

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Grout.

1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Welding certificates.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Field quality-control and third party inspection reports.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172), or approved equivalent.
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE, or approved equivalent.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

- D. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - 1. Select and complete connections using schematic details indicated and AISC 360.
 - 2. Use Allowable Stress Design; data are given at service-load level.
- B. Moment Connections: Type FR, fully restrained, where required./
- C. Construction: Simple framing.

2.2 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- B. W and WT-Shapes: ASTM A992.
- C. Channels, Angles: ASTM A36.
- D. Plate and Bar: ASTM A36.
- E. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B, $F_y = 46$ ksi, structural tubing.
- F. Steel Pipe: ASTM A53, Type E or Type S, Grade B.
- G. Welding Electrodes: E70XX, Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade C, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
- B. Shear Connectors: ASTM A108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- C. Un-headed Anchor Rods: ASTM F1554, Grade 36 or as specified on the drawings.
 - 1. Configuration: Straight, threaded for bolts top and bottom .

- 2. Finish: Plain
- D. Headed Anchor Rods: ASTM F1554, Grade 36.
 - 1. Finish: Plain.
- E. Threaded Rods: ASTM A36 or ASTM A193, Grade B7.
 - 1. Finish: Plain.

2.4 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.5 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, non-corrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
- B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

4. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.
 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 1. Liquid Penetrant Inspection: ASTM E165.
 2. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 3. Ultrasonic Inspection: ASTM E164.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

- B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate where directed on the drawings.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.4 FIELD QUALITY CONTROL

- A. Third Party Inspections: Engage a qualified inspector to perform the following inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1.
 - 1. In addition to visual inspection, test and inspect field welds according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165.

- b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
- c. Ultrasonic Inspection: ASTM E164.

END OF SECTION

SECTION 05 31 00

STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Roof deck.
 - 2. Non-composite form deck.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
 - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product certificates.
- C. Evaluation reports.
- D. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.

2.2 ROOF DECK

- A. 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:
 - 1. CMC Joist & Deck.
 - 2. Consolidated Systems, Inc.; Metal Deck Group.
 - 3. Epic Metals Corporation.
 - 4. New Millennium Building Systems, LLC.
 - 5. Nucor Corp.; Vulcraft Group.
 - 6. Verco Manufacturing Co.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A1008, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 - 2. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33, G60 zinc coating.
 - 3. Galvanized and Shop-Primed Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 - 4. Deck Profile: As indicated.
 - 5. Profile Depth: As indicated.
 - 6. Design Uncoated-Steel Thickness: As indicated.

2.3 NON-COMPOSITE FORM DECK

- A. 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:
 - 1. CMC Joist & Deck.
 - 2. Consolidated Systems, Inc.; Metal Deck Group.
 - 3. New Millennium Building Systems, LLC.

4. Nucor Corp.; Vulcraft Group.
 5. Roof Deck, Inc.
 6. Verco Manufacturing Co.
- B. Non-composite Form Deck: Fabricate ribbed-steel-sheet non-composite form-deck panels to comply with "SDI Specifications and Commentary for Non-composite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Uncoated Steel Sheet: ASTM A1008, Structural Steel (SS), Grade 33 minimum.
 2. Prime-Painted Steel Sheet: ASTM A1008, Structural Steel (SS), Grade 33 minimum, with top and underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 3. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33 zinc coating.
 4. Galvanized and Shop-Primed Steel Sheet: ASTM A653, Structural Steel (SS), Grade 33 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 5. Profile Depth: As indicated.
 6. Design Uncoated-Steel Thickness: As indicated.

2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- G. Galvanizing Repair Paint: ASTM A780.
- H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- G. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- H. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.
- I. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- J. Pour Stops and Girder Fillers: Weld steel-sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- K. Floor-Deck Closures: Weld steel-sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.3 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior and load-bearing wall framing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product test reports.
- D. Research reports.

1.4 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
1. ClarkWestern Building Systems, Inc.
 2. Consolidated Fabricators Corp.; Building Products Division.
 3. Dietrich Metal Framing; a Worthington Industries company.
 4. MarinoWARE.
 5. Nuconsteel; a Nucor Company.
 6. Southeastern Stud & Components, Inc.
 7. Steel Network, Inc. (The).
 8. United Metal Products, Inc.
 9. United Steel Manufacturing.

2.2 PERFORMANCE REQUIREMENTS

- A. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Sheet: ASTM A1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
1. Grade: As indicated.
 2. Coating: G60.
- C. Steel Sheet for Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
1. Grade: 50, Class 1.
 2. Coating: G60.

2.4 EXTERIOR 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: As indicated.

2. Flange Width: As indicated.

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and matching minimum base-metal thickness of steel studs.
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges:

2.5 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration.

2.6 CLIPS AND FASTENERS

- A. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488 conducted by a qualified testing agency.
- B. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.
- C. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780.
- 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 C1107/C1107M, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
- D. Install framing members in one-piece lengths.
- E. 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.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- G. Install insulation, specified in Section 072100 "Thermal 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.
- H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- I. Erection Tolerances: Install cold-formed steel 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 from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 EXTERIOR AND LOAD-BEARING 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 spacings as follows:

1. Anchor Spacing: As indicated.
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch 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: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- G. 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 wall openings 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.
- H. 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.
- I. Install horizontal bridging in stud system, spaced vertically 48 inches. Fasten at each stud intersection.
 1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
 2. 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.
 3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

- K. 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 steel 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 steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 44 00

COLD-FORMED METAL TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cold-formed steel trusses for roofs.
 - 2. Cold-formed steel trusses for floors.

1.2 PRE-INSTALLATION MEETINGS

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- C. Delegated-Design Submittal: For cold-formed steel trusses.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product test reports.
- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. 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]:

1. Aegis Metal Framing.
2. MarinoWARE.
3. Nuconsteel, A Nucor Company.
4. TrusSteel; an ITW company.
5. USA Frametek.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.
2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:
 - a. Floor Trusses: Vertical deflection of 1/480 for live loads and 1/360 for total loads of the span. Vertical deflection of 1/720 for live loads of the span.
 - b. Roof Trusses: Vertical deflection of 1/240 of the span.
 - c. Scissor Roof Trusses: Horizontal deflection of 1-1/4 inches at reactions.
3. Design framing systems to provide for movement of framing members located outside the insulated building envelope 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.

C. Cold-Formed Steel Framing Design Standards:

1. Floor and Roof Systems: Design according to AISI S210.
2. Lateral Design: Design according to AISI S213.
3. Roof Trusses: Design according to AISI S214.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.3 COLD-FORMED STEEL TRUSS MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Sheet: ASTM A1003, structural grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60.

2.4 ROOF TRUSSES

- A. Roof Truss Members: Manufacturer's standard steel sections.
 - 1. Connecting Flange Width: 1-5/8 inches, minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
 - 2. Minimum Base-Metal Thickness: 0.0428 inch.

2.5 FLOOR TRUSSES

- A. Floor Truss Members: Manufacturer's standard steel sections.
 - 1. Connecting Flange Width: 1-5/8 inches, minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
 - 2. Minimum Base-Metal Thickness: 0.0428 inch.

2.6 ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A1003, structural grade, Type H, metallic coated, of same grade and coating weight used for truss members.
- B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

2.7 CLIPS AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dip process according to ASTM A123.
- B. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and Appendix D in ACI 318, greater than or equal to the design load, as determined by testing per ASTM E488 conducted by a qualified testing agency.
- C. Power-Actuated Fasteners: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.

- D. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- E. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780.
- B. Shims: Load bearing, of high-density multimonomer plastic, nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

2.9 FABRICATION

- A. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate trusses using jigs or templates.
 - 2. Cut truss members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 4. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies 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. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed steel trusses without reducing thickness of fire-resistive materials below that is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.2 INSTALLATION

- A. Install, bridge, and brace cold-formed steel trusses according to AISI S200, AISI S214, AISI's "Code of Standard Practice for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Fasten cold-formed steel trusses by welding or mechanical fasteners.
 - 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; comply with requirements for spacing, edge distances, and screw penetration.
- C. Install temporary bracing and supports. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- D. Truss Spacing: As indicated on shop drawings, maximum 48" at roof and 24" at floor.
- E. Do not alter, cut, or remove framing members or connections of trusses.
- F. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.
- G. Erect trusses without damaging framing members or connections.
- H. Coordinate with wall framing to align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.
- I. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's TechNote 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses."
- J. Erection Tolerances: Install cold-formed steel 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 trusses no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform inspections.

- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Field and shop welds will be subject to testing and inspecting.
- D. Prepare test and inspection reports.

3.4 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 A780 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 trusses are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 50 00 – METAL FABRICATIONS

PART 1: GENERAL

1.01: General

- A. Conform to the general provisions of the contract, General and Supplementary Conditions to the contract, Division One of this Specification, the Drawings and this Specification Section.
- B. Should conflict arise between the Drawings and the provisions of the Specifications, the Specifications shall govern.
- C. The Contractor shall furnish labor, materials, tools, equipment, and performance of all work and services necessary or incidental to furnish and erect work of this section, complete with accessories, as shown on the drawings and as specified. Work shall be in accordance with the provisions of the contract documents, and completely coordinated with work of all other trades.
- D. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

1.02: Scope of Work (includes but is not necessarily limited to the following):

- A. General:
 - 1. Refer to the drawings for the extent of work to be done.
 - 2. Inspect existing conditions and the work of other trades for proper conditions before the work of this section begins.
 - 3. Coordinate the work of this section with the work of other trades.
 - 4. Protect people, property and the work of this section and other trades.
 - 5. Clean up work site and dispose of waste and debris on a daily basis.
- B. Scope:
 - 1. Countertop support frames and brackets.
 - 2. Steel railings and guardrails.
 - 3. Roof screen and equipment screen framing.
 - 4. Miscellaneous steel framing and supports.
 - 5. Miscellaneous metal fabrications included as part of or in support of materials and products of other sections.

1.03: Related Work Specified Elsewhere (includes but is not limited to the following):

- A. Section 05 12 00, Structural Steel Framing: Refer also to General Structural Notes on drawings for structural steel requirements.
- B. Section 07 62 00, Sheet Metal Flashing and Trim.
- C. Section 07 92 00, Joint Sealants
- D. Section 09 22 16, Non-Structural Metal Framing

- E. Section 09 90 00, Painting.

1.04: Protection

- A. Protect people from injury. Protect the work of other trades, adjacent property, and structures from damage.
- B. The Contractor or Subcontractor shall repair or replace, as directed by the Architect, all work or property damaged by the Contractor or Subcontractor at no additional cost to the Owner.
- C. Deliver, store and handle all materials and products to prevent damage to each material and product. Should products and materials be damaged through improper storage or handling, the contractor shall replace or repair said item with no cost to the owner.

1.05: Regulatory Codes and Agencies

- A. See Division 1.

1.06: References

- A. Publications listed herein are part of this specification to the extent referenced. The criteria established within these specifications shall take precedence over the standards referenced herein.
 - 1. AISC Specification for Structural Steel Buildings.
 - 2. AISC Code of Standard Practice for Steel Buildings and Bridges.
 - 3. AWS D1.1, Structural Welding Code - Steel.
 - 4. AWS D1.3, Structural Welding Code Steel Sheet.
 - 5. Structural Steel: ASTM A-36, A-440, A-501, A-575 or A-108.
 - 6. Cast Steel: ASTM A-27, Grade 65-35, and A-148, Grade 80-50.
 - 7. Steel Forgings: ASTM A-235 and A-237.
 - 8. Rivet Steel: ASTM A-502.
 - 9. Bolts: ASTM A-307, A-325, A-354.
 - 10. Filler Metal: AWS Standards.
 - 11. Cast Iron: ASTM A-48, Class 30, Min. 30,000 psi tensile.
 - 12. Malleable Iron: ASTM A-47, and A-197.
 - 13. Steel Pipe: ASTM A-53.
 - 14. Galvanizing: ASTM A-123, A-386, or A-525.
 - 15. Copper: ASTM B-370, or B-248.
 - 16. Brass: ASTM B-36.
 - 17. Aluminum: ASTM B-308 for particular alloy in standard shapes and extrusions, B-26 for castings.
 - 18. Stainless Steel: ASTM A-484, and A-276, Type 302.

- B. Work of this section to comply with the most recent published standards of the following:
 - 1. AAMA - Architectural Aluminum Manufacturer's Association.
 - 2. AHDGA - American Hot-Dip Galvanizers Association.
 - 3. AISC - American Institute of Steel Construction.
 - 4. ASTM - American Society for Testing and Materials.
 - 5. AWS - American Welding Society.
 - 6. FS - Federal Specifications.
 - 7. Steel Structure Painting Council - S.S.P.C.

1.07: Quality Assurance

- A. Obtain materials of each type from a single manufacturer and source, unless prior approval is received from the Architect in writing.
- B. Fabricator qualifications:
 - 1. Fabricator shall have a minimum of five (5) years' experience in the highest quality fabrication of each product.
 - 2. Fabricator shall have plant, facilities and personnel adequate for the production of each product as required by this Section and within the construction schedule.

1.08: Workmanship

- A. Level of skill: In the acceptance or rejection of the work, no allowance will be made for a lack of skill.
- B. Indication of a lack of skill from the worker shall be sufficient grounds for the Architect to reject the work and to require its complete removal and complete reapplication at no additional cost to the Owner.

1.09: Submittals

- A. Conform to the requirements of Division 1.
- B. Product Data:
 - 1. Submit manufacturers' published literature for specified products and accessories as applicable, including manufacturers' specifications, physical characteristics and performance data.
 - 2. Submit, as a supplement, manufacturers' instructions and directions for application if not included in manufacturers' published literature.
 - 3. Product Data: Submit technical data sheets for non-proprietary shop primers indicating compliance with specified performance requirements
- C. Shop Drawings: Submit shop drawings showing details of fabrication, assembly, handrail dimensions and construction, and installation including templates for anchor bolt placement.

1.10: Delivery, Storage, and Handling

- A. Delivery:
 - 1. Deliver materials to the site without defects, damage or deterioration.
 - 2. Deliver all materials in the original unopened packages, containers, or bundles with manufacturer original label intact and legible. Do not remove labels.
 - 3. Do not deliver to the site more than one week prior to installation. Coordinate with the General Contractor for proper delivery time.
 - 4. For metal fabrications intended for installation in the building interior, do not deliver to the building until the building is enclosed and dry. Take steps to ensure protection of metal fabrications from corrosion after delivery.
- B. Handling:
 - 1. Take all precautions to handle all materials to prevent damage.
 - 2. Do not apply any damaged materials, products or accessories.
 - 3. Until final acceptance is received, replace any and all damaged metal fabrications, materials, products or accessories at no cost to the owner.
- C. Storage:
 - 1. Neatly stack shipping containers flat and fully supported to prevent sagging in any dimension or damage to the edges, ends, and surfaces.
 - 2. Store all metal fabrications, materials, products and accessories a minimum of 3' above the floor.
 - 3. Do not store long lengths on top of short lengths.
 - 4. Keep all materials dry by storing inside the building under roof.
 - 5. Where products and / or materials have been approved for storage outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation.
 - 6. Do not store in or near patient, staff, pedestrian or vehicular traffic areas.
 - 7. Store all materials properly to avoid all contaminants that could adversely affects structural or appearance qualities.
 - 8. Do not store near open flames or hazardous material and areas.

1.11: Definitions

- A. Definitions in ASTM E 985 for railing-related terms apply to this Section.

1.12: System Description

- A. Structural Performance - Handrails and Railing Systems:
 - 1. Capable of withstanding concentrated load of at least 200 pounds force applied in any direction at any point on the rail. Intermediate rails and components of guardrails shall be capable of withstanding a load of 25 pounds-force per square foot applied horizontally at right angles over entire tributary area, including openings and spaces between rails.

2. Comply with requirements of applicable codes. See Division 1.

PART 2: PRODUCTS

2.01: Materials

- A. For work exposed to view, use materials selected for their smoothness and freedom from surface blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.
- C. Cold-Formed Steel Tubing: ASTM A 500, Grade B.
- D. Uncoated Hot-Rolled Structural Steel Sheet: ASTM A 570, Grade 30, unless otherwise indicated or required by design loading.
- E. Galvanized Structural Quality Steel Sheet: ASTM A 446; Grade A, unless another grade is required for design loading, and G90 coating designation, unless otherwise indicated.
- F. Steel Pipe: ASTM A 53.
 1. Galvanized finish for exterior installations and where indicated.
 2. Type E or S, Grade B.
 3. Standard weight (Schedule 40) unless another weight, type, and grade is required by structural loads.
- G. Brackets, Flanges, and Anchors: Cast or formed metal of the same type material and finish as supported rails.
- H. Concrete Inserts:
 1. Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27.
 2. Bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.
- I. Fasteners: Provide zinc coated fasteners for exterior use where built into exterior walls. Select fasteners for type, grade, and class required.
 1. Bolt and Nuts: Regular hexagon head ASTM A-307, Grade
 2. Lag Bolts: Square head type, F.S. FF-B-561.
 3. Machine Screws: Cadmium-plated steel, F.S. FF-S-92.
 4. Wood Screws: Flat head carbon steel, F.S. FF-S-111.
 5. Plain Washers: Round, carbon steel, F.S. FF-W-92.
 6. Lock Washers: Helical spring carbon steel, F.S. FF-W-84.
- J. Masonry Anchorage Devices: Expansion shields complying with F.S. FF-S-325, as follows:
 1. Lead expansion shields for machine screws and bolts 1/4 inch and smaller: Head out embedded nut type, single unit class, Group I, Type 1, Class 1.
 2. Lead expansion shields for machine screws and bolts larger than 1/4 inch: Group I, Type 1, Class 2.
 3. Bolt anchor expansion shields for lag bolts: Zinc-alloy, long shield anchors class, Group II, Type 1, class 1.

4. Bolt anchor expansion shields for bolts: Closed end bottom bearing class, Group II, Type 2, Class 1.
- K. Steel Framed Stairs: Provide complete stair assemblies of type indicated and including metal framing, hangers, columns, railings, struts, clips, brackets, bearing plates, and other components required for support and anchorage of stairs and platforms. Join pieces by welding unless otherwise indicated.
1. Stair framing: Fabricate stringers of structural steel tubing, channels or plates or a combination thereof. Provide closures for exposed ends of stringers. Construct platforms of structural steel channel headers and miscellaneous framing members, of size indicates or required to support design loadings.
 2. Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal pans not less than that required to support total design loading.
 - a. Form metal pans of uncoated hot-rolled steel sheet.
 - b. Directly weld risers and subtreads to stringers. Locate welds on side of metal pans to concealed by concrete fill.
- L. Steel Railings and Guardrails
1. Fabricate to dimensions shown, with smooth bend and welded joints using steel tubing or pipe of diameter and finish as indicated.
 2. Secure posts and rail ends to building construction as indicated.
 3. Blast clean steel components and shop prime with proprietary paint.

2.02: Schedule

- A. The following is a general listing of items furnished under this Section. The Contractor shall verify its completeness. Supply items as required to complete construction and installation.
1. Anchorage Accessories: Generally, this includes anchorage items required to secure wood to wood, wood to steel, wood to masonry, steel to masonry, steel to steel, or steel to other metals, or miscellaneous flashing as indicated, herein specified, or required.
 2. Miscellaneous Steel and Iron Items: Plates, straps, angles, clips, lintels, joist hangers, and all miscellaneous iron and steel items not specified under other Divisions required to complete work. Anchor bolts, angles, clips and other iron or steel items used for support of other work shall be structural steel grades. All items exposed to the exterior or otherwise exposed to moisture, dampness or steam shall be hot-dipped galvanized as per ASTM A-123.
 3. Steel Supports: Brackets for lavatory counters, etc., shall be fabricated to details with structural steel sections. Miter corners and weld joints. Grind welds smooth; shop prime as specified herein under fabrication.
 4. Vertical Ladders: Fabricate of galvanized steel with minimum side rail dimension of 1/2 inch x 2 inch, rungs of minimum 7/8 inch round or square bars. Punch rungs through side rails and weld. Provide brackets sized to support a concentrated moving load of 200 lbs., and to provide minimum clearance from centerline of rung to wall or obstruction of 7 inches. Minimum ladder width shall be 18 inches between side rails with maximum rung spacing of 12 inches o.c. Grind all rough surfaces smooth. Provide ladders fabricated as indicated.
 5. Interior and Exterior Stair Railing: Fabricate of nominal 1-1/2 inch diameter (1.9 o.d.) Schedule 40, standard weight steel pipe, unless otherwise detailed. Fabricate accurately

to details, use radius fittings, or bend members to uniform curves at all changes in direction. Weld all pipe joints continuously and grind smooth. Intersection coped, welded, and ground smooth. Securely fasten to walls with Julius Blum handrail brackets. Erect plumb and true to line. All pipe railings and brackets shall be factory prime coated. Comply with all applicable codes, including accessibility for the disabled.

6. Loose Lintels: A-36 steel, sized as indicated. Galvanized lintels in exterior walls. Prime paint lintels in interior with alkali resistant paint.

2.03: Accessories

- A. Nonshrink Metallic Grout:
 1. Premixed, factory-packaged, ferrous aggregate grout:
 2. Approved manufacturer and product:
 - a. Embeco 885, by Masterbuilders Technologies.
 - b. Compliant with volume change requirement of CE CRD-C 621as listed in the above paragraph 2.03.A.2a.
- B. Nonshrink Nonmetallic Grout:
 1. Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout.
 2. Approved manufacturer and product:
 - a. Masterflow 928 by Masterbuilders Technologies, CE CRD-C 621.
 - b. Compliant with volume change requirements and exceed the compressive strength requirements of CE CRD-C-621 as listed in the above paragraph 2.03.B.2a.
- C. Interior Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site. Use for interior applications only.
- D. Fasteners: Provide bolts, nuts, lag bolts, machine screws, toggle bolts, masonry anchorage devices, lock washers as required for application indicated and complying with applicable Federal standards. Hot-dip galvanize fasteners for exterior applications to comply with ASTM A 153.
- E. Shop Paint:
 1. Interior Steel:
 - a. Modified alkyd rust-inhibitive primer.
 - b. Volume Solids: 56 percent.
 - c. Proprietary Product: Tnemec 10-1009 Gray, except where 10-99W White or 10-99G Green is indicated.
 2. Exterior Exposed Steel: Aromatic urethane, moisture-cured, zinc-rich primer.
 - a. Volume Solids: 63 percent.
 - b. Conform to SSPC -PS 12.01 (SSPC-Paint 20, Type II).
 - c. Proprietary Product: Tnemec 90-97 Reddish-Gray, or 90G97 Green.
 3. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12 except containing no asbestos fibers.

- a. Galvanizing: ASTM A 123, hot dipped, for fabricated and unfabricated steel products made of uncoated rolled, pressed and forged steel shapes, plates, bars and strip 0.0229 inch and thicker.
4. Galvanizing Repair Paint: High zinc dust content paint with dry film containing not less than 94 percent zinc dust by weight, complying with DOD-P-21035 or SSPC-Paint-20.
5. Rough Hardware:
 - a. Furnish custom-fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes for framing and supporting and anchoring woodwork.
 - b. Galvanize, unless otherwise indicated.

2.04: Fabricated Units

- A. Countertop Support Frames and Brackets:
 1. Fabricate under-counter support frame of steel channels of size and weight to resist bending and deflection under loads that might reasonably be anticipated at any point on countertop. Provide intermediate members to support top completely.
 2. Weld joints for maximum strength and grind smooth.
 3. Fabricate cantilever-mounting frames of structural steel shapes, with full-penetration welds. Engineer and fabricate frames for anchorage to floor within stud or furring space.
 4. Weld mounting frames to counter support frame to transfer loads fully to building structure.
- B. Steel Railings and Guardrails:
 1. Fabricate to dimensions shown, with smooth bends and welded joints using steel tubing or pipe of diameter and finish as indicated.
 2. Secure posts and rail ends to building construction as indicated.
 3. Blast clean steel components and shop prime with proprietary paint.
- C. Miscellaneous Steel Trim:
 1. Fabricate to shapes and sizes as required for profiles shown with continuous welded joints and smooth exposed edges.
 2. Use concealed field splices wherever possible.
 3. Provide cutouts, fittings, and anchorages; coordinate assembly and installation with other work.
- D. Miscellaneous Framing and Supports: Provide as required to complete work and not included with structural steel framework. Fabricate of welded construction in as large units as possible; drill and tap as required to receive hardware and similar items. Include required anchors for building into other work spaced not more than 24 inches o.c.

2.05: Fabrication

- A. Use materials of size and thickness shown, or, if not shown, of required size, grade and thickness to produce strength and durability in finished product.
- B. Weld corners, joints and seams continuously to comply with AWS recommendations.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Use AWS qualified welding procedures.
 3. Obtain fusion without undercut or overlap.
 4. Remove welding flux immediately.
 5. Finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
- C. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
- D. Galvanizing: Hot-dip galvanize items as indicated, to comply with listed standard:
1. ASTM A 123, for galvanizing steel and iron products.
 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- E. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
1. Interior Exposure (SSPC Zone 1A): SSPC SP-3, Power Tool Cleaning.
 2. Exterior Exposure (SSPC Zone 1BA): SSPC SP-6/NACE No. 3, Commercial Blast Cleaning.
- F. Shop Finishing:
1. Hot dip galvanize ferrous metal fabrications subject to exterior exposure in inaccessible locations or not scheduled to have paint finish.
 2. Apply shop primer to uncoated surfaces of metal fabrications, except those members and portions of members to be embedded in concrete or mortar, interior steel framing to receive application of spray-applied fireproofing, unless otherwise indicated. Comply with SSPC-PA 1, Paint Application Specification No. 1, for shop painting.
 3. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3: EXECUTION

3.01: Inspection

- A. Inspect the work of other trades to ascertain if conditions are suitable for the work of this section.
- B. In the event of any discrepancies or unsuitable conditions, do not proceed until those conditions have been corrected. Proceeding with work indicates acceptance of underlying conditions.

3.02: Coordination

- A. Coordinate all work involving material, labor and equipment of other trades penetrating or attaching to the work of this section so that each trade's work can be installed, erected or fabricated as required and that the work space be maintained and left clean and safe.

3.03: Installation

- A. Perform cutting, drilling, and fitting necessary for installation.

- B. Set work accurately in location, alignment, and elevation measured from established lines and levels. Set metal work level, true to line, and plumb.
- C. Perform field welds using AWS qualified welding procedures.
- D. Provide anchorage devices and fasteners where necessary for installation to other work.
- E. Set loose items on cleaned bearing surfaces, using wedges or other adjustments as required. Solidly pack open spaces with bedding mortar, consisting of one part Portland cement to three parts sand and only enough water for packing and hydration, or use commercial nonshrink grout material.
- F. Apply black asphaltic coating to concealed bottoms, sides, and edges of cast iron units set into concrete.
- G. Shim and grout as necessary. Weld field connections and grind smooth. Where practicable, conceal fastenings.
- H. Secure metal to wood with lag screws, of adequate size, with appropriate washers.
- I. Secure metal to concrete with embedded anchors, setting compounds, caulking and sleeves, or setting grout. Use expansion bolts, toggle bolts, or screws for light duty service only.
- J. Meet requirements specified for structural steel for erecting items of structural nature or use and conform to "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" (AISC specifications) for structural items.
- K. Do not field-splice fabricated items, unless items exceed standard shipping length or change of direction requires splicing. Do not use mechanical splicing by means of wedges without full welding.
- L. Furnish all handrails complete with brackets. Wherever pickets or posts are indicated to be set in sleeves, provide sleeves having a minimum wall thickness of 1/8 inch. Set pickets or posts in sleeves with non-shrink grout as specified by this section, back 1/4 inch from surface; fill flush with polyurethane sealant.
- M. Provide each fabricated item complete with attachment devices as indicated, or as required, to install.
- N. Provide plywood patterns for anchoring device locations for all items to be attached to cast-in-place concrete or masonry construction. Provide in timely manner so as to facilitate construction schedule.
- O. Provide indicated grout bed for metal items attached to concrete or masonry construction.

3.04: Touch-Up

- A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces. Apply by brush or spray to provide a minimum 2.0 mil (0.05 mm) dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.05: Clean Up

- A. At the end of each day's work and at final completion, the site shall be free of all waste materials and equipment used by the Contractor. Remove all waste materials and debris and dispose of in a legal and safe manner.

- B. The Contractor shall be responsible for maintaining a clean work place and shall pay for all costs, at no additional expense to the Owner, should outside labor and equipment be used to clean up the work site.
- C. Prevent waste materials from entering and accumulating in the storm drainage system and on adjacent property.

*****End of Section 05 50 00*****