

DIVISION 5
Metals



SECTION 05120 - STRUCTURAL STEEL

1.1 RELATED DOCUMENTS

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

1.2 GENERAL

- A. Structural Performance: Engineer structural steel connections required by the Contract Documents to be selected or completed by the fabricator to withstand design loadings indicated.
- B. Engineering Responsibility: Engage a fabricator who utilizes a qualified professional engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.
- C. Submittals: In addition to Product Data and mill test reports on structural steel and bolts, submit Shop Drawings detailing fabrication of structural steel components, including connections, splices, holes, welds, and bolts.
 - 1. Include Shop Drawings and calculations signed and sealed by a professional engineer responsible for their preparation who is legally authorized to practice in the state the project is located and who is experienced in providing structural steel engineering services.
- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
 - 2. ASTM A 6 (ASTM A 6M) "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
 - 3. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel."
 - 1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

- F. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
 - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
- G. Engineer's Qualifications: Fabricator's Engineer shall be familiar with steel connection design and shall carry professional liability insurance with a minimum per incident and annual policy limit of \$1,000,000. Proof of insurance shall be supplied to Architect.

1.3 PRODUCTS

- A. Structural Steel Shapes, Plates, and Bars: ASTM A 36 (ASTM A 36M), carbon steel.
- B. Structural Steel Wide Flange Sections: ASTM A 992 (ASTM A 992M), Grade 50, high-strength, low-alloy columbium-vanadium steel.
- C. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B.
- D. Steel Pipe: ASTM A53, Grade B.
- E. Anchor Rods, Bolts, Nuts: ASTM F1554 Gr 36 ksi., unheaded rods.
- F. Nonhigh-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A (ASTM F 568, Property Class 4.6); carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers, uncoated.
- G. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated.
- H. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.
- I. Nonmetallic, Shrinkage-Resistant Grout: Premixed, ASTM C 1107, of consistency suitable for application.
- J. Fabrication: Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.
 - 1. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.

2. Shop install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
 3. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - a. Connection Type: Snug tightened, unless indicated as direct-tension, or tensioned shear/bearing connections.
 - b. Slip-critical bolts are prohibited from all connections.
 4. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
- K. Shop Priming: Shop prime steel, except surfaces embedded in concrete or mortar, surfaces to be field welded, and surfaces to receive sprayed-on fireproofing.
1. Surface Preparation: SSPC-SP 2 "Hand Tool Cleaning" or SSPC-SP 3 "Power Tool Cleaning."
 2. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1.4 EXECUTION

- A. Erect structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates and set on wedges, shims, or setting nuts as required.
 1. Tighten anchor bolts, cut off wedges or shims flush with edge of base or bearing plate, and pack grout solidly between bearing surfaces and plates.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
- E. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 1. Connection Type: Snug tightened, unless indicated as direct-tension, or tensioned shear/bearing connections.

- F. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
- G. Shop and Field Quality Control: Owner will engage an independent testing and inspecting agency to perform shop and field inspections and tests and to prepare test reports. Inspections shall satisfy requirements of Schedule of Special Inspection Services prepared by Engineer of Record.
 - 1. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
 - 2. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
 - 3. High-strength bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 - 4. In addition to visual inspection, welded connections will be inspected and tested according to AWS D1.1 procedures.

END OF SECTION 05120

SECTION 05310 - STEEL DECK

1.1 RELATED DOCUMENTS

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

1.2 GENERAL

- A. Submittals: Product data and manufacturer's certificates for each type of deck and accessory and the following:
 - 1. Shop drawings showing layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other units of Work.
- B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel," including welder certification.
- C. Fire-Test-Response Characteristics: Where indicated, provide labeled steel deck panels identical to those tested as part of an assembly for fire resistance per ASTM E 119 by a testing and inspection agency performing testing and follow-up services, that is acceptable to authorities having jurisdiction.

1.3 PRODUCTS

- A. Composite Steel Floor Deck: Fabricate panels with integrally embossed or raised pattern ribs and interlocking side laps, conforming to SDI Publication No. 28 "Specifications and Commentary for Composite Steel Floor Deck," the minimum section properties indicated, and the following:
 - 1. Galvanized and Shop-Primed Steel Sheet: ASTM A 446, Grade A, G 60 (ASTM A 446M, Grade A, Z 180) zinc coated according to ASTM A 525 (ASTM A 525M); cleaned, pretreated, and primed with manufacturer's baked-on, lead- and chromate-free rust-inhibitive primer.
 - 2. Profile Depth: As indicated.
 - 3. Design Uncoated-Steel Thickness: As indicated.

- B. Accessories: Floor deck accessory materials and floor deck pour stops and closures that comply with requirements indicated and recommendations of the steel deck manufacturer.
 - 1. Shear Connectors: AWS D1.1, Type B, headed stud type, cold-finished carbon steel.

1.4 EXECUTION

- A. Install deck panels and accessories according to applicable specifications and commentary of SDI Publication No. 28, manufacturer's recommendations, and requirements of this Section.
- B. Place deck panels on supporting framing and adjust to final position with ends accurately aligned and bearing on supporting framing before being permanently fastened. Do not stretch or contract side lap interlocks.
- C. Place deck panels flat and square and fasten to supporting framing without warp or deflection.
- D. Cut, reinforce, and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to the decking.
- E. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
- F. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces with galvanized repair paint according to ASTM A 780 and the manufacturer's instructions.
- G. Touchup Painting: Wire brush, clean, and paint scarred areas, welds, and rust spots on both surfaces of installed deck panels.
- H. Touchup Painting: Cleaning and touchup painting of field welds, abraded areas, and rust spots, as required after erection and before proceeding with field painting, are included in Division 9 Section "Painting."
- I. Field Quality Control: The Owner will employ a testing agency to perform inspections and to submit inspection reports. Inspections shall satisfy requirements of Schedule of Special Inspection Services prepared by Engineer of Record.

END OF SECTION 05310

SECTION 05400 – COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract from the front of the Specification book, including General Conditions and Supplementary General Conditions, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior non-load-bearing curtain-wall framing.
- B. Gypsum Exterior sheathing. Related Sections include the following:
 - 1. Division 7 Section "Building Insulation" for exterior insulation.
 - 2. Division 9 Section "Gypsum Board Assemblies" for interior non-load-bearing metal-stud framing, shaft wall assemblies, ceiling-suspension assemblies, and acoustical insulation in interior walls.

1.3 Division 9 Section "Gypsum Board Shaft-Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies. DEFINITIONS

- A. Minimum Uncoated Steel Thickness: Minimum uncoated thickness of cold-formed framing delivered to the Project site shall be not less than 95 percent of the thickness used in the cold-formed framing design. Lesser thicknesses shall be permitted at bends due to cold forming.
- B. Producer: Entity that produces steel sheet coil fabricated into cold-formed members.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Curtain-Wall Framing: Horizontal deflection of 1/360 of the wall height, and maximum 0.3".

3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection (for non-load bearing framing only) of primary building structure as follows:
 - a. Downward movement of 1 inch .
- B. Design exterior non-load-bearing curtainwall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.5 SUBMITTALS

- A. General: Submit in accordance with Section 01300.
- B. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- C. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining Work.
 1. Design Data: For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Gages indicated are minimum allowable gage. Verify load capacity of manufacturer's product being furnished for the Project.
 2. Submitted drawings and calculations must be complete and accurate. If upon initial review of the submittal, the submittal is rejected or returned for revisions and resubmittal, the Architect and Structural Engineer of Record (SER) will review the resubmittal one additional time at no charge to the contractor. Subsequent reviews required to obtain Architect and SER approval will be invoiced to the General Contractor at consultant's standard hourly rates.

- D. Welding Certificates: Copies of certificates for welding procedures and personnel.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. Engineer's Certificate: Submit professional engineer's certificate of liability insurance.
- G. Product Test Reports: From a qualified testing agency indicating that each of the following complies with requirements, based on comprehensive testing of current products:
 - 1. Expansion anchors.
 - 2. Power-actuated anchors.
 - 3. Mechanical fasteners.
 - 4. Vertical deflection clips.
 - 5. Miscellaneous structural clips and accessories.
- H. Research/Evaluation Reports: Evidence of cold-formed metal framing's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

- A. Installer 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.
- B. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal framing by employing a qualified professional engineer to prepare design calculations, Shop Drawings, and other structural data.
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and 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.
 - 1. Professional engineer shall provide certificate of liability insurance, with coverage of not less than \$1500,000.00.
 - 2. See General Notes on drawings for additional requirements.

- D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
 - E. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
 - F. Fire-Test-Response Characteristics: Where metal framing is part of a fire-resistance-rated assembly, provide 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.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - G. AISI Specifications: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing :
 - 1. Center for Cold-Formed Steel Structures (CCFSS) Technical Bulletin: "AISI Specification Provisions for Screw Connections."
 - H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
 - B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Cold Formed Metal Framing:
 - a. Dietrich Industries, Inc.
 - b. MarinoWare; Div. of Ware Industries, Inc.
 - c. Unimast, Inc.

2. Weather-Resistant Gypsum Sheathing Board:
 - a. USG
 - b. National Gypsum.
 - c. Georgia-Pacific Corporation.

2.2 MATERIALS

- A. All galvanized studs, joists, and accessories shall be of the type, size, steel thickness and spacing required by structural design and shall be manufactured to ASTM A 653 with a yield stress of either 33 KSI or 50 KSI as required. Minimum galvanized coating is G-60 in conformance with ASTM C 955.

2.3 NON-LOAD-BEARING CURTAIN-WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, complying with ASTM C 955, and as follows:
 1. Minimum Uncoated-Steel Thickness: 0.0428 inch
 2. Flange Width: 1-5/8 inches
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, complying with ASTM C 955, and as follows:
 1. Minimum Uncoated-Steel Thickness: 0.0428 inch [Matching steel studs].
 2. Flange Width: 1-1/4 inches.
- C. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads, and as follows:
 1. Minimum Uncoated-Steel Thickness: 0.0428 inch

2.4 FRAMING ACCESSORIES

- A. Miscellaneous Framing Components: Fabricate steel-framing accessories of the same material and finish used for framing members, with a minimum yield strength of 33,000 psi.

2.5 ANCHORS, CLIPS, AND FASTENERS

- A. General: Provide required or indicated items; provide galvanized fasteners for assemblies having galvanized major steel components.

- B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.
- C. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed 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. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- E. Welding Electrodes: Comply with AWS standards.

2.6 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, Nonshrink 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. Spary Foam Insulation: Great Stuff Pro, Wall & Floor Construction Adhesive.
 - 1. Location: Sealing all gaps and concealed voids

2.7 EXTERIOR SHEATHING

- A. Gypsum Sheathing Board:
 - 1. Type and Thickness: Exterior Drywall, 1/2 inch thick.
 - 2. Size: 48 by 96 inches .
 - 3. Available Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to
 - a. Georgia-Pacific Corp.; Dens-Glass Gold.
 - b. USG or National Gypsum; 1/2" Exterior Drywall.

2.8 SHEATHING ACCESSORIES

- A. Fasteners for Gypsum Sheathing to Metal Framing: Steel drill screws, ASTM C 954, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- B. Fasteners for Plywood Sheathing to Metal Framing: Hilti Kwik-Flex or Elco Dril-Flex; no substitution, 10-24 x 2-3/4" wafer head No. 3.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Attach continuous angles, supplementary framing, or tracks to structural members indicated.
- B. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 INSTALLATION, GENERAL

- A. Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.
- B. Install cold-formed metal framing and accessories plumb, square, and true to line, with lateral bracing and bridging, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.
 - 1. Cut framing members by sawing or shearing; do not torch cut.

2. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads. Use minimum of 2 self-tapping metal screws per connection, unless otherwise indicated.
- C. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members. Splicing of load bearing components is prohibited.
- 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 in built-up exterior framing members, such as headers, sills, boxed joists, 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 and as follows:
 1. Space individual framing members no more than plus or minus 1/8 inch from plan location and a maximum of 2 inches from abutting walls. Construct corners using minimum of three studs. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 2. Install cold-formed metal framing to a maximum out-of-square tolerance of 1/8-inch (3 mm).

3. Align top and bottom tracks; locate as indicated, and secure track to substrates at maximum 24 inches on center, using fastening methods specified in manufacturer's printed installation instructions for project substrate types.
4. Install double studs at jambs of openings for doors, cased openings, and windows; install intermediate studs above and below openings to align with wall stud spacing.
5. Seat studs in track square with track flange, with stud ends tight to tracks (maximum 1/16 inch from surface of track web at only one end).
6. Attach cross studs for attachment of fixtures; install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
7. Locate ends of load bearing components directly over support points.
8. Provide web stiffeners at locations indicated or required.

3.4 NON-LOAD-BEARING CURTAIN-WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
 1. Stud Spacing: As indicated
 2. Stud Spacing: As indicated
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 1. Install single deep-leg deflection tracks and anchor to building structure.
 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 3. Connect vertical deflection clips to [infill] studs and anchor to primary building structure.

- E. Install horizontal bridging in curtain-wall studs, spaced in rows indicated on Shop Drawings but not more than 54 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. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - a. Install solid blocking at centers indicated.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing system.

3.5 SHEATHING INSTALLATION

- A. General: Install gypsum sheathing to comply with GA-253 and manufacturer's written instructions.
- B. Cut boards at penetrations, edges, and other obstructions of the work; fit tightly against abutting construction, except provide a 3/8-inch setback where non-load-bearing construction abuts structural elements.
- C. Coordinate sheathing installation with flashing and joint sealant installation so these materials are installed in the sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.
- D. Apply fasteners so screw heads bear tightly against face of sheathing boards but do not cut into facing.
- E. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.

- F. Horizontal Installation: Abut ends of boards over centers of stud flanges and stagger end joints of adjacent boards not less than one stud spacing. Screw-attach boards at perimeter and within field of board to each steel stud at approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.6 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified independent testing agency to perform field quality-control testing.
- B. Field and shop welds will be subject to inspection and testing.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace Work that does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

3.7 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. Protect cutouts, corners, and joints in sheathing by filling with a flexible sealant or by applying tape recommended by sheathing manufacturer at time sheathing is applied.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure cold-formed metal framing and sheathing are without damage or deterioration at time of Substantial Completion.

END OF SECTION 05400

SECTION 05500 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Miscellaneous metal fabrications.
 - 2. Shop coatings.
 - 3. Elevator pit ladder.
 - 4. Angle lintels.
 - 5. Angle sills for elevator entrances.

- B. Related Sections:
 - 1. Concrete: Division 3.

1.3 REFERENCES

- A. ANSI A14.3-1984 -- American National Standard for Ladders - Fixed - Safety Requirements; 1984.
- B. ASTM A 36/A 36M-92 -- Standard Specification for Structural Steel; 1992.
- C. ASTM A 307-92a -- Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 1992.
- D. ASTM A 501-89 -- Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 1989.
- E. ASTM A 563-93 -- Standard Specification for Carbon and Alloy Steel Nuts; 1993.
- F. ASTM C 1107-91a -- Standard Specification for Packaged Dry, Hydraulic - Cement Grout (Nonshrink); 1991.
- G. AWS D1.1-92 -- Structural Welding Code -- Steel; American Welding Society; 1992.

- H. AWS D1.3-89 -- Structural Welding Code--Sheet Steel; American Welding Society; 1989.
- I. FS FF-B-561D -- Bolts, (Screw), Lag; 1989.
- J. FS FF-S-325 -- Shield, Expansion; Nail Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry); 1957 (Amended 1965).
- K. FS FF-W-84A -- Washers, Lock (Spring); 1967 (Amended 1980).
- L. FS FF-W-92B -- Washer, Flat (Plain); 1974.
- M. FS TT-P-664D -- Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant; 1988.
- N. SSPC-PA 1 -- Shop, Field, and Maintenance Painting; Steel Structures Painting Council; 1991.
- O. SSPC-SP 1 -- Solvent Cleaning; Steel Structures Painting Council; 1982.
- P. SSPC-SP 3 -- Power Tool Cleaning; Steel Structures Painting Council; 1989.
- Q. SSPC-SP 5 -- White Metal Blast Cleaning; Steel Structures Painting Council; 1991.
- R. SSPC-SP 6 -- Commercial Blast Cleaning; Steel Structures Painting Council; 1991.
- S. SSPC-SP 8 -- Pickling; Steel Structures Painting Council; 1991.
- T. SSPC-SP 10 -- Near-White Blast Cleaning; Steel Structures Painting Council; 1991.

1.4 SUBMITTALS

- A. Shop Drawings: For each fabricated item, show the following:
 1. Plans and elevations.
 2. Jointing and connections.
 - a. Indicate welded connections using standard AWS symbols; indicate net weld length.
 3. Profiles of sections and reinforcing.
 4. Fasteners and anchors.
 5. Accessories.
 6. Location of each finish.

1.5 JOB CONDITIONS

- A. Coordination with Masonry and Concrete Work: Where fabricated items or their anchors are to be embedded into concrete and masonry work, deliver such items to those performing the installation, together with coordination drawings and installation instructions.

PART 2 - PRODUCTS

2.1 MATERIALS - METALS

- A. Steel Shapes:
 - 1. Plates, bars, angles, channels, and H-sections: ASTM A 36.

2.2 MATERIALS - MISCELLANEOUS

- A. Grout: Nonmetallic, noncorrodible, nonshrink, factory blended and packaged; complying with ASTM C 1107; recommended by manufacturer for exterior use.
- B. Concrete Inserts: Style as required for application.
- C. Fasteners: Use fasteners suitable for the material being fastened and for the type of connection required.
 - 1. For exterior use or built into exterior walls: Nonferrous stainless steel, zinc coated or cadmium plated.
 - 2. Use fasteners of same material as items being fastened unless otherwise indicated.
 - 3. Bolts and studs: ASTM A 307.
 - 4. Nuts: ASTM A 563.
 - 5. Lag bolts: FS FF-B-561.
 - 6. Plain washers: FS FF-W-92.
 - 7. Lock washers: FS FF-W-84.
 - 8. Expansion shields: FS FF-S-325.
- D. Shop Primer: Rust-inhibitive, lead and chromate free, low VOC primer, complying with FS TT-P-664, or equivalent.

2.3 FABRICATION – GENERAL AND METAL STAIR SYSTEM

- A. Fabricate and shop-assemble in largest practical sections for delivery to site.
 - 1. Prepare and reinforce fabrications as required to receive applied items.
 - 2. Fabricate items with joints tightly fitted and secured.
 - 3. Make exposed joints tight, flush, and hairline.

- B. Fasteners: Use concealed fasteners if possible.
 - 1. Exposed fasteners: Flathead, countersunk type unless otherwise indicated.
- C. Anchors: Fabricate to suit conditions indicated; use anchors of same material and finish as item except where specifically indicated otherwise.
- D. Welding:
 - 1. Welding of steel: Comply with AWS D1.1 recommendations.
 - 2. Provide continuous welds at welded corners and seams.
 - 3. Exposed welds: Grind flush and smooth.

2.4 FABRICATION - LADDERS

- A. Fixed Ladders: Comply with ANSI A14.3 and applicable regulations; construct as indicated.
 - 1. All steel construction.
 - a. Shop prime.
 - b. Rungs: 3/4 inch diameter solid bar, at 12 inches on center.
 - 2. Side rails: Continuous, flat, 1/2- by 2-1/2-inch bar.
 - a. Rail spacing: 18 inches clear.
 - b. Where other handholds are not indicated:
 - (1) Make rails extend at least 50 inches above the top rung; return to wall.
 - 3. Weld rungs to side rails, on centerline.
 - 4. Supports: At top and bottom, and at not more than 4 feet on center; weld or bolt brackets to ladder.
 - 5. Clearance from wall and obstructions: 7 inches, minimum, to centerline of rungs.
 - 6. Smooth sharp edges and remove burrs from side rails.

2.5 FABRICATION - SHOP COATINGS

- A. Shop prime all iron and steel fabrications.
- B. Prepare surfaces to be coated as follows:
 - 1. Solvent-clean in accordance with SSPC-SP 1.
 - 2. Interior fabrications: Clean in accordance with SSPC-SP 3, SSPC-SP 5, SSPC-SP 6, SSPC-SP 8, or SSPC-SP 10.
- C. Shop Priming: Comply with SSPC-PA 1.
 - 1. Apply primer immediately following surface preparation.
 - 2. Do not prime surfaces to be welded.
 - 3. Do not prime surfaces in direct contact bond with concrete.

4. Apply extra coat to corners, welds, edges, and fasteners.

D. Shop Painting: Comply with SSPC-PA 1.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Anchor metal fabrications to substrates indicated; provide all fasteners required.

B. Perform all field fabrication required for installation.

1. Fit joints tightly.

2. Weld joints as indicated.

a. Weld in accordance with AWS code.

b. Exposed welds: Grind flush and smooth.

C. Install items in correct location, plumb and level, without rack or warp.

D. Provide temporary supports and bracing as required.

3.2 CLEANING AND TOUCH-UP

A. Touch up shop paint immediately after erection.

1. Clean field welds, bolted joints, and areas where primer is damaged.

2. Paint with material used for shop painting, minimum 2 mils dry film thickness.

END OF SECTION 05500

SECTION 05521 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract from the front of the Specification book, including General Conditions and Supplementary General Conditions, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipe and tube railings.
 - 2. Miscellaneous metal fabrications.
 - 3. Shop coatings.
 - 4. Stair handrails at all stairs, including wall brackets, escutcheons and attachments.
- B. Related Sections:
 - 1. Blocking for handrail attachments: Division 6.
 - 2. Painting: Division 9.

1.3 REFERENCES

- A. ASTM A 53-90b -- Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless; 1990.
- B. ASTM A 123-89a -- Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 1989.
- C. ASTM A 500-92 -- Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 1992.
- D. AWS D1.1-92 -- Structural Welding Code -- Steel; American Welding Society; 1992.
- E. AWS D1.3-89 -- Structural Welding Code--Sheet Steel; American Welding Society; 1989.
- F. FS FF-B-561D -- Bolts, (Screw), Lag; 1989.
- G. FS FF-S-111D -- Screw, Wood; 1974.
- H. FS FF-W-84A -- Washers, Lock (Spring); 1967 (Amended 1980).

- I. FS FF-W-92B -- Washer, Flat (Plain); 1974.
- J. FS TT-P-664D -- Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant; 1988.
- K. SSPC-PA 1 -- Shop, Field, and Maintenance Painting; Steel Structures Painting Council; 1991.
- L. SSPC-SP 1 -- Solvent Cleaning; Steel Structures Painting Council; 1982.
- M. SSPC-SP 3 -- Power Tool Cleaning; Steel Structures Painting Council; 1989.
- N. SSPC-SP 5 -- White Metal Blast Cleaning; Steel Structures Painting Council; 1991.
- O. SSPC-SP 6 -- Commercial Blast Cleaning; Steel Structures Painting Council; 1991.
- P. SSPC-SP 8 -- Pickling; Steel Structures Painting Council; 1991.
- Q. SSPC-SP 10 -- Near-White Blast Cleaning; Steel Structures Painting Council; 1991.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance Requirements: Where complete sizes or dimensions of structural members, connections, or fasteners of any item are not indicated, design the item to produce strength appropriate to the use intended.
- B. Handrails: Design to resist the loads specified by applicable building code(s).

1.5 SUBMITTALS

- A. Shop Drawings: For each fabricated item, show the following:
 1. Plans and elevations.
 2. Jointing and connections.
 - a. Indicate welded connections using standard AWS symbols; indicate net weld length.
 3. Profiles of sections and reinforcing.
 4. Fasteners and anchors.
 5. Accessories.
 6. Location of each finish.

1.6 QUALITY ASSURANCE

- A. Where fabrications are specified to comply with specific structural performance requirements, provide design sealed by a professional engineer registered in the state in which the project is located.

1.7 JOB CONDITIONS

- A. Fit fabrications accurately to actual construction. Record field measurements on shop drawings.

PART 2 - PRODUCTS

2.1 MATERIALS - METALS

- A. Steel Shapes:
 - 1. Pipe: Schedule 40 1 1/4" nominal diameter.

2.2 MATERIALS - MISCELLANEOUS

- A. Fasteners: Use fasteners suitable for the material being fastened and for the type of connection required.
 - 1. For exterior use or built into exterior walls: Nonferrous stainless steel, zinc coated or cadmium plated.
 - 2. Use fasteners of same material as items being fastened unless otherwise indicated.
 - 3. Lag bolts: FS FF-B-561.
 - 4. Wood screws: FS FF-S-111.
 - 5. Plain washers: FS FF-W-92.
 - 6. Lock washers: FS FF-W-84.
- B. Shop Primer: Rust-inhibitive, lead and chromate free, low VOC primer, complying with FS TT-P-664, or equivalent.

2.3 FABRICATION - GENERAL

- A. Fabricate and shop-assemble in largest practical sections for delivery to site.
 - 1. Prepare and reinforce fabrications as required to receive applied items.
 - 2. Fabricate items with joints tightly fitted and secured.
 - 3. Make exposed joints tight, flush, and hairline.

- B. Fasteners: Use concealed fasteners if possible.
 - 1. Exposed fasteners: Flathead, countersunk type unless otherwise indicated.
- C. Anchors: Fabricate to suit conditions indicated; use anchors of same material and finish as item except where specifically indicated otherwise.
- D. Welding:
 - 1. Welding of steel: Comply with AWS D1.1 recommendations.
 - 2. Provide continuous welds at welded corners and seams.
 - 3. Exposed welds: Grind flush and smooth.

2.4 FABRICATION - RAILINGS

- A. Railings - General: Construct as indicated.
 - 1. Preassemble in shop to maximum extent practicable.
 - 2. Bending of members: Use jigs to make each similar configuration the same; make neat bends without other deformation.
 - 3. Close exposed open ends of members using same material as used in member.
 - 4. Provide all components necessary for assembly of railings and for attachment to other work.
 - a. For anchoring to stud partitions: Use fittings fastened with lag bolts to wood backing between studs.
- B. Steel Pipe/Tube Railings:
 - 1. Round steel tubing, cold-formed.
 - 2. Shop prime.
 - 3. Connections: Welded and ground.
 - 4. Welding: Fill joints completely and grind off flush.
 - 5. Elbows: Bent or mitered.
 - 6. Tee and cross intersections: Coped and welded.
 - 7. Ends: Turn all ends to wall beyond code required extensions.

2.5 FABRICATION - SHOP COATINGS

- A. Shop prime all iron and steel fabrications except exterior rails.
- B. Prepare surfaces to be coated as follows:
 - 1. Solvent-clean in accordance with SSPC-SP 1.
 - 2. Interior fabrications: Clean in accordance with SSPC-SP 3, SSPC-SP 5, SSPC-SP 6, SSPC-SP 8, or SSPC-SP 10.

- C. Shop Priming: Comply with SSPC-PA 1.
 - 1. Apply primer immediately following surface preparation.
 - 2. Do not prime surfaces to be welded.
 - 3. Do not prime surfaces in direct contact bond with concrete.
 - 4. Apply extra coat to corners, welds, edges, and fasteners.
- D. Shop Painting: Comply with SSPC-PA 1.
- E. All exterior pipe rails to be hot dipped galvanized.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Anchor metal fabrications to substrates indicated; provide all fasteners required.
- B. Perform all field fabrication required for installation.
 - 1. Fit joints tightly.
 - 2. Weld joints as indicated.
 - a. Weld in accordance with AWS code.
 - b. Exposed welds: Grind flush and smooth.
- C. Install items in correct location, plumb and level, without rack or warp.
- D. Provide temporary supports and bracing as required.

3.2 INSTALLATION - RAILINGS

- A. Align joints before anchoring railing.
- B. Verify that posts are plumb before anchoring.

3.3 CLEANING AND TOUCH-UP

- A. Touch up shop paint immediately after erection.
 - 1. Clean field welds, bolted joints, and areas where primer is damaged.
 - 2. Paint with material used for shop painting, minimum 2 mils dry film thickness.

END OF SECTION 05521

