SECTION 051200

STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 RELATED SECTIONS

A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Specifications, apply to work of this Section.
B. 033000 - Cast-In-Place Concrete.
C. 042200 - Concrete Unit Masonry.

1.02 SCOPE

A. Furnish labor and materials necessary to install a complete system.

1.03 STANDARDS (latest editions)

A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
B. AISC "Code of Standard Practice" (AISC Code).
C. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including "Commentary" and Supplements thereto as issued (AISC Spec.).
D. AISC "Specifications for Structural Joints using High Strength Bolts" approved by the Research Council on Structural Connections of the Engineering Foundation (AISC Joint Spec.).
E. ASTM A6 "Standard Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use".
F. ASTM A992 "Standard Specification for Structural Steel Shapes".
G. AWS "Standard Qualification Procedure".
H. AWS D1.1 "Structural Welding Code-Steel".
I. ASTM A307 "Standard Specification for Carbon Steel Bolts, Studs and Threaded Rod 60,000 psi Tensile Strength".
J. ASTM A563 "Standard Specification for Carbon and Alloy Steel Nuts".
K. SSPC - PA 1 "Paint Application Specification No. 1 Shop, Field, and Maintenance Painting".

1.04 SUBMITTALS

A. Submit pursuant to 013000 Administrative Requirements for Shop Drawings, Product Data, Samples.
B. Submit pursuant to 016000 Product Requirements.
C. Shop Drawings
    1. Include complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
    2. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS A2.1 and A2.4 symbols, and show type, size, and length of each weld.
    3. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages.
    4. Certificates of Compliance for all grades and types of: steel, high strength bolts, anchor bolts, welding electrodes, etc. used on the project.

1.05 QUALITY ASSURANCE

A. All work of this section shall be performed by a fabricator with experienced workmen familiar with the work and according to manufacturers recommendations and/or industry standards.

B. Source Quality Control
   1. The Owner will employ an approved, independent, objective and competent inspection and testing agency to perform tests and to submit test reports.
   2. Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field per AISC (latest edition) and AWS D1.1 (latest edition) standard requirements. These inspections will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
   3. Promptly remove and replace materials or fabricated components which do not comply.

C. Fabricate and erect pursuant to following:
   1. AISC "Code of Standard Practice for Steel Buildings and Bridges":
      a) Except for those definitions and statements which conflict with the Owner/Contractor Agreement, the General Conditions, Supplementary Conditions, and General Requirements in which case requirements of these documents take precedence over the AISC Code.
      b) Paragraph 4.2.1 of the AISC Code is hereby modified by deletion of following sentence: "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as part of his preparation these shop drawings".
   2. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings".
   3. American Welding Society D1.1 "Structural Welding Code - Steel".
   4. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".

1.06 DELIVERY, STORAGE AND HANDLING

A. Pursuant to manufacturer’s published instructions.
B. Protect against moisture exposure and damage.
C. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
D. Deliver anchor bolts, leveling plates and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to avoid delay.
E. Store materials to permit easy access for inspection and identification. Keep steel members off ground. Protect steel members and packaged materials from erosion and deterioration.
F. Do not store materials on structure in a manner that might cause distortion or damage to members of supporting structures. Repair or replace damaged materials or structures as directed.

1.07 DESIGN REQUIREMENTS

A. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions unless otherwise indicated.
B. Promptly notify Architect whenever design of members and connections for any portion of structure are not indicated clearly.

PART 2 PRODUCTS

2.01 MATERIALS

A. Structural Steel Rolled Wide Flange: ASTM A992, minimum yield stress 50,000 psi Angles, Bars, Plates, and Tie Rods: ASTM A36, minimum yield stress 36,000 psi, Structural Steel Tube: ASTM A500, Grade B minimum yield stress 46,000 psi. Structural Steel Pipe: ASTM A53, Grade B minimum yield stress 35,000 psi.

B. Anchor Bolts: ASTM F1554, 36 ksi. or 55 ksi., ASTM F436 hardened steel washers and with ASTM A563 nuts; plain, no finish or with galvanization. Anchor bolts may be supplied as straight rods with nuts and washers at both ends.

C. Structural Steel Primer Paint: Fabricators Standard Rust-Inhibitive Primer.

D. Composite Construction Shear Connectors: ASTM A108, Grades C1010, C1015, C1017, or C102U cold drawn steel having a minimum tensile strength of 60 ksi. and a minimum elongation of 20 percent in 2 inch gage length as specified in the AWS Structural Welding Code D1.1.

E. Stainless Steel Plate: ASTM A480, Type S30400, minimum yield stress 30,000 psi.

F. Stainless Steel Rolled Shapes: ASTM A276, Type S30400, minimum yield stress 30,000 psi.

2.02 SHOP CONNECTION MATERIALS

A. Bolts, high strength: Unless otherwise noted - 3/4 inch diameter, Group A, ASTM F3125 Grade A325, plain, no finish, with matching nuts and washers both of same finish as bolts. Use of ASTM F1852 Twist-Off bolts is permissible for ASTM F3125 grade A325 bolts.

B. Electrodes for Welding: AWS Code; electrodes: E70XX

2.03 FIELD CONNECTION MATERIALS

A. Bolts, high strength: Unless otherwise noted - 3/4 inch diameter, Group A, ASTM F3125 Grade A325, with matching nuts and washers both of same finish as bolts. Use of ASTM F1852 Twist-Off bolts is permissible for ASTM F3125 grade A325 bolts.

1. Galvanized G-60 coating.

B. Electrodes for Welding: AWS Code; electrodes: E70XX.

2.04 FABRICATION

A. Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate structural steel pursuant to AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling.

C. Where finishing is required, complete assembly of units, including welding, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, or other defects.

D. Connections: weld and bolt shop connections as indicated. Fashion beam connections with (2) L4 x 3 1/2 x 5/16 framing angles, fillet welding and 3/4" diameter. A325-N bolts, u.o.n. See schedules on drawings for information, connection information and alternate connection options. Diameter of holes in bolted parts shall be 1/16” greater than the nominal diameter of the bolt. No unfair holes will be accepted, and enlargement of holes shall not be accomplished by burning.

E. High-Strength Bolted Construction: Install high-strength threaded fasteners pursuant to AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

F. Welded Construction: Comply with AWS Code for procedures, appearance, and quality of welds together with methods used in correcting welding work. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.

G. Provide angles, bars or plates as necessary for deck support at columns where members do not frame in from all four sides and where connections interfere with the support of the metal decking.

H. Holes for Other Work
   1. Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.
   2. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
   3. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.05 SHOP PRIMING/PAINTING

A. Primer: Immediately after surface preparation, apply structural steel primer pursuant to manufacturer's instructions and at a rate to provide dry film thickness of not less than 1.5 mils. Use application methods which result in full coverage of joints, corners, edges, and exposed surfaces.
   1. Provide a one-coat shop applied primer system complying with: SSPC - PA 1.

B. Program: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2 in. of embedded areas only.
   1. Do not paint surfaces which are to be welded or high-strength bolted with friction-type connections.
   2. Do not paint surfaces which are to receive spray fireproofing.
   3. Apply two coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat.

C. Galvanized Finishes: As Shown on Drawings
   1. All exterior wall (loose) structural steel lintels shall be hot dipped galvanized. This includes overhead door lintels and bent plate jamb plates at overhead doors.
   2. Columns that are identified as being “galvanized” shall be hot dipped galvanized. Attached base plates, leveling plates and anchor bolts are also to be h.d. galv.
   3. Provide necessary weeps holes and all welds to be sealed.
   4. Galvanize structural members AFTER all fabrication is completed on those pieces. Do not cut or alter any member that has been galvanized unless approved by architect.

D. Shop Paint (General): Steel primer selected from the following:
   1. TNEMEC 10-99 (Red), 10-99G (Green) or 10-1009 (Gray).
   2. Rust-Oleum 769.
   3. Valspar 13-R-53.
   4. Sherwin-Williams “Kromik”.

E. Shop Paint for Galvanized Steel: FS TT-P-641, Type II.

PART 3 EXECUTION

3.01 ERECTION

A. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made.

Provide temporary guy lines to achieve proper alignment of structure as erection proceeds.

B. Setting Bases and Bearing Plates:
   1. Clean steel, cast-in-place concrete, and concrete masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
   2. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices. Align and level plates.
   3. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
   4. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure. See Section 036000 Grout

C. Field Assembly:
   1. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   2. Level and plumb individual members of structure within specified AISC tolerances.
   3. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
   4. Splice members only where indicated and accepted on shop drawings.
   5. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
   6. Do not use gas cutting torches for any modifications.
   7. Comply with AISC Specifications and Code for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
   8. On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at surfaces adjacent to field welds.

D. Connections: weld and bolt field connections as indicated.

E. High-Strength Bolted Construction: Install high-strength threaded fasteners pursuant to AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts using the snug tight criteria" u.o.n. Use of ASTM F1852-05 Twist-Off bolts is permissible for ASTM A325 bolts. Use of ASTM F2280-06 Twist-Off bolts is permissible for ASTM A490 bolts.

F. Welded Construction: Comply with AWS Code for procedures, appearance, and quality of welds together with methods used in correcting welding work. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.

G. Touch-up Painting:
   1. Immediately after erection, clean field welds, bolted connections, and areas where shop paint has been abraded. Apply paint to exposed areas using same materials as used for shop painting.
   2. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils or thickness recommended by paint manufacturer.

3.02 CONSTRUCTION TOLERANCES

A. Construct steel members within the following tolerances:
   1. Maximum variation for columns from plumb:
      a) 1/4 in. in 10 ft.

b) 1/2 in. in 30 ft or more.

2. Maximum variation for columns from column centerline:
   a) 1/4 in. center to center of adjacent anchor bolt group.
   b) 1/4 in. maximum accumulation in 100 feet but not to exceed 1 in.

3.03 FIELD MEASUREMENTS

A. Verify with field measurements dimensions that are shown on Drawings.

END OF SECTION

SECTION 053100

STEEL DECKING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Specifications, apply to work of this Section.

1.02 SCOPE

A. Furnish labor and materials necessary to install a complete system.
B. Steel roof and/or floor deck design based upon following span criteria.
   1. Three or more spans.
   2. Two spans at ends of runs is acceptable where necessary to avoid conditions where only a single span remains in the run of the deck.

1.03 STANDARDS

A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
B. AISI "Specification for the Design of Cold-Formed Steel Structural Members".
C. ASTM A446 "Standard Specification for Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality".
D. ASTM A525 "Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) By The Hot-Dip Process".
E. SDI "Design Manual for Composite Decks, Form Decks, and Roof Decks".

1.04 SUBMITTALS

A. Submit pursuant to 013000 Administrative Requirements for Shop Drawings, Product Data, Samples.
B. Submit pursuant to 016000 Product Requirements.
C. Manufacturer's Literature:
   1. Description of decking and installation instructions.
D. Shop Drawings:
   1. Show decking layout, openings required for other parts of the Work, support of decking at openings, and sheet metal accessories, methods of attachment, and other pertinent details.
E. Certificates of Compliance for all grades and types of: steel, bolts, welding electrodes, ect. used on the project.

1.05 QUALITY ASSURANCE

A. All work of this section shall be performed by experienced workmen familiar with the work and according to manufacturers recommendations and/or industry standards.
B. Source Quality Control
   1. The Owner will employ an approved, independent, objective and competent inspection agency testing agency to perform tests and to submit test reports.

2. Materials and installation procedures are subject to inspections and tests in the field per AWS D1.1 (latest edition) standard requirements. These inspections will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
3. Promptly remove and replace materials or fabricated components which do not comply.

1.06 DELIVERY, STORAGE AND HANDLING

A. Pursuant to manufacturer's published instructions.
B. Protect against moisture exposure and damage.
C. Deliver, store, and handle steel decking to avoid corrosion, deformation and other damage.
D. Store decking and related materials so that they are not in contact with ground and are properly supported in a sloped position for drainage and covered to keep dry Remove damaged materials from job site immediately.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Membership by steel roof deck manufacturer in Steel Deck Institute is not required.
B. Subject to compliance with requirements, provide products from one of following or approved equal:
1. United Steel Deck, Inc.
2. Vulcraft Div., Nucor Corp.

2.02 MATERIALS

A. Steel for Galvanized Metal Deck Units: ASTM A 446, grade as required to comply with SDI specifications

2.03 DECK TYPE

A. Provide following deck for use on roof/porch framing with rigid insulation:
1. 1 1/2" deep, Type B, 22 Gauge, roof deck, galvanized G-60 coating.
B. Provide following deck for use under framed concrete slabs:
1. 1 1/2" deep VLI composite floor deck, 18 Gauge, galvanized G-60 coating.
2. 3" deep VLPA composite floor deck, 18 Gauge, galvanized G-60 coating.

2.04 ACCESSORIES

A. Provide sheet metal accessories of same material, Gauge, and finish as deck, unless otherwise shown on Drawings or specified. Sheet metal accessories include but are not necessarily limited to:
1. Slab pour stops for framed floors, deck closure plates and sump pans.
2. Cover plates for gaps not covered by deck units and to cover welding access holes.

PART 3 EXECUTION

3.01 PREPARATION

A. Check alignment and levels of support framing. Do not proceed with metal deck work until improper conditions have been corrected. Installation of decking constitutes acceptance of supporting and surrounding construction.

3.02 INSTALLATION

A. Install steel deck and accessories pursuant to SDI "Design Manual for Composite Decks, Form Decks and Roof Decks" and manufacturer's published instructions, approved shop drawings and erection layouts. Place decking units on supporting steel, align and adjust to final position before permanently fastening.

B. Install steel deck to supporting steel structure as follows:
   1. Roof deck: with 5/8" diameter puddle welds at 12" o.c. spacing max. (36/4 pattern). Use welding washers only for deck that is 24 ga. or lighter.
   2. Composite floor deck: with 5/8" diameter puddle welds at 12" o.c.

C. Fasten side laps of metal deck as follows:
   1. Roof deck: with #10 TEK screws, at all panel laps pursuant to manufacturer's published recommendations and to satisfy structural diaphragm requirements. Unless otherwise shown, provide minimum side lap fastening at mid span of deck but not to exceed 3 ft. o.c.
   2. Composite floor deck: button-punching at mid span of deck but should not exceed 3 ft. o.c.

D. Reinforce deck with 12 gauge reinforcement plate 12” larger than the dimension of the opening welded to the roof deck at each flute for the following opening sizes:
   1. For round openings in the roof deck that are equal to or greater than 8” but less than 14” in any direction.
   2. For square or rectangular openings in the roof deck that are equal to or greater than 6” but less than 14” in any direction.

E. Reinforce deck with 2 x 2 x 3/16 inch steel angles perpendicular to flutes; extend minimum two flutes; extend minimum two flutes beyond each sides of opening and fusion weld to deck at each flute for the following opening sizes:
   1. For round openings in the roof deck that are equal to or greater than 14” but less than 18” in any direction.
   2. For square or rectangular openings in the roof deck that are equal to or greater than 14” but less than 18” in any direction.

F. Reinforce deck opening with 4 x 4 x 1/4 inch steel angles that frame into adjacent joists or beams for the following opening sizes:
   1. For round openings in the roof deck that exceed 18” in any direction.
   2. For square or rectangular openings in the roof deck that exceed 18” in any direction.

G. Repair or replace damaged material.

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END OF SECTION

SECTION 054010

PRE-ENGINEERED, PRE-FABRICATED STEEL ROOF TRUSSES

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Specifications, apply to work of this Section.
B. 051200 - Structural Steel Framing

1.02 SCOPE

A. Furnish labor and materials necessary to install a complete system.
B. Section includes pre-engineered, pre-fabricated steel framing elements. Work includes:
   1. Steel roof trusses.
   2. Anchorage, connections, bracing and bridging
C. Related work
   1. Sheathing, roofing, fascia, soffit

1.03 STANDARDS

A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
B. AISC "Code of Standard Practice" (AISC Code).
C. AISI "Cold-Formed Steel Design Manual", Latest edition including 2004 supplement
D. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including "Commentary" and Supplements thereto as issued (AISC Spec.).
E. ASTM A6 "Standard Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use".
F. ASTM A992 "Standard Specification for Structural Steel Shapes".
G. AWS "Standard Qualification Procedure".
H. AWS D1.1 "Structural Welding Code-Steel".
I. AWS D1.3 "Structural Welding Code-Sheet Steel".

1.04 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design, engineer, fabricate, and erect cold-formed steel trusses to withstand specified design loads within limits and under conditions required.
   1. Design Loads: As specified.
   2. Deflections: Live load deflection meeting the following (unless otherwise specified):
      a. Floor Trusses: Vertical deflection less than or equal to 1/360 of the span.
      b. Roof Trusses: Vertical deflection less than or equal to 1/240 of the span.
   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 (range) of 120 deg F (67 deg C).

1.05 SUBMITTALS

A. Submit pursuant to 013000 Administrative Requirements for Shop Drawings, Product Data, Samples.
   1. Shop Drawings
      a) Signed, dated and sealed by fabricator's Professional Engineer registered in state in which Project is located, including complete details and schedules for fabrication and assembly of steel members, procedures, and diagrams.
         (1) Include details showing member, type, location, spacing, size and thickness or gage of members, method of attachment to other truss members and supporting members and all necessary erection details. Indicate supplemental bracing, strapping, splices, bridging, accessories and details required for proper installation. Show methods of connections and other pertinent data. Indicate welds by standard AWS A2.1 and A2.4 symbols, and show type, size, and length of each weld and or fastener.
         (2) Submit detailed truss layouts. Provide templates, and directions for installation of anchorage devices, screws, bolts and other anchorages.
         (3) Include description of design criteria, engineering analysis depicting member stresses and truss deflection, truss supporting reactions, top chord and bottom chord bracing requirements.
   2. Certificates of Compliance for all grades and types of: steel, bolts, screws, welding electrodes, ect. used on the project.
B. Submit pursuant to 016000 Product Requirements.

1.06 QUALITY ASSURANCE

A. All work of this section shall be performed by experienced workmen familiar with the work and according to manufacturers recommendations and/or industry standards.
B. Source Quality Control
   1. Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency, which will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
   2. Promptly remove and replace materials or fabricated components which do not comply.
C. Fabricate and erect pursuant to following:
   1. AISC "Code of Standard Practice for Steel Buildings and Bridges":
      a) Except for those definitions and statements which conflict with the Owner/Contractor Agreement, the General Conditions, Supplementary Conditions, and General Requirements in which case requirements of these documents take precedence over the AISC Code.
      b) Paragraph 4.2.1 of the AISC Code is hereby modified by deletion of following sentence: "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as a part of his preparation these shop drawings."
   2. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings".
   3. AISI "Cold-Formed Steel Design Manual".
   4. American Welding Society D1.1 "Structural Welding Code - Steel".

5. American Welding Society D1.3 "Structural Welding Code – Sheet Steel".
6. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".

1.07 DELIVERY, STORAGE AND HANDLING

A. Pursuant to manufacturer's published instructions.
B. Protect against moisture exposure and damage.
C. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
D. Deliver anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to avoid delay.
E. Store materials to permit easy access for inspection and identification. Keep steel members off ground. Protect steel members and packaged materials from erosion and deterioration.
F. Do not store materials on structure in a manner that might cause distortion or damage to members of supporting structures. Repair or replace damaged materials or structures as directed.

1.08 PROJECT CONDITIONS

A. During construction, adequately distribute all loads applied to trusses so as not to exceed the carrying capacity of any one joist, truss or other component.

1.09 DESIGN REQUIREMENTS

A. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions unless otherwise indicated.
B. Promptly notify Architect whenever design of members and connections for any portion of structure are not indicated clearly.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Alpine Engineered Products, Inc. or equal.

2.02 COMPONENTS

A. Provide manufacturer's "TrusSteel" (or equal) standard steel truss members, bracing, bridging, blocking, reinforcements, fasteners and accessories with each type of steel framing required, as recommended by the manufacturer for the applications indicated and as needed to provide a complete steel truss system.

2.03 MATERIALS

A. Materials:
   1. All component gauges: Fabricate components of structural quality steel sheet per ASTM A653 with a minimum yield strength of 55,000 psi. for chord members and 45,000 psi. for web members.
   2. Bracing, bridging and blocking members: Fabricate components of commercial quality steel sheet per ASTM A653 with a minimum yield strength of 33,000 psi.
B. Steel truss components: Provide sizes, shapes and gages indicated.

1. Design Uncoated-Steel Thickness: 22 ga., 0.0284 inch (0.91 mm).
2. Design Uncoated-Steel Thickness: 20 ga., 0.0329 inch (1.20 mm).
3. Design Uncoated-Steel Thickness: 18 ga., 0.0428 inch (1.52 mm).
4. Design Uncoated-Steel Thickness: 16 ga., 0.0538 inch (1.90 mm).

C. Finish: Provide components with protective zinc coating complying with ASTM A653, minimum G60 coating.

D. Fastenings:
1. Manufacturer recommended self-drilling, self-tapping screws with corrosion-resistant plated finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection.
2. Welding: Comply with AWS D1.1 when applicable and AWS D1.3 for welding base metals less than 1/8" thick.
3. Other fasteners as accepted by truss engineer.

2.04 FABRICATION

A. Factory fabricate steel trusses to greatest extent possible - plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
1. Fabricate truss assemblies in jig templates.
2. Cut truss members by sawing or shearing or plasma cutting.
3. Fasten steel truss members by welding or screw fastening, or other methods as standard with fabricator. Wire tying of framing members is not permitted.
a. Comply with AWS 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 steel truss component manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

B. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to minimize member and connection stresses.

C. Fabrication Tolerances: Fabricate trusses to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet (1:960) and as follows:
1. Spacing: Space individual trusses no more than plus or minus 1/8 inch (3mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each steel truss to a maximum out-of-square tolerance of 1/8 inch (3mm).

D. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine structure, substrates and installation conditions. Do not proceed with steel truss installation until unsatisfactory conditions have been corrected.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION, GENERAL

A. General:

1. Erection of trusses, including proper handling, safety precautions, temporary bracing and other safeguards or procedures are the responsibility of the Contractor and Contractor's installer.
2. Exercise care and provide erection bracing required to prevent toppling of trusses during erection.

B. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at design spacing indicated.

C. Provide proper lifting equipment suited to sizes and types of trusses required, applied at lift points recommended by truss fabricator. Exercise care to avoid damage to truss members during erection and to keep horizontal bending of the trusses to a minimum.

D. Provide framing anchors as indicated or accepted on the engineering design drawing or erection drawings. Anchor trusses securely at bearing points. Anchor gable end trusses intermittently (4'-0" o.c. max) along steel supporting plates, angles or beams.

E. Install roof framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.
1. DO NOT cut or modify truss members without prior approval of truss engineer.
2. Fasten steel roof framing by welding or screw fastening, as standard with fabricator. Wire tying of roof framing is not permitted.
a. Comply with AWS 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 roof framing Manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
c. Provide temporary bracing and leave in place until trusses are permanently stabilized.

F. Erection Tolerances: Install trusses to a maximum allowable tolerance variation from plumb, level, and true to line 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 (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.03 ROOF TRUSS INSTALLATION

A. Erect trusses with plane of truss webs plumb and parallel to each other. Align and accurately position at spacing indicated. Install blocking between trusses to keep them spaced, aligned and plumb.

B. Install trusses bearing on supporting framing, level, straight, and plumb, adjust to final position, brace, and reinforce.
1. Install trusses over supporting framing with a minimum end bearing of 3 inches (76mm).

C. Space trusses as follows:
1. Truss Spacing: not to exceed 2'-0" o.c.

D. Erect trusses without damaging truss members or connections.

E. Align truss bottom chords with load-bearing studs or continuously reinforced track to transfer loads to structure. Anchor trusses securely at all bearing points.

F. Install web bracing, bridging and permanent "system" bracing per truss manufacturer's requirements.

G. Install necessary roof cross and diagonal bracing per design professional recommendations.

H. Install bridging at each end of trusses and at intervals indicated. Fasten bridging at each truss intersection as follows:
1. Bridging: Cold-rolled steel channel or tube fastened to chords of trusses.

I. Secure trusses to load-bearing interior walls to prevent lateral movement of bottom chord.

J. Install miscellaneous truss framing and connections, including bracing, stiffeners, clip angles, hold-down angles, anchors, and fasteners, to provide a complete and stable framing assembly.

K. Do not alter, cut, or remove truss members or connections of truss members.

3.04 REPAIRS AND PROTECTION

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

END OF SECTION

SECTION 055000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel, aluminum, and stainless steel items, including: metal bollards, slotted channel framing, miscellaneous trim, and miscellaneous metal framing and supports.

B. Confined space extrication training hatch.

C. SCBA Bottle Rack

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 042000 - Unit Masonry: Placement of metal fabrications in masonry.

C. Section 042001 - Masonry Veneer: Placement of metal fabrications in masonry.

D. Section 051200 - Structural Steel Framing: Structural steel column anchor bolts.

E. Section 052100 - Steel Joist Framing: Structural joist bearing plates, including anchorage.

F. Section 053100 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.

G. Section 055100 - Metal Stairs.

H. Section 055213 - Pipe and Tube Railings.

I. Section 099000 - Painting and Coating

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).

B. ASTM A27/A27M - Standard Specification for Steel Castings, Carbon, for General Application; 2019

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

D. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 2009.

E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2018.

F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

G. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

H. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2013.

I. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2014, with Editorial Revision (2017).

J. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2014.

K. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

L. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.

M. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009.

N. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.

O. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes 2019a.

P. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

Q. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.

R. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes 2012.

S. ASTM B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes (Metric) 2012.

T. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2014.

U. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2013.

V. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2013.

W. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements; 2010.

X. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2013.

Y. ASTM F594 - Standard Specification for Stainless Steel Nuts; 2009.

Z. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.

AA. AWS D1.1/D1.1M - Structural Welding Code - Steel 2015, with Errata (2016).

BB. AWS D1.2/D1.2M - Structural Welding Code - Aluminum 2014, with Errata.

CC. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 1999 (Ed. 2004).

DD. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic") 2002 (Ed. 2004).

EE. SSPC-PA 1 - Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel; 1982 (Ed. 2004).

FF. SSPC-SP 2 - Hand Tool Cleaning 2018.

GG. SSPC-SP 6 - Commercial Blast Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.06 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on shop drawings. Provide allowance for trimming and fitting at site/

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

F. Slotted Channel Fittings: ASTM A1011/A1011M.

G. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.

H. Bolts, Nuts, and Washers: ASTM A307, galvanized to ASTM A153/A153M where connecting galvanized components.

I. Cast-in-Place Anchors in Concrete: Threaded or wedge type; galvanized ferrous castings, ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel; capable of sustaining, without failure, a load equal to four times the load imposed, tested in accordance with ASTM E488.

J. Expansion Anchors at Interior Locations: Anchor bolt and sleeve assembly; zinc-plated carbon-steel components, ASTM B633, Class Fe/Zn 5; capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, tested in accordance with ASTM E488.

K. Post-Installed Anchors at Interior Locations: Torque-controlled expansion anchors or Chemical anchors; zinc-plated carbon-steel components, ASTM B633, Class Fe/Zn 5.

L. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

M. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

N. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet and Plate Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.

D. Fasteners: Stainless steel.

E. Bolts, Nuts, and Washers: Stainless steel.

F. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.03 MATERIALS - STAINLESS STEEL

A. Stainless Steel Sections: ASTM A240/A240M or ASTM A666, Type 304.

B. Plates: ASTM A167.

C. Fasteners: Stainless steel.

D. Bolts, Nuts, and Washers: ASTM F593 and ASTM F594, Alloy Group 1.

E. Expansion Anchors at Exterior Locations: Anchor bolt and sleeve assembly; ASTM F593 and F594, Alloy Group 1; capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, tested in accordance with ASTM E488.

F. Post-Installed Anchors at Exterior Locations: Torque-controlled expansion anchors or Chemical anchors; ASTM F593 and F594, Alloy Group 1.

G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

2.04 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site. Clearly mark for reassembly and coordinated installation.

B. Fabricate items with joints tightly fitted and secured.

C. Fabricate seam and other connections to exclude water where exposed to weather. Provide weep holes where water may accumulate.

D. Continuously seal joined members by intermittent welds and plastic filler.

E. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

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

G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

1. Integrally Welded Strap Anchors for Concrete/Masonry Embedment: 1/8 inch by 1-1/2 inch; minimum 6 inch embedment and 2 inch hook; not less than 8 inches from ends and corners of units and 24 inches, o.c., unless otherwise indicated.

2.05 FABRICATED ITEMS

A. Bollards: Steel pipe with cap, as detailed; galvanized finish.

B. Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of masonry.

1. For support of exterior masonry; galvanized and prime paint finish.

2. For support of interior masonry; prime paint finish.

C. Loose Lintels: As detailed.

1. For support of exterior masonry; galvanized and prime paint finish.

2. For support of interior masonry; prime paint finish.

3. Size: Bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

D. Door Frames for Overhead Door Openings: Bent plate sections; galvanized and prime paint finish.

E. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel finish.

F. Miscellaneous Trim: As detailed; prime paint finish.

1. Galvanize and prime paint exterior trim.

G. Miscellaneous Framing and Supports: Provide as required to complete the Work; prime paint finish; size, shapes and profiles necessary to receive adjacent construction.

1. Galvanize and prime paint exterior framing and supports.

2.06 CONFINED SPACE EXTRICATION TRAINING HATCH

A. Description: Ferrous; 36 inch ID by 1 - to 2 -inch riser with 4-inch minimum width flange and 34-1/8 inch diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."

B. Material: ASTM A 48/A 48M, Class 35 gray iron or ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

C. Product: "Model R-1581, Manhole Frame, Solid Lid" as manufactured by Neenah Foundry Company: www.nfco.com. Contractor must confirm frame depth is identical to overall concrete depth in area to be installed. **Product Data Sheet Submittal required.**

1. Substitutions: See Section 016000 - Product Requirements.

2.07 FINISHES - STEEL

A. Prime paint steel items.

1. Exceptions: Galvanize items to be embedded in concrete and items to be embedded in masonry.

2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP3 for interior exposuresand SSPC-SP6 for exterior exposures.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat, in accordance with SSPC-PA1.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.08 FINISHES - ALUMINUM

A. Exterior Aluminum Surfaces: Class I color anodized.

B. Interior Aluminum Surfaces: Mill finish or Class I color anodized, as specified.

C. Interior Aluminum Surfaces at Training Opening: Random Scratches.

1. Product: FPM Metals, Pattern P112.

D. Class I Color Anodized Finish: AAMA 611AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick; color as selected by Architect from Manufacturer's full line of colors.

E. Class I Color Anodized Finish: AAMA 611AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick; color as selected by Architect from Manufacturer's full line of colors.

F. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

2.09 FINISHES - STAINLESS STEEL

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.

C. Directional Satin Finish: No. 4.

D. Passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.10 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components as indicated on drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.05 CLEANING

A. Clean stainless steel thoroughly with clean water and soap, rinse with clean water, and dry with soft cloths.

B. Clean field welds, bolted connections, and abraded areas of galavanized surfaces and repair galvanizing in accordance with ASTM A780.

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END OF SECTION

SECTION 055100
METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stairs with concrete treads.

B. Structural steel stair framing and supports.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete fill in stair pans; mesh reinforcement for landings.

B. Section 055000 - Metal Fabrications.

C. Section 055213 - Pipe and Tube Railings: Metal handrails and balustersfor the stairs specified in this section.

D. Section 099000 - Painting and Coating

E. Section 099123 - Interior Painting: Paint finish.

F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.

H. AWS D1.1/D1.1M - Structural Welding Code - Steel 2015, with Errata (2016).

I. NAAMM AMP 510 - Metal Stairs Manual 1992.

J. SSPC-SP 2 - Hand Tool Cleaning 2018.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. **Include all Section 055213 Pipe and Tube Railing information on same Shop Drawing Submittal**. See Section 055213 for product requirements.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Welders' Certificates.

1.04 QUALITY ASSURANCE

A. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

PART 2 PRODUCTS

2.01 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.

1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.

2. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.

a. Stair Capacity: Uniform live load of 100 lb/sq ft and a concentrated load of 300 lb with deflection of stringer or landing framing not to exceed 1/360 of span.

3. Dimensions: As indicated on drawings.

4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.

5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.

6. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:

1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.

a. Welded Joints: Continuously welded and ground smooth and flush.

b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.

c. Exposed Edges and Corners: Eased to small uniform radius.

d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.

C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH CONCRETE TREADS

A. Jointing and Finish Quality Level: Industrial, as defined above.

B. Risers: Closed.

C. Treads: Metal pan with field-installed concrete fill.

1. Concrete Depth: 1-1/2 inches, minimum.

2. Tread Pan Material: Steel sheet.

3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.

4. Concrete Reinforcement: Welded wire mesh.

5. **Provide sanitary cove on riser to meet concrete surface as detailed**.

D. Stringers: Rolled steel channels.

1. Stringer Depth: 10 inches.

E. Under Side of Stair: Exposed to view, to be finished as called for in the Finishes Schedule.

2.03 HANDRAILS AND GUARDS - (SEE SECTION 055213)

2.04 MATERIALS

A. Steel Sections: ASTM A36/A36M.

B. Concrete Fill: See Section 033000.

C. Concrete Reinforcement: Mesh type as detailed, galvanized.

2.05 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

1. Preparation of Steel: In accordance with SSPC-SP 3, Power Tool Cleaning.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. When field welding is required, clean and strip primed steel items to bare metal.

B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.03 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

F. Obtain approval prior to site cutting or creating adjustments not scheduled.

G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 055213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall mounted handrails.

B. Stair railings and guardrails.

C. Mezzanine railings and guardrails.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 042200 - Concrete Unit Masonry: Placement of anchors in masonry.

C. Section 055100 - Metal Stairs: Attachment plates for handrails specified in this section.

D. Section 099113 - Exterior Painting: Paint finish.

E. Section 099123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2017a.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

C. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire 2012.

D. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube 2016.

E. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube 2010e1.

F. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tubes for General Purpose Applications 2020.

G. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings 2013, with Editorial Revision.

H. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings 2000 (Reapproved 2006).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. **Include the railing shop drawings on the same submittal as the Steel Stair Shop Drawings (Section 055100).**

C. Samples: Submit one, 12 inch long sample of each handrail specified in Aluminum. Submit one sample of elbow, wall bracket, escutcheon, and end stop for each system specified in Aluminum. For each finish product specified, provide two complete sets of actual material color samples representing manufacturer's full range of available colors and patterns.

1.05 QUALITY ASSURANCE

A. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

D. Allow for expansion and contraction of members and building movement without damage to connections or members.

E. Dimensions: See drawings for configurations and heights.

1. Top Rails: 2 inches by 3 inches rectangular.

2. Posts: 2 inches square.

3. Balusters: 1/2 inch square solid bar for Steel Systems.

F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are

unavoidable provide flush countersunk fasteners.

1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.

2. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.

3. Wall Brackets: The Wagner Companies; Product "Style D Handrail Bracket, No. RB14025": www.wagnercompanies.com.

    a. Substitutions: See Section 016000 - Product Requirements.

G. Form changes in direction of railings by bending.

H. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

I. Provide slip-on non-weld mechanical fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 ALUMINUM MATERIALS

A. Aluminum Pipe: Schedule 40; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M. 1 1/2" Schedule 40 formed from extruded 6063-T6 aluminum, except where there are formed elbows where 6063-T4 is required.

1. Finish: Anodized Aluminum. Anodized color to be selected from Manufacturer's full range.

B. Aluminum Horizontal Pipe Picket Railing Series 550: Schedule 40; ASTM B429/B429M, ASTM B241/B241M or ASTM B483/B483M. 1-1/2 inch Schedule 40 pipe with 1.9 inch outside diameter run between posts and utilizes concealed fasteners. Pickets are 3/4 inch round pipe spaced at 4.5 inch on center, or as defined on the Project Drawings, and run between the top and bottom rail utilizing concealed fasteners. Neither horizontal or vertical components shall be fastened via welding. All top rail shall be continuous through the full length of the system.

C. Color/Finish: Contractor shall provide samples for all of the below and upon selection by Architect, provide one of the following from the Manufacturer's Standard Color/Finish Lines:

1. Duranodic Architectural Hard Coat Anodized Finish, AA-M12C22A42 from full range of Standard Colors.

D. Straight Splice Connectors: Concealed spigot; machined aluminum.

E. Exposed Fasteners: No exposed bolts or screws. All hidden fasteners shall be aluminum or stainless steel.

F. Post Mounting: Base Mounting Option with concealed anchor base flange. Submit product to Architect for approval prior to ordering.

G. Manufacturers: Superior Aluminum Products, Inc. www.superioraluminum.com

1. Series 500/550 Non-Welded Aluminum Pipe Railing

H. Substitutions: See Section 016000 - Product Substitutions. Proposed Substitution shall offer an equal quantity and array of colors/fijnishes as the specified product as reviewed and decided upon by the Architect.

2.03 STEEL RAILING SYSTEM

A. Exposed Fasteners: No exposed bolts or screws.

B. Color: See Finish Schedule and Section 099000 - Painitng and Coating.

C. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

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

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Install railings in compliance with ADA Standards for accessible design at applicable locations.

D. Install wall brackets at spacing required to support structural loads, but not more than 48" o.c.

E. Anchor railings securely to structure.

F. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.05 CLEANING

A. Clean field welds, bolted connections, and abraded areas of shop paint. Paint per Finish Schedule and Section 099000 - Painitng and Coating.

3.06 PROTECTION

A. Protect railing finishes from damage during construction period with temporary protective coverings approved by railing manufacturer.

B. Remove coverings at time of Substantial Completion.

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END OF SECTION