PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

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

B. Related Sections:
   1. Section 014000 "Quality Requirements" for independent testing agency procedures and administrative requirements.
   2. Section 05 3100 "Steel Decking" for field installation of shear connectors through deck.
   3. Section 05 5000 "Metal Fabrications" for miscellaneous steel fabrications including steel lintels and shelf angles not attached to structural-steel frame and other metal items not defined as structural steel.
   4. Section 05 5500 "Metal Stairs."
   5. Section 09 9000 " Painting"

1.03 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Heavy Sections: Rolled and built-up sections as follows:
   1. Shapes included in ASTM A 6/A 6M with flanges thicker than 2 inches.
   2. Welded built-up members with plates thicker than 2 inches.

1.04 PERFORMANCE REQUIREMENTS

A. Provide connections as shown or noted on Drawings. Design of connections not shown or noted shall be provided by Structural Engineer-of-Record upon request.

B. Provide details of truss connections required by the Contract Documents to be completed by structural steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

C. Alternate connections may be submitted by the Contractor with prior approval of Structural Engineer-of-Record. Connections shall be designed for loads indicated on drawings or provided by Structural Engineer-of-Record. Loads indicated are developed using Load and Resistance Factor Design (LRFD) load combinations unless noted otherwise. One set of calculations for all alternate connections signed and sealed by a qualified engineer shall be submitted with or in advance of applicable shop drawings.

D. Construction: Refer to the Drawings for description of lateral load resisting system.

1.05 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Calculations, Shop Drawings, and Erection Drawings (including Field Work drawings): Submit for action required connection calculations, shop drawings and erection drawings for all steel indicated on the Contract Documents.
   1. Location of each piece or detail within the structure.
   2. Include details of cuts, connections, splices, camber, holes, steel type, grade, and other pertinent data.
   3. Include embedment piece and setting drawings.
   4. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
   5. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
   6. Drawings submitted in multiple packages shall contain individual submittals complete with all applicable erection drawings, details, and piece drawings.
   7. Reproduction of Contract Documents is not permitted.
   8. Provide schedule for submittal of shop and erection drawings.
   9. Connection design calculations: Calculations are required for all details that are indicated on the Drawings. Each calculation package shall be sealed and signed by the Contractor's Engineer.
   10. Erection Drawings: The erection drawings shall include plans showing exact locations of base and bearing plates, and/or anchor rods and other embedded items. All field connections not specifically shown on shop drawings shall be shown on erection drawings, including field bolt size, type, number, location, and any special installation requirements and field weld size, type, length, and location.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing.

D. High Strength Bolting Procedures: Submit for action written high strength bolting procedures that are in accordance with RCSC "Specification for Structural Joints using ASTM A325, A490, or F3043 Bolts.

E. Charpy V-Notch testing results for heavy sections and weld metal when required.

F. Erection Procedure: Submit for action a steel erection procedure, prepared under the supervision of the Contractor's Engineer, for review by the SER. The review by SER shall only be for the effects of the steel erection procedures on the final structure. This erection procedure shall, at a minimum, meet requirements outlined on the Contract Documents and shall bear the seal and signature of the Contractor's Engineer. No deviation from the approved procedure will be permitted without prior written approval by the Contractor's Engineer and review by the SER.

G. Quality Control Program: Submit for record complete details of the Contractor's quality control program including the names of the personnel responsible for this work.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and fabricator.

B. Welding certificates.

C. Mill test reports for structural steel, including chemical and physical properties.

D. Product Test Reports: For the following if present on project:
   1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   2. Direct-tension indicators.
   3. Tension-control, high-strength bolt-nut-washer assemblies.
   4. Shear stud connectors.
   5. Shop primers.
   6. Nonshrink grout.

1.07 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.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

E. Comply with applicable provisions of the following specifications and documents:
   1. AISC 303 as amended below:
      a) Section 3.2: Replace entire section with the following: “Requirements for structural steel including quantities, sizes, locations, arrangement, and details shall be shown or noted in the overall Contract Drawing package. Fabricator is responsible for incorporating all such information from structural, architectural, mechanical, and electrical drawings, as well as those of other disciplines.”
      b) Section 3.5: Remove all text after first sentence.
      c) Section 3.6: Replace entire section with the following: “When the fast-track project delivery system is selected, release of structural drawings shall constitute release for construction only if specifically noted as such on the drawing. Drawing indicated “preliminary” or “not for construction” shall not be used for detailing or construction except where the risk of any cost or delay associated with subsequent revisions to Contract Documents is accepted by the Owner, Contractor or Fabricator.”
      d) Section 4.4: Revise second sentence to read the following: “The shop and erection drawings shall be returned in accordance with the schedule defined in Division 1 of the project Specification. In the absence of such schedule, the Owner’s Designated Representative for Design shall return submittals within 14 calendar days of receipt from the Owner’s Designated Representative for Construction.”
   2. AISC 360.
   3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

F. Preinstallation Conference: Conduct conference at Project site.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
   1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
   1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
   2. Clean and relubricate bolts and nuts that become dry or rusty before use.
   3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.09 COORDINATION

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

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.10 DESIGN OF CONNECTIONS

A. The contractor is responsible to design all connection indicated on the Contract Documents. All connections indicated shall be designed for the forces and/or connection design criteria called for in the Contract Documents.

B. Connection concepts shown on the Drawings show only the minimum requirements to convey design intent.

C. All connections and details shown on shop and erection drawings shall be prepared under the supervision of the Contractor’s Engineer, in accordance with AISC “Load Resistance Factor Design Specification for Structural Steel Buildings.”

D. The contractor shall design and provide any stiffener plates, doubler plates, reinforcing plates, etc. and their connections that may be required to develop and/or transfer the forces and/or connection design criteria called for in the Contract Documents.

E. Design Connections to withstand the combined effects of shears, axial forces, moments and torques and as required by applicable code(s) and the Contract Documents.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M unless indicated otherwise on Drawings.

B. Channels, Angles, Shapes: ASTM A 36/A 36M unless indicated otherwise on Drawings.

C. Plate and Bar: ASTM A 36/A 36M unless indicated otherwise on Drawings..

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade C, structural tubing, unless indicated otherwise on the drawings.

E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
   1. Weight Class: As indicated on Drawings.
   2. Finish: Black except where indicated to be galvanized.

F. Welding Electrodes: Comply with AWS requirements, 70 Series
   1. Conform to Charpy V-Notch test requirements of AISC 360.

G. Heavy Sections:
   1. Conform to Charpy V-Notch test requirements of AISC 360.

2.02 BOLTS, CONNECTORS, AND ANCHORS

A. Use Tension-Control, High-Strength Bolt-Nut-Washer Assemblies whenever possible unless indicated otherwise.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

C. High-Strength Bolts, Nuts, and Washers, ASTM A 490, Type 1, heavy-hex steel structural bolts; AS5M A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers with plain finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Plain.

E. Steel Headed Stud Anchors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Unheaded Anchor Rods: ASTM F 1554, Grade 55, weldable.
   1. Configuration: Straight.
   2. Nuts: ASTM A 563 heavy-hex carbon steel.
   3. Plate Washers: ASTM A 36/A 36M carbon steel.
   4. Washers: ASTM F 436, Type 1, hardened carbon steel.
   5. Finish: Plain.

G. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, straight.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Plain.

H. Threaded Rods: ASTM A 36/A 36M.
1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Washers: ASTM A 36/A 36M carbon steel.
3. Finish: Plain.

I. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

J. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

K. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

L. Deformed Anchor Studs (DAS) / Deformed Bar Anchors (DBA): Made from ASTM A 108 low carbon steel, cold worked and deformed per ASTM A 496. Minimum yield stress = 60 ksi (415 MPa); minimum tensile strength = 80 ksi (550 MPa).

M. Rebar: Rebar used for welding shall meet the requirements of ASTM A-706. Minimum bend diameters per ACI 318.

N. Expansion Anchors, Screw Anchors, and Adhesive Anchors: Size and Manufacturer as indicated on Drawings. Complete assemblies with required rods, nuts, washers, and adhesive system as applicable. Installed in accordance with Manufacturer's installation instructions. Current ICC approval and published ICC Research Report required.
1. Finish for use in conditioned environments free from potential moisture (interior): Plain or in accordance with Manufacturer's standard.
2. Finish for use in exposed or potentially wet environments and for attachment of exterior cladding materials: Galvanized in conformance with ASTM A 153 or stainless steel, Series 300.

O. Primer: Where steel is to be field painted, provide fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

P. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20

2.03 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time. Minimum compressive strength = 6000 psi .

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time. Minimum compressive strength = 6000 psi . Required where grout is exposed to view or weathering.

2.04 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
   1. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
   4. Mark and match-mark materials for field assembly.
   5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations, if applicable.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces. Do not enlarge bolt holes by burning.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning or SSPC-SP 3, "Power Tool Cleaning."

F. Steel Headed Stud Anchors and Deformed Anchor Studs / Deformed Bar Anchors: Prepare steel surfaces as recommended by manufacturer of anchors. Use automatic end welding of anchors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
   1. Cut, drill, thermal cut, or punch holes perpendicular to steel surfaces.
   2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.

H. Splices: Splicing of members to obtain required lengths is not permitted without prior approval of structural Engineer-of-Record unless indicated on the Drawings.

I. Substitutions: Where exact sizes and weights indicated on Drawings are not readily available, secure approval of alternate sizes from Structural Engineer-of Record in time to prevent project delay.

2.05 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: As indicated on Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.06 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, including top flange of beams to receive steel headed stud anchors.
3. Surfaces to be high-strength bolted with slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Surfaces not otherwise indicated to be painted that are not exposed to view or weather in the final condition.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to either of the following specifications and standards:
1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power 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.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection.

2.07 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
1. Fill vent and drain holes in closed sections (HSS or Pipe) that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels and shelf angles located in exterior walls.

2.08 SOURCE QUALITY CONTROL

A. Testing and Inspection: As indicated on Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
   1. Coordinate installation of non-structural steel items that load the temporarily supported steel frame such that temporary supports are adequate to resist all imposed loads.
   2. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
   3. Do not apply permanent loading other than the weight to supported concrete slab-on-deck assemblies to composite beams and girders until concrete has achieve 75 percent of its design strength without prior approval of structural Engineer-of-Record.

3.03 ERECTION

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

B. Base Bearing 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 indicated on 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. Clean and moisten surfaces to receive grout. Immediately remove any remaining free water. 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's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.
   2. Make allowances for difference between temperature at time of erection and mean temperature of 70° F when structure is completed and in service.

E. Splice members only where indicated.
   1. Fasten splices in compression after bearing surface have been brought into contact. Close all gaps greater than 1/16” by driving non-tapered mild steel shims full depth of bearing surface along full length of gap.

F. Do not use thermal cutting during erection unless approved by Structural Engineer-of-Record. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Steel Headed Stud Anchors: 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.

3.04 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: As indicated on Drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M 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 where indicated on Drawings, back gouge, and grind steel smooth.
   3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.05 FIELD QUALITY CONTROL

A. Testing and Inspection: As indicated on Drawings.

3.06 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: Cleaning and touchup painting are specified in Section 09 9000 " Painting."

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Roof deck.
   2. Composite floor deck.

B. Related Requirements:
   1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
   2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.

1.03 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.

1.04 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
   1. Power-actuated mechanical fasteners.
   2. Acoustical roof deck.

1.05 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.06 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

2.01 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. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.02 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. ASC Profiles, Inc.; a Blue Scope Steel company.
   2. Canam United States; Canam Group Inc.
   3. CMC Joist & Deck.
   4. Consolidated Systems, Inc.; Metal Dek Group.
   5. Cordeck.
   6. DACS, Inc.
   7. Epic Metals Corporation.
   8. Marlyn Steel Decks, Inc.
   9. New Millennium Building Systems, LLC.
   10. Nucor Corp.; Vulcraft Group.
   11. Roof Deck, Inc.
   12. Valley Joist; Subsidiary of EBSCO Industries, Inc.
   13. Verco Manufacturing Co.
   14. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

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 A 1008/A 1008M, Structural Steel (SS), grade, thickness and profile as indicated, shop primed with manufacturer's standard baked-on, rust-inhibitive primer. Use at interior locations.
      a) Color: Manufacturer's standard.
   2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), grade, thickness and profile as indicated, G60 zinc coating. Use at exterior locations not indicated to be painted and exposed to view.
   3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), grade, thickness and profile as indicated, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer. Use at exterior locations indicated to be painted and exposed to view.
      a) Color: Manufacturer's standard.
   4. Span Condition: As indicated.
   5. Side Laps: Overlapped.

2.03 COMPOSITE FLOOR 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. ASC Profiles, Inc.; a Blue Scope Steel company.
   2. Canam United States; Canam Group Inc.
   3. CMC Joist & Deck.
   4. Consolidated Systems, Inc.; Metal Dek Group.
   5. Cordeck.
   6. DACS, Inc.
   7. Epic Metals Corporation.
   8. Marlyn Steel Decks, Inc.
   9. New Millennium Building Systems, LLC.
   10. Nucor Corp.; Vulcraft Group.
   11. Roof Deck, Inc.
   12. Verco Manufacturing Co.
   13. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

B. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
   1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), grade, thickness and profile as indicated, with top surface phosphatized and unpainted and underside surface shop primed with manufacturers' standard baked-on, rust-inhibitive primer. May be used at interior locations.
   2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), grade, thickness and profile as indicated, G60 zinc coating. May be used at interior or exterior locations not indicated to be painted and exposed to view.
   3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), grade, thickness and profile as indicated, G60 zinc coating; with unpainted top surface and cleaned and pretreated bottom surface primed with manufacturer's standard baked-on, rust-inhibitive primer. Use at exterior locations indicated to be painted and exposed to view.
   4. Span Condition: As indicated.

2.04 NONCOMPOSITE FORM DECK

A. Manufacturers: Subject to compliance with requirements, provide products by the following, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. ASC Profiles, Inc.; a Blue Scope Steel company.
   2. Canam United States; Canam Group Inc.
   3. CMC Joist & Deck.
   4. Consolidated Systems, Inc.; Metal Dek Group.
   5. Cordeck.
   6. DACS, Inc.
   7. Marlyn Steel Decks, Inc.
   8. New Millennium Building Systems, LLC.
   9. Nucor Corp.; Vulcraft Group.
   10. Roof Deck, Inc.

11. Valley Joist; Subsidiary of EBSCO Industries, Inc.
12. Verco Manufacturing Co.
13. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

B. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), grade, thickness and profile as indicated, G60 zinc coating typical. Use G90 where exposed to moisture.
2. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), grade, thickness and profile as indicated, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.. Use at locations indicated to be painted and exposed to view.
a) Color: Manufacturer's standard.
3. Span Condition: As indicated
4. Side Laps: Overlapped

2.05 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. 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.

E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated but not less than recommended by SDI Publication No. 31 for overhang and slab depth.

F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

H. Galvanizing Repair Paint: ASTM A 780

I. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. When steel headed stud anchors are to be welded through metal deck and/or corrugated metal forming, the top flange of beams to receive such anchors shall be unpainted and free of debris prior to installation of the deck and/or forming.

3.02 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. Install temporary shoring before placing deck panels if required to meet deflection limitations. Obtain prior written approval from Structural Engineer-of-Record before installing shoring.

C. Locate deck bundles to prevent overloading of supporting members.

D. 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.
   1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
   1. Refer to Drawings for opening sizes requiring reinforcement and typical reinforcement options.
   2. Miscellaneous openings not shown on the Drawings such as those required for vents, risers, conduits, etc. shall be cut and reinforced if necessary, by the trade requiring the opening.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck with prior written approval of Structural Engineer-of-Record. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.03 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels as indicated on drawings. Provide weld washer at each location where uncoated deck of thickness 0.028 inches (0.7 mm) or less is being fastened to supporting members by welding.

B. End Bearing: Install deck ends over supporting frame with a minimum end bearing length as indicated, with end joints as follows:
   1. End Joints: Lapped as indicated.

C. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or 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.

3.04 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
   1. Weld Diameter: As indicated, nominal.
   2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of 12 inches apart, but not more than 18 inches apart. Steel headed stud anchors may be substituted for welds one for one in meeting spacing requirements.
   3. Weld Washers: Install weld washers at each weld location when the minimum uncoated steel thickness is less than 0.028 inches .

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches, and as follows unless otherwise indicated:
   1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
   2. Mechanically clinch or button punch.
   3. Fasten with a minimum of 1-1/2-inch- long welds.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing as indicated with end joints as follows:
   1. End Joints: As indicated.

D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

E. 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.

F. Install piercing hanger tabs at minimum spacing indicated in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.

G. Fastening Corrugated Metal Forming: Secure to supporting member with 1/2 inch minimum diameter fusion welds made through 0.0747 inch welding washers. Minimum weld requirements as follows:
   1. End Laps: In valley of side laps and at center of sheet.
   2. Intermediate Supports: In valley of side lap on every other support and in valley of center corrugation on the remaining supports (to form an X pattern).
   3. Exterior Edges: 12” on center.
   4. Minimum Number of Welds Per 100 square foot of Deck Area:
      a) 0.0164 inches thick and thinner – 25
      b) Thicker than 0.0164 inches – 15

H. Steel headed stud anchors shall be field welded to the structural members only after all steel framing, deck and/or forms are in place and shored when required. Deck and/or forming shall

be installed such that the bottom rib plate is in continuous contact with the surface to receive anchors.

I. Steel Headed Stud Anchor Capacity: Number of steel headed stud anchors indicated on Drawings is based on the allowable capacity for anchors in normal weight or light weight concrete as listed in AISC 360 for the composite deck specified. If additional anchors are required due to decreases in anchor capacity for the type of deck and stud placement supplied, such additional anchors shall be provided at no additional cost to the Owner.

J. Steel Headed Stud Anchor Installation:
   1. Install anchors in accordance with Manufacturer's instructions. Use only personnel and equipment authorized by the Manufacturer.
   2. Use through-deck anchor welding where deck material thickness permits proper weld fusion to develop required anchor capacity. Provide adequate test results to verify feasibility of through-deck welding for the particular anchor sizes and deck thicknesses involved.
   3. If through-deck anchor welding is not feasible, install anchors through pre-punched holes in deck. Provide pre-punched holes only where required for anchor installation and keep hole oversize to minimum required to develop a proper weld.

K. At the beginning of each shift of work, and after each time welding equipment has been moved, two test anchors shall be installed and bent to 45 degrees by the Contractor. If failure occurs, adjust equipment and repeat test. Two consecutive test studs shall be welded and found satisfactory before production for that shift begins or is resumed.

3.05 FIELD QUALITY CONTROL

A. Testing and Inspection: As indicated on Drawings.

3.06 PROTECTION

A. Galvanizing Repairs: Where deck is exposed to weather or moisture, 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 brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.
   1. Do not use deck units for storage or as a working platform until permanently secured in position.
   2. Contractor shall assure that completed deck is not damaged by use as a runaway, storage of materials or subsequent work.
   3. Contractor shall assure that construction loads are not allowed which exceed the safe carrying capacity of the deck.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Exterior non-load-bearing and soffit wall framing.

B. Related Sections include the following:
   1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
   2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
   3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.03 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 on drawings.
   2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
      a) Exterior Non-Load-Bearing Framing: Horizontal deflection as indicated on drawings.
   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 of primary building structure as follows:
      a) Upward and downward movement of 3/4 inch up and 3/4 inch down (1 1/2 total).

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
   1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
   2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.04 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Provide ¼" = 1'-0" scale elevations of all walls and plans of all soffits comprised of cold-formed metal framing. 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. 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.

C. Welding certificates.

D. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
   1. Vertical deflection clips.
   2. Horizontal drift deflection clips

1.05 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. 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.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

E. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

F. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
   1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
   2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.06 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

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
   1. Allied Studco.
   2. AllSteel Products, Inc.
   3. California Expanded Metal Products Company.
   4. Clark Steel Framing.
   5. Consolidated Fabricators Corp.; Building Products Division.
   6. Craco Metals Manufacturing, LLC.
   7. Custom Stud, Inc.
   8. Dale/Incor.
   9. Design Shapes in Steel.
   10. Dietrich Metal Framing; a Worthington Industries Company.
   11. Formetal Co. Inc. (The).
   12. Innovative Steel Systems.
   13. MarinoWare; a division of Ware Industries.
   14. Quail Run Building Materials, Inc.
   15. SCAFCO Corporation.
   16. Southeastern Stud & Components, Inc.
   17. Steel Construction Systems.
   18. Steeler, Inc.
   19. Super Stud Building Products, Inc.
   20. United Metal Products, Inc.

2.02 MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
   1. Grade: As required by structural performance.
   2. Coating: G60 , or equivalent.

B. Steel Sheet for Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
   1. Grade: As required by structural performance.
   2. Coating: G90 .

2.03 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: As indicated on drawings and required by structural performance.
   2. Flange Width: As indicated on drawings and required by structural performance.
   3. Section Properties: As indicated on drawings and required by structural performance.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: As indicated on drawings and required by structural performance.
   2. Flange Width: As indicated on drawings and required by structural performance.

C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a) Dietrich Metal Framing; a Worthington Industries Company.
      b) MarinoWare, a division of Ware Industries.
      c) SCAFCO Corporation
      d) The Steel Network, Inc.

D. Maximum track lateral deflection under design load shall not exceed 1/8”or the elastic limit load.

E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

F. Stiff Clips: Clip capable of supporting design loads indicated through positive mechanical attachment to the stud web. Maximum deflection of the clip/stud assembly under design loads shall be the smaller of 1/8” or the elastic limit load.

2.04 CEILING AND EXTERIOR SOFFIT JOIST FRAMING

A. Steel Ceiling And Soffit Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, punched with enlarged service holes, with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: 0.0329 inch.
   2. Flange Width: 1-5/8 inches minimum.
   3. Section Properties: As required and as indicated.

2.05 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers, knee braces, and girts.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.06 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36 55, 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.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.07 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. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

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.

2.08 FABRICATION

A. Fabricate cold-formed metal framing 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 framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting 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.
   4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies 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 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

3.01 EXAMINATION

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

3.02 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 framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

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

D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.03 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch .

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. 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, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. 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.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 07 Section "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.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. 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. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.04 EXTERIOR NON-LOAD-BEARING 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 bottom track, unless otherwise indicated. Space studs as follows:
   1. Stud Spacing: 16 inches

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. Connect vertical deflection clips to studs and anchor to building structure.
   2. Connect drift clips to cold formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

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 wall-framing system.

3.05 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.

3.06 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included: Furnish and install miscellaneous metal items required and specified. Provide miscellaneous bolts, anchors, supports, braces, and connections necessary for completion of Work.

1.02 RELATED DOCUMENTS

A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are located in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

A. In accordance with Section 01 3000.
   1. Submit Shop Drawings on miscellaneous metal items for review by Architect, prior to fabrication. Include type, grade, class of metal and sizes, details of fabrication, methods of assembling, connections to supporting construction, reinforcement, and location of hardware.
      a. Contract Document electronic files (including all drawings, specifications, addenda and supplemental information) will not be made available to Bidders or Sub-bidders before the award of a Contract. After the award of the Contract, the General Contractor may make request for release of electronic document files.

B. Substitutions will not be considered prior to the award of the General Contract.

1.04 REFERENCES

A. American Institute of Steel Construction (AISC):
   1. Specifications for the Design, Fabrication and Erection of Structural Steel for Building

B. American National Standards Institute (ANSI):
   1. ANSI A14.3, "Ladders, Fixed, Safety Requirements."

C. American Society for Testing and Materials (ASTM):
   1. ASTM A36, "Structural Steel."
   2. ASTM A53, "Hot-Dipped, Zinc-coated Welded and Seamless Steel Pipe."
   3. ASTM A123, "Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products."
   4. ASTM A153, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware."
   5. ASTM A307, "Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength."

6. ASTM A446, "Specification for Sheet Steel, Zinc-Coated by the Hot-Dip Process."
7. ASTM A500, "Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Round and Shapes."
8. ASTM A568, "Specification for General Requirements for Steel, Carbon and High-Strength Low Alloy Hot-Rolled Sheet and Cold Rolled Sheet."
9. ASTM A627, "Specification for Homogeneous Tool-Resisting Steel Bars for Security Applications.
10. ASTM A780, "Practice for Repair of Damaged Hot-Dipped Galvanized Coatings."
11. ASTM B221, "Aluminum-Alloy Extruded Bar, Rod, Wire, Shape, and Tube."

D. American Welding Society (AWS):
1. AWS D1.1 - Structural Welding Code.

E. Steel Structures Painting Council Specification (SSPC):
1. Steel Structures Painting Manual.

1.05 QUALITY ASSURANCE

A. Qualifications of Welders: Use certified welders and the shielded arc process for welding performed in connection with work of this Section.

B. Codes and Standards: In addition to complying with pertinent codes and regulations, comply with:
1. "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction.
2. "Code for Welding in Building Construction" of the American Welding Society.

C. Conflicting Requirements: In event of conflict between pertinent codes and regulations, requirements of the referenced standards, and these specifications, provisions of more stringent govern.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel plates, angles, and other structural shapes shall conform to ASTM A36.
1. Painted Steel Plate, shop primed, flat paint finish, welds to be smooth/clean/mitered, Category 1 AESS

B. Steel pipe shall conform to ASTM A53, Grade B, Schedule 40.

C. Galvanized steel pipe and tube shall conform to ASTM A53.

D. Steel Tubing shall conform to ASTM A500.

E. Sheet Steel, Galvanized: ASTM A446.

F. Sheet and Strip Steel, Hot Rolled: ASTM A568.

G. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

H. Aluminum:
1. Extruded Aluminum: ASTM B221, Alloy 6063-T5/T52.
2. Castings: ASTM B 26, Alloy A356.0-T6.
3. Anchors and Fasteners for Aluminum: Stainless steel.

I. Welding Materials: AWS D1.1; type required for materials being welded.

J. Anchors
1. Threaded Type Concrete Inserts: Galvanized malleable iron or cast steel capable of receiving 3/4 inch diameter machine bolts.
2. Slotted Type Concrete Inserts: Welded box type fabricated with minimum 1/8 inch thick galvanized pressed steel plate with slot to receive 3/4 inch diameter square head bolt and knockout cover.
3. Expansion Shield for Masonry Anchorage: FS FF-2-325.
4. Toggle Bolts: FS FF-B-588.

K. Adhesive Anchors:
1. In Unreinforced Masonry Units ICC-ES AC60. Acceptable adhesives are Hilti HIT-HY70 (ICC-ESR-3342) Simpson SET (ICC-ES ESR-1772) Simpson AT (ICC-ES ESR-1958).
   a. Steel anchor element shall be Hilti HAS-E or ASTM F1554 Grade 36 continuously threaded rod.
2. In Hollow Concrete Masonry Units: ICGES AC58. Acceptable adhesives are Hilti HIT-HY 70 (ICC-ESR-2682), Simpson SET, Simpson AT, or approved equal.
   a. Plastic mesh screen tube per manufacturer recommendations required.
3. In Solid Grouted Masonry Units: ICC-ES AC58. Acceptable adhesives are Hilti HIT-HY 70 (ICC-ESR-3342), Simpson SET-XP (IAPMO UES-ER-265), or Simpson AT-XP (IAPMO UES-ER-281).
   a. Steel anchor element shall be Hilti HASE, ASTM F1554 Grade 36, or ASTM A193, Grade B6, B8 or B8M continuously threaded rods.
4. In Concrete: ICC-ES AC308. Acceptable anchors are Hilti HIT-HY 200 SAFESet fast cure (ICC-ESR-3187), Hilti HIT-RE 500-SD slow cure (ICC-ESR-2322), Simpson SET-XP (ICC-ESR-2508), Simpson AT-XP (IAPMO UES-ER-263), or approved equal.
   a. Steel anchor element shall be Hilti HASE, STM F1554 Grade 36, or ASTM A193, Grade B6, B8, or B8M continuously threaded rod.

L. Fasteners General:
1. Provide **Type 304** stainless-steel fasteners at stainless steel and aluminum fabrications.
2. Bolts, Nuts and Washers for Exterior Locations: ASTM A307, galvanized in accordance with ASTM A153.
3. Bolts, Nuts and Washers for Interior Locations: ASTM A307, Grade A, regular hexagon head.
4. Bolts, Round Head: ANSI B-18.5
5. Wood Screws, Flat Head Carbon Steel: ANSI B-18.6.1.
6. Plain Washers, Helical Spring Type Carbon Steel: FS FF-W-84.

M. Column Anchor Rods: ASTM F1554, Grade 36 minimum, but See Schedule on drawings for other specified Grades.

2.02 FABRICATION

A. Fabricate steel items according to approved shop drawings and to applicable portions of AISC Specifications. Conceal welds where possible; grind exposed welds smooth and flush with adjacent finished surface. Ease exposed edges to small uniform radius.

B. Pre-assemble products in shop to greatest extent possible. Disassemble units to extent necessary for shipping and handling. Clearly mark units for re-assemble and installation.

C. For exposed to view fabrications, use materials which are smooth and free of surface blemishes including pitting, seams marks, roller marks, roller trade names and roughness. Remove blemishes by grinding or by welding and grinding, prior to cleaning, treating and application of surface finishes including zinc coating.

D. Fabricate items with joints tightly fitted and secured.

E. Fit and shop assemble in largest practical sections for delivery to Project site.

F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of structure, except where specifically noted otherwise.

G. Make exposed joints butt tight, flush and hairline.

H. Fabricate anchorage and related components of same material and finish as metal fabrication, unless indicated otherwise.

2.03 ROUGH HARDWARE

A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.

B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.04 LOOSE STEEL LINTELS

A. Fabricate loose structural steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.

B. Weld adjoining members together to form a single unit where indicated.

C. Size loose lintels for equal bearing of one inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.

D. All steel lintels exposed to weather shall be galvanized.

2.05 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports for applications indicated or which are not a part of structural steel framework, as required to complete work.

B. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent other construction retained by framing and supports. Fabricate from structural steel shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.
   1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
      a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inch x 8 inches long.

2.06 SHELF AND RELIEVING ANGLES

A. Fabricate shelf and relieving angles from steel angles of sizes indicated and for attachment to concrete or steel framing. Provide slotted holes to receive 3/4 inch bolts, spaced not more than 6 inches from ends and not more than 24 inches o.c., unless otherwise indicated.

B. Galvanize shelf angles to be installed on exterior concrete or steel framing.

2.07 FINISHES, GENERAL

A. Comply with NAAMM Metal Finishes Manual for recommendations relative to application and designations of finishes.

B. Finish metal fabrications after assembly.

C. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
   1. Galvanize ALL EXTERIOR EXPOSED structural shapes, lintels, shelf angles and decorative steel components.

D. Lead free, alkyd primer: Manufacturer's standard.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

3.02 CLEANING

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.
   1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Worked covered by this Section includes furnishing of and paying for all materials, labor, services, equipment, licenses, taxes, other items, and appliances for execution, installation and completion of all work specified herein and/or shown on the drawings.

1.02 RELATED DOCUMENTS

A. Applicable portions of the Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to the execution of the Contract, other documents listed in the Agreement and Modifications issued after the execution of the Contract shall apply to this Section. The general requirements for this work are located in Division 1 of the Specifications.

1.03 SUBMITTALS AND SUBSTITUTIONS

A. In accordance with Section 01 3000.

B. Substitutions will not be considered prior to the award of the General Contract.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.04 QUALITY ASSURANCE

A. Design, engineer, fabricate and install handrails and railing systems to comply with requirements of ASTM E985 for structural performance based on testing performed in accordance with ASTM E 894 and E 935.

B. Structural design, fabrication and assembly shall be in accordance with requirements of NAAMM Metal Stairs Manual, except as otherwise specified or shown.

C. Design stairs to support a live load of 100 pounds per square foot.

D. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Handrails and Top Rails of Guards:
      a. Uniform load of 50 lbf/ ft. applied in any direction.
      b. Concentrated load of 200 lbf applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   2. Infill of Guards:
      a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
      b. Infill load and other loads need not be assumed to act concurrently.

E. ASTM E 985 - For railing - related definitions and structural performance criteria.

F. Shop Drawings and Calculations must be stamped by a professional engineer licensed in the State where the work is located.

PART 2 - PRODUCTS

2.01 STAIR TYPES

A. Fire Stairs:
   1. Steel pan stairs with concrete fill. Prep surfaces for rubber treads and nosings per finish plans and details.
   2. Painted steel Guard Rail: Flat Bars and plates, custom
   3. Painted Steel Handrail
   4. Delegated design at fire stairs. Refer to Architectural Stair Plans for overall dimensions and design intent.

B. Monumental Stair:
   1. Steel pan stairs with concrete fill, with applied terrazzo treads and risersper architectural details
   2. Custom Glass Guardrail (See 08 8000)
   3. Satin Brass Handrail, mounted per drawings

C. Exterior “Architectural” Stairs L3-L4:
   Painted steel guardrails/steel

2.02 MATERIALS

A. Steel Pipe: ASTM A53, Standard Weight.
   1. Shop primed for interior applications
   2. G90 hot dipped galvanized for exterior applications.

B. Rectangular Tubing: ASTM A500, Grade B or have equal yield, ultimate, and weldability properties.

C. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

E. Sheet Steel: ASTM A366.

F. Structural Steel: ASTM A36.

G. Steel Floor Plate: ASTM 786.

H. Steel Decking: Form from steel conforming to ASTM A446, with properties conforming to AISI Specification for the Design of Cold-Formed Steel Structural Members. Shop primed for interior applications, zinc coated for exterior applications.

I. Stainless Steel
   1. Pipe & Fittings: Type 304 (18-8), Ornamental Grade, No.4 Satin Finish.
   2. Tubing: ASTM A 554, Grade MT 304
   3. Castings: ASTM A 743, Grade CF8 or CF20.
   4. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.
   5. Bars and Shapes: ASTM A 276, Type 304.

J. Copper Alloys, General: Provide alloys indicated and with temper to suit application and forming methods, but with strength and stiffness not less than Temper H01 (quarter hard) for plate, sheet, strip, and bars and Temper H55 (light drawn) for tube and pipe.
   1. Extruded Shapes, Bronze: ASTM B 455, Alloy UNS C38500 (architectural bronze).
   2. Seamless Pipe, Bronze: ASTM B 43, Alloy UNS C23000 (red brass, 85 percent copper).
   3. Seamless Tube, Bronze: ASTM B 135 (ASTM B 135M), Alloy UNS C23000 (red brass, 85 percent copper).
   4. Castings, Bronze: [Composition bronze castings complying with ASTM B 62, Alloy UNS C83600 (85-5-5-5 or No. 1 composition commercial red brass)] [or] [sand castings complying with ASTM B 584, Alloy UNS C86500 (No. 1 manganese bronze)].
   5. Plate, Sheet, Strip, and Bars; Bronze: ASTM B 36/B 36M, Alloy UNS C28000 (muntz metal, 60 percent copper).

2.03 FASTENERS

A. Provide Type 304 or 316 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade and class required for conditions indicated and as specified.
   1. At steel railings, use Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153.
   2. At aluminum and stainless steel railings, use Type 304 or 316 stainless steel fasteners.

B. Bolts And Nuts: ASTM A 307, Grade A. High strength bolts; ASTM A 325. Hot-dip galvanize all items in accordance with ASTM A 153.

C. Expansion Bolts Wedge Anchors: Ramset "Trubolt" or Hilti "Kwik Bolt".

D. Expansion Shields: F.S. FF-S-325.

E. Anchor Bolts: Furnish and deliver to site, anchor bolts and other items to be embedded in concrete. Provide necessary shop details and diagrams for concrete forms and, if required, provide templates to insure proper and accurate locations and setting of anchor bolts.

F. Toggle Bolts: Tumble-wing type F.S. FF-B-588 type, class and style as required.

G. Lock Washers: F.S. FF-W-84, helical spring type carbon steel.

2.04 FABRICATION GENERAL

A. Verify dimensions on site prior to shop fabrication.

B. Fit and shop assemble components in largest practical sizes, for delivery to site and installation.

C. Supply components required for secure anchorage of stairs, handrails and railings.

D. Fully weld joints. Grind exposed welds smooth and flush with adjacent surfaces.

E. Make exposed butt joints tight, flush, and hairline.

F. Accurately form components required for anchorage of members to each other and to building structure.

G. Welding:
   1. Structural steel, AWS D1.1 and sheet steel, AWS D1.3.
   2. Where possible, locate welds on unexposed side.
   3. Grind exposed welds smooth and true to contour of welded member. Remove welding splatter.

2.05 STEEL FINISH

A. Lead free, alkyd primer: Manufacturer's standard.

B. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to steel according to ASTM A 123/A 123M.
   1. Galvanize ALL EXTERIOR EXPOSED steel stair and railing components.

2.06 CLOSED RISER STAIRS

A. Provide treads, risers, platforms, stringers, headers and other supporting members.

B. Fabricate pans for treads from sheet steel, and fabricate pans for platforms from steel decking. Form risers to have sanitary cove.

C. Fabricate stringers, headers, and other supporting members from structural steel.

2.08 STEEL RAILING SYSTEM

A. Rails and Posts: Sizes and shapes as indicated.

B. Mounting on Concrete Floor: Steel sleeves, sized to receive railing post with 1/4 inch clearance.

C. Mounting on Masonry or Concrete Walls: Provide brackets with anchors.

D. Mounting on Stud Walls: Provide brackets and anchor plates, predrilled to receive bolts.

E. Splice Connectors: Steel threaded collars.

PART 3 - EXECUTION

3.01 PREPARATION

A. Supply items to be embedded in masonry or concrete or placed in partitions with setting templates and erection drawings to approximate sections.

3.02 STAIR INSTALLATION

A. Provide hangers and struts required to support the loads imposed.

B. Perform job site welding and bolting as specified for shop fabrication.

C. Set stairs and other members in position and secure to structure as shown. Install stairs plumb, level and true to line.

3.03 RAILING INSTALLATION

A. Provide standard terminal fittings at ends of posts and rails.

B. Secure brackets, posts and rails to steel by welds, and to masonry or concrete with expansion sleeves and bolts, except secure posts at concrete by setting in sleeves filled with commercial non-shrink grout.

C. Set rails horizontal or parallel to rake of stairs to within 1/8-inch in 12 feet.

D. Set posts plumb and aligned to within 1/8-inch in 12 feet.

3.04 FIELD PRIME PAINTING

A. When installation is complete, clean field welds and surrounding areas to bright metal, and coat with same primer paint used for shop priming.

END OF SECTION