDITIONS

- A. The Contractor shall examine the areas and conditions under which work of this Section will be provided, shall correct conditions detrimental to the timely and proper completion of the work, and shall NOT proceed until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

- A. Prior to start of installation, verify that beams are in proper alignment and that surfaces are clean for welding. Place each unit on the supporting steel framework; and adjust to final position prior to permanent welding. Align each unit and fasten into final location in accordance with the manufacturer's and SDI's recommended installation procedures as approved.
- B. Install all accessory items in accordance with the manufacturer's recommended installation procedures as approved.

### 3.3 TOUCH UP PAINTING:

- A. Upon completion of installation, and as a condition of acceptance, the Contractor shall visually inspect and identify surfaces where finish was damaged, and touchup paint galvanized surfaces with zinc-rich primer or other galvanized repair paint approved for the purpose, and shall additionally provide touchup paint at adjacent damaged surfaces as required.

END OF SECTION 05300

## SECTION 05400 - COLD FORMED METAL FRAMING

### PART 1 - GENERAL

#### 1.1 THE REQUIREMENT

- A. The CONTRACTOR shall construct all light metal framing and appurtenant work, complete, in accordance with the requirements of the Contract Documents.

#### 1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. **Codes:** In accordance with IBC 2006 and with ASCE 7.

B. **Commercial Standards:**

ANSI/ASTM A 446	Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
ASTM A 570	Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality
ASTM C 645	Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board

### PART 2 - PRODUCTS

#### 1.3 METAL STUDS

- A. **Load Bearing:** Metal studs of 16-gage steel shall be used where shown or where specified to be used. They shall be standard 16-gage, punched steel, galvanized studs formed from steel meeting the requirements of ASTM A 570 with 50,000 psi.

1. Studs designed for load bearing conditions and exterior use shall be 3.625" or 6" as shown on the drawings. The studs shall have a flange width of 1 5/8" with a min return lip of 1/2".

#### 1.4 MISCELLANEOUS MATERIALS

- A. **Hanger Wire:** Hanger wire for suspended gypsum board ceilings shall be of soft-temper, annealed and galvanized steel wire. Hanger wire size shall be not less than that required by governing code.
- B. **Runner Channels:** Runner channels shall be 1-1/2-inch cold-rolled channels and 3/4-inch stiffener channels, galvanized or factory-coated with rust-inhibitive paint. Channels shall have minimum weight of 475 and 300 lbs/1000 L.F. respectively.
- C. **Furring Channels:** Furring channels shall be designed for screw attachment of 5/8-inch gypsum wallboard. They shall be roll-formed, galvanized Grade "A" steel conforming to ANSI/ASTM A 446, with a metal thickness of 0.022-inch minimum, 7/8-inch depth, and 1-3/8-inch web.

- D. **Tie Wire:** Tie wire shall be galvanized, 16-gage, annealed steel wire.
- E. **Fasteners:** Fasteners shall be as required and as recommended within the Reference Standards.
- F. **Welding Materials:** Welding materials shall be as recommended in the published standards of the structural stud manufacturer.
- G. **Power-Driven Pins:** Power-driven pins to be installed in concrete or steel shall be of heat-treated steel alloy. If the pins are not sufficiently corrosion-resistant for the conditions to which they are to be exposed, they shall be protected in an acceptable manner. Pins shall have capped or threaded heads capable of transmitting the loads the shanks are required to support. Pins that are connected to steel shall have longitudinal serrations around the circumference of the shank. Complete information describing pin capacity, connections, and proposed area of use shall be submitted to the ENGINEER.

## 2 -- EXECUTION

### 2.1 INSTALLATION REQUIREMENTS

- A. All work shall be installed in conformance with the manufacturer's recommendations, the applicable requirements of the governing code, ANSI, and as specified or shown.

### 2.2 CEILING SUSPENSION SYSTEM

- A. **Components:** All necessary items for a complete installation shall be provided, including devices for attachment to overhead construction, hanger wires, main runners, splines, splicers, connecting clips, wall connectors, hold-down clips, edge mouldings, and other appurtenances.
- B. **Hanger Wires:** Hanger wires shall be spaced along the main runner so that each hanger supports a maximum area of 16 square feet.
- C. **Runner Channels:** Main runners shall be 1-1/2-inch channels spaced at 4 feet on centers. Hanger wires shall be saddle-tied along runners. Cross-furring channels shall be spaced at 16 inches on centers, maximum, and shall be saddle-tied to main runner channel.
- D. **Interruptions:** At any openings that interrupt the continuity of furring channels, additional cross reinforcing shall be provided to restore lateral stability of grillage.

### 2.3 METAL STUDS, FURRING AND FRAMING (For Non-Bearing Walls)

- A. **Runner Track Attachment:** Floor and ceiling runner tracks shall be securely fastened to floor and overhead construction as shown and as required.
- B. **Stud Attachment:** Studs shall be securely fastened to tracks, and spaced in accordance with the stud schedule. Each stud shall be crimped into runner tracks at the top, bottom, and both sides for friction fit with 1/4-inch deflection clearance on top.
- C. **Wall Stiffening:** Walls shall be stiffened with 3/4-inch channels placed horizontally at not more than 4-1/2-foot vertical spacing.

D. **Stud Requirements:** Metal stud installation shall conform to the following requirements:

1. Studs shall be located at all door frame jambs, at abutting construction, intersecting walls, and corners. Each corner and intersection of walls and partitions shall be formed with not less than 3 studs.
2. Double studs shall be secured to the jamb anchors of each door frame by bolt or screw attachment. Studs at door openings shall extend to the structure.
3. Studs extending from door frame header to ceiling runner over door frames shall be positioned at wall board joints. Stud walls which do not extend to structures above the ceiling shall be braced to the structure at every 8 ft - 0 inches.
4. The CONTRACTOR shall install studs at wall-mounted fixtures and at a maximum of 12 inches on centers behind walls to receive ceramic tile.
5. Stud walls shall be braced as necessary to provide rigid construction. Double row of studs for chase walls shall be braced with cross ties of 1/2-inch or 5/8-inch thick gypsum board, 12 inches wide, installed at quarter points of studs.
6. Parapet walls and hung exterior walls and soffits shall be framed as shown with not less than 18-gage studs.

E. **Openings:** Openings shall conform to the following requirements:

1. Channels shall be provided around openings for attachment of metal frames, dampers, grilles, and ductwork in connection with metal studs and shall be securely fastened to studs.
2. Headers, sills, and jack studs shall be provided as required at openings. Headers shall overlap adjacent vertical studs and shall be securely screw-attached to adjacent studs.

F. **Lintels:** Trussed or box-framed lintel members designed to resist applied loads without excessive deflection shall be provided and shall be secured together by screws or other approved means.

G. **Support for Wall-Mounted Braced Items:** Solid blocking, 1-1/2-inch channels, horizontal studding or other members within walls shall be provided as required to provide secure and adequate support for wall-mounted or wall-braced items. Galvanized plates shall be provided as backing for handrail brackets, 16-gage by 8-inch by 16-inch.

H. **Horizontal Stiffeners:** Ends of horizontal stiffeners shall be securely fastened to abutting construction.

I. **Furring Channels:** Furring channels shall be spaced 24 inches on centers, maximum, unless shown otherwise. Spans shall not exceed manufacturer's published recommendations and governing code requirements.

2.4 STRUCTURAL LOAD BEARING STEEL STUD WALLS

A. **Prefabrication:** Structural steel stud walls may be fabricated into panels or components prior to erection.

- B. **Stud Spacing:** Studs shall be spaced at 16-inch centers unless noted otherwise.
- C. **Component Attachment:** All attachments of components shall conform to the following requirements:
  - 1. All attachments of similar components shall be done by welding. Dissimilar stud components shall be attached by welding, screw attaching, or bolting. All welds shall be fillet, plug, butt, or seam welds.
  - 2. Wire tying of framing components in structural applications will not be permitted and will not be acceptable.
  - 3. Splices in axial hooded studs shall not be used.
- D. **Butt Joints in Tracks:** Butt welds or splices shall be used at all butt joints in the tracks.
- E. **Stud Track Anchorage:** All framing members shall be anchored as follows:
  - 1. Bottom track for structural steel studs shall be anchored to concrete floor or foundation slabs with 1/8-inch diameter shank power-driven fasteners at 6-inch on center.
  - 2. Wall top and bottom tracks [for structural steel studs connected to structural steel members shall be provided with a 3-inch-long weld connection every 2 ft-6 in of run.]

2.5 WORKMANSHIP

- A. **Alignment:** All metal studs shall be installed rigid, in line, level, and plumb and shall be suitable for the application of the intended succeeding contiguous materials. The maximum allowable deviation in any plane shall be 3/16-inch from an 8-foot straight line and 1/2-inch maximum in a surface having a total length in excess of 8 feet.
- B. **Component Fit:** All framing members and tracks shall meet the following requirements:
  - 1. All framing components shall be cut squarely or on an angle, as in bracing, to fit squarely against abutting members.
  - 2. Tracks shall be securely anchored to the floor and overhead structure or other members.
  - 3. Studs shall be seated squarely in the track with the stud web and flanges abutting the track web, shall be plumbed or aligned, and shall be securely attached to the flanges or web of both the upper and lower tracks.
- C. **Temporary Bracing:** Framing and panels shall be braced as follows:
  - 1. All framing shall be held firmly in position until properly fastened.
  - 2. Prefabricated panels shall be square and braced against racking. Lifting of prefabricated panels shall be done in a manner as to not cause local distortion in any member.
- D. **Jack Studs:** Jack studs shall be provided between all track and window sills; between window and door headers and top track; at free-standing stair rails; and elsewhere to furnish structural support. Jack studs shall be securely attached to supporting members.

END OF SECTION 05400



## SECTION 05500 - METAL FABRICATIONS

### **PART 1 - GENERAL**

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Metal roof access ladders.
  - 2. Metal downspout boots.
- B. Related Sections:
  - 1. Division 7 Section "Roof Accessories."

#### 1.3 PERFORMANCE REQUIREMENTS

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

#### 1.4 SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal fabrications.
  - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- B. 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 licensed in the State of Louisiana responsible for their preparation.
- C. Qualification Data: For qualified professional engineer.

#### 1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

## 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

## 1.7 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

### 2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 passive stainless-steel fasteners. Select fasteners for type, grade, and class required.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy Group 1 (A1) or Group 2 (A4).
- C. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
- D. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).
- E. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

### 2.3 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

- B. 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.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously 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. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
  - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

#### 2.4 METAL ROOF ACCESS LADDERS

##### A. General:

- 1. Comply with ANSI A14.3 unless otherwise indicated.

##### B. Aluminum Ladders:

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. ACL Industries, Inc.
  - b. Alco-Lite Industrial Products.
  - c. Halliday Products.